Car Builders' Dictionary

1916 (Eighth) Edition

Definitions and Illustrations of American
Railway Cars, Their Parts and Equipment

Compiled and Edited
for the
Master Car Builders' Association

By ROY V. WRIGHT, Managing Editor of the *Railway Age Gazette* and Editor of the *Railway Mechanical Engineer*, and A. C. LOUDON, Associate Editor of the above publications, assisted by George Mitchell.

UNDER THE SUPERVISION OF THE FOLLOWING COMMITTEE

H. C. MANCHESTER, *Superintendent Motive Power and Equipment, Delaware, Lackawanna & Western*

WM. SCHLAFGE, *General Mechanical Superintendent, Erie Railroad*

G. W. WILDIN, *Mechanical Superintendent, New York, New Haven & Hartford*

Published by Simmons-Boardman Publishing Company

Woolworth Bldg.
New York, N. Y.

Transportation Bldg.
Chicago, Ill.

Sole Selling Agents

McGraw-Hill Book Company, Inc.

New York
239 West 39th Street

London
6 Bouverie Street, E. C.

Berlin
31 Under den Linden

Preface

In the seventh edition of the Car Builders' Dictionary, published in 1912, the definition section was given a thorough revision and the entire illustrated section of the book was reconstructed, very few of the illustrations which appeared in the previous edition being retained.

In this, the eighth edition, the definition section has again been thoroughly edited and the attempt has been made in the illustrated section to embody the latest features in the design and construction of railway cars and their accessories. Where any engravings have been retained from the 1912 edition they illustrate practices which are still in use.

The development of the steel car, both passenger and freight, has been brought thoroughly up to date and, wherever possible, practices which have seemed obsolete have been omitted. The definition section has been greatly enlarged by the addition of all the recent Master Car Builders' Association specifications; the Interchange Rules have been brought up to date, and the latest tank car and postal car specifications included.

The main part of the illustrated section of the dictionary includes practically the same number of pages as the 1912 edition, but the pages devoted to Master Car Builders' Association standards and recommended practices have necessarily increased in number because of the numerous additions made within the past three years.

New York, January, 1916.

To the Users of this Dictionary

It has been pointed out by the users of this work that if some way could be found to amplify the information given in the Illustrated Section respecting the various cars, devices, and other products, it would be extremely helpful.

The very nature of the book, covering as it does every known and available device helpful to car building and maintenance, makes an unusually large volume. It is, therefore, absolutely necessary to restrict the type matter to captions.

Many of the devices are, however, described in greater detail in the Catalogue and Advertising Sections which begin on page 977. The Catalogue Section, in particular, goes systematically into a serious attempt to give briefly the construction, utility, advantages, and savings to be derived from the use of certain articles.

The Alphabetical Index, giving the names of the companies so listed (page 1022); the Buyers' Classified Directory, giving the different products mentioned (page 1023); and the Trade Name Index, giving the name by which a product is usually distinguished (page 1029), will all be found of practical help by those who make full use of this work.

A DICTIONARY OF AMERICAN

RAILWAY CAR PRACTICE

A

"A" Car Roof. A car roof with straight carlines, meeting at a point like rafters in the center of the upper deck.

"A" Frame. A strut in the form of the sides of the letter A, to which the boom guys of a steam shovel are fastened.

"A" Frame Step. The supports of the bottom ends of the "A" FRAME of a steam shovel.

Accelerator. Fig. 2145. A special fitting used in connection with the hot water circulation heating system to quicken the circulation of hot water.

Accordion Hood. 124, Figs. 552-555. A term sometimes applied to the top transverse portion of a vestibule diaphragm.

Acetone. A colorless liquid, obtained from the destructive distillation of wood, which resembles alcohol and which has the property of absorbing acetylene gas under pressure in a high degree.

Acetylene Gas. A colorless gas, C_2H_2, produced when water is brought in contact with calcium carbide. It has a distinctive odor and burns with a bright, luminous flame. It is used in car lighting with success. It may be generated in the car, under the car, or carried in tanks filled with acetone and asbestos under pressure.

Acetylene Gas Lamps and Fixtures. Figs. 2372, etc.

Acetylene Gas Lighting Systems. Figs 2392-96. This system uses acetylene gas stored in tanks filled with asbestos and charged with 4/10 of a volume of acetone, a colorless liquid obtained from the dry distillation of wood which absorbs large quantities of acetylene under pressure. When the pressure is relieved the acetylene is given off and the acetone remains in the tank and may be used over again on recharging; 2,000 cubic feet of acetylene may be stored under a pressure of 150 lbs. in a tank 114 in. by 20 in. and may not be exploded by any known means when in the tanks filled with asbestos bricks. Such a supply is sufficient for more than one month's lighting of an ordinary car. The gas is generated in stations at terminals, and the tanks, when empty, are replaced by full tanks supplied from the charging stations or charged from yard lines. The lamps and piping for the car are similar to those used with the Pintsch gas system.

Figs. 2397-2420. In this system the gas is generated in the apparatus shown in Figs. 2401-03, which is enclosed in one end of a car. The carbide is contained in cartridges, pockets or baskets. The water flowing down and coming into contact with the carbide generates acetylene gas, which is stored in the receiving tank under the car as shown in Fig. 2410. The piping and arrangements through the car are similar to those of the Pintsch system. The form of the lamp is shown in Fig. 2408.

Figs. 2421-26. This system employs a gas generator mounted under the car. The carbide is put in a cartridge which is put in or removed from the generator as shown in Figs. 2425-2426.

Adjustable Foot Rest. A sliding foot rest, supported by various mechanical devices—as by a ratchet arc or on rabbet pieces. A foot rest or rail under a seat, which can be adjusted to suit the passenger using it. See FOOT REST.

Admission Valve. (Car Heating.) Used in connection with steam heat system.

Advertising Rack Rail. (Street Cars.) A strip of wood to which the frames for advertising cards are screwed or otherwise fastened.

Agasote. A substitute for wood; used extensively in place of wood for headlinings, side panels, floors and outside roofs. Its composition is secret, but it does not contain rosin or any acid compound injurious to paint or steel. Panels made from this material can be scraped, planed, molded or sawed on any woodworking machine and will not split under various changes of temperature and humidity. Used extensively for interior finish of steel cars, owing to its insulating and sound-deadening properties. The material used in steel cars is fire resisting.

Air Brake. Figs. 1345-1475. Any brake operated by air pressure, but usually restricted to systems of continuous brakes operated by compressed air, in distinction from VACUUM BRAKES, which see, which are operated by creating a vacuum. The air is compressed by some form of pump on the locomotive, or a motor compressor on electric cars, and is conveyed by pipes and flexible hose between the cars to cylinders and pistons under each car, by which the pressure is transmitted to the brake levers, and thence to the brake shoes. This system is what is now termed the straight-air brake. It is now obsolete in steam road practice, having been replaced by the AUTOMATIC AIR BRAKE. See also ELECTRO-PNEUMATIC BRAKE, TRACTION AIR BRAKE, VACUUM BRAKE, EMPTY and LOAD BRAKE EQUIPMENT, HIGH SPEED BRAKE, QUICK ACTION AUTOMATIC AIR BRAKE.

Air Brake. (General arrangement and details.) Figs. 1345-1475. (M. C. B. Standard.) Fig. 2845.

The general arrangement and details of brake gear for air-brake cars, as shown, are standard. The following standards have also been adopted in this connection:

1. Maximum train-pipe pressure, 70 pounds per square inch.

2. Maximum brake power on freight cars, 70 per cent of the light weight of car.

3. All levers 1 inch in thickness; all pins to be 1 3-32 inches in diameter; all jaws or clevises made of ¾-inch by 2½-inch iron; all rods ¾-inch diameter.

4. Angle of brake beam lever, 40 degrees with vertical.

The revision made in 1896 consisted in the omission

of such detail dimensions as could not be used in all cases, such as the length and proportions of main levers, and the omission of some of the smaller parts from the drawing, such as the pipe clamps, staples, etc. The dimensions of the cross-section of the malleable iron truck lever connection were increased, and the letters W. I. M. I., C. I., etc., indicating the material of which the parts were to be made, were omitted from the drawing.

In 1898 the following changes were made:

Diameter of truck lever connection for outside hung brakes changed from ¾ inch to ⅞ inch, and a note to this effect was added under title on the drawing.

Diameter of hole for cotter in air-brake pin was first indicated as 7/16 inch.

Addition was made to note under drawing of truck lever connection for inside hung brakes, as follows: "If made of round iron or steel, must not be less than 1⅝ inches diameter."

Dummy coupling was omitted from drawing and air hose was shown as hanging down.

The words "33 inches or" were omitted from height shown for air-brake pipe above rail.

Diameter of release-valve rod was changed from ¼ to ⅜ inch.

In 1900 a standard brake pipe nipple, 10 inches long, was ordered shown located directly back of the angle cock.

In 1904 the location of the main air pipe and angle cock was changed from Recommended Practice to Standard.

In 1911 the following specifications were adopted:

Brake chain shall be of not less than ⅜-inch, preferably 7/16-inch, wrought iron or steel, with a link on the brake-rod end of not less than 7/16-inch, preferably ½-inch wrought iron or steel, and shall be secured to brake-shaft drum by not less than ½-inch hexagon or square head bolt. Nut on said bolt shall be secured by riveting end of bolt over nut.

In 1908 the diameter of the holes in the different levers, guides, brackets and connections were omitted, and a note added to drawing reading as follows: "All holes for brake pins not less than 1 3/32 inches diameter nor more than 1⅛ inches diameter."

In 1909, in order to suit the different types of air-brake equipment and particularly to provide for the 10-inch brake cylinder, a note was added to the drawing, as follows:

For brake cylinders larger than 8 inches or for brake-cylinder pressures above 50 pounds per square inch, the size of brake rods and levers should be increased, if neecssary, so that the fiber stress shall not exceed 15,000 pounds per square inch for rods and 23,000 pounds per square inch for levers.

In 1909 the use of malleable-iron construction was discontinued, and provision made that the truck connections be made of round iron or steel not less than 1⅝ inches diameter.

In 1911 the use of cast steel for truck-lever connections was permitted.

In 1911 a standard bottom rod for use with all-steel or steel-tired wheels with inside hung brakes was adopted as shown on the drawing.

In 1912 the drawing was revised to show an additional lever, in order that the hand brake and air brake will work in harmony on double hand-brake cars.

Air Brake (General Arrangement and Details) (M. C. B. Recommended Practice).

In 1913 the braking power for freight equipment at 60 per cent of the light weight of the car, based on 50 pounds per square inch cylinder pressure, was adopted as Recommended Practice.

Air Brake and Train Air Signal Instructions. (M. C. B. Recommended Practice.)

In 1898 the Air Brake and Signal Instructions which had been in use since 1892 were slightly revised and adopted as a Recommended Practice of the Association. Revised in 1904. These instructions were also approved by the American Railway Master Mechanics' Association as originally adopted in 1892 and as revised in 1898 and 1904. For instructions in detail, also see separate pamphlet.

In 1911 Rule 121 was modified and some slight changes made in text and illustrations and the rules ordered printed in the Proceedings.

In 1914 the Air Brake and Train Air Signal Instructions were revised.

In 1914 the general questions regarding the use of the air brake and train air signal instructions were omitted in accordance with the result of letter ballot.

A—GENERAL INSTRUCTIONS.

1. The following rules and instructions are issued for the government of all employees of this railroad whose duties bring them in contact with the maintenance and operation of the air brake and train air signal apparatus. They must be obeyed in all respects, as employees will be held strictly responsible for the observance of same.

Every employee whose duties are connected in any way with the maintenance and operation of the air brake will be examined from time to time as to his qualifications for such duties by the Inspector of Air Brakes or other person appointed by the proper authority, and a record will be kept of such examination.

Any employee whose work indicates an apparent lack of the requisite brake knowledge will be required to pass an examination at any time following such indications.

B—INSTRUCTIONS TO ENGINEMEN.

2. Enginemen when taking charge of locomotives must see that the air brake and train air signal apparatus on engine and tender is in good working order and that the air compressor and lubricator work properly; that the devices used for regulating all pressures are adjusted at the authorized amount; that brake valves work properly in all positions of the handle, and that, when brakes are fully applied, with cam type of driver brake, the pistons do not travel less than 2, nor more than 3½ in., and with other forms of driver brakes from 4 to 6 in.; that the engine truck and trailer brake piston travel be not less than 4, nor more than 6 in.; that the tender brake piston does not travel less than 6 nor more than 8 in.

Enginemen must report to roundhouse foremen, in writing, at the end of the run, any defects in the air brake or train air signal apparatus.

3. *Making Up Trains. Testing Brakes at Terminal Points and Before Starting Down Such Grades As May Be Designated By Special Instructions.*—The brake pipe on the engine and under the tender must always be blown out and maximum pressure obtained in main reservoir before coupling engine to train.

After the train has been coupled, stretched and fully charged, the engineman shall, at the request of the inspector or trainmen, apply the brakes with full

service application and leave them so applied until all brakes operated from the engine have been inspected and the signal given to release. The engineman must then release the brakes and he must not leave the station until it has been ascertained that all brakes are released and he has been informed by the inspector, or the trainmen, of the number of brakes in service and of their condition. If any defect is discovered during this test same must be corrected and the brakes again tested, and the operation repeated until the brakes are known to be in good condition.

In testing passenger train brakes, signal for releasing must be given from the air signal discharge valve on rear car.

Following the separation of couplings for local switching, or when engine is parted from train, or train has been parted for any purpose, the above test need not be complied with further than to ascertain, by test, that the rear brakes are responsive to brake valve on engine and that all brakes have properly released. However, when cars are added to train, the brakes on such cars must be inspected as in terminal test. When a back-up hose is to be used to control the train, the brakes must be applied for test with the back-up hose, and released from the brake valve on the engine.

4. *Service Application—Passenger Trains.*—In making service stops from high speed, two applications should be used. The first application should be derived from two or more brake-pipe reductions, and when the speed has reduced to about fifteen miles per hour, release all brakes, and complete the stop with a moderate service application.

In making service stops with trains of less than seven cars, the brakes should be released about the time the drivers make the last revolution, except on heavy grades. Even on moderate grades and when stopping at water stations, coaling chutes, short platforms, etc., this should be done, and after releasing re-apply the brakes, either automatic or independent, as required, to prevent the train from starting. To avoid shocks and train parting the brakes must not be released on trains of seven or more cars while moving at a speed of less than ten miles per hour.

If *undesired quick action* has taken place during a service application on trains of more than five cars, the brakes must not be released until the train comes to a stop.

5. *Service Application—Freight Trains.*—In applying the brakes to steady the train on descending grades, or for reducing speed for any purpose, an initial brake-pipe reduction of not less than 7 lb. must be made. Releasing brakes at low speeds must not be attempted unless local conditions are favorable for same.

Ample time should always be allowed for making the stop, first permitting the slack of train to become adjusted before commencing to use the brake. After this the first brake-pipe reduction should be made and it should be sufficiently heavy to make the stop, being not less than 7 or more than 12 lb., according to the length of the train. Then when not more than a car length (40 ft.) short of the completion of the stop, a second reduction sufficiently heavy should be made to cause the brake valve to be blowing when stop is completed. After a reduction to apply brakes, no attempt must be made to release, until air ceases to discharge from the brake-valve pipe exhaust.

When backing freight trains and it is desired to stop, apply the brake in service, and when conditions permit, keep the engine brake from applying and the throttle open until stop is complete, the idea of keeping the engine brake released and using steam while train brake is applying being to keep the slack of train bunched and thus prevent train parting.

6. *Emergency Applications.*—The emergency application of the brakes must be used only in actual emergencies. Under such conditions the brake valve handle must be left in emergency position until train has come to a stop.

ENGINEMEN'S STRAIGHT AIR OR INDEPENDENT BRAKE VALVES.

(A) Always keep both brakes cut in and ready for operation, unless failure of some part requires cutting out.

(B) Always carry an excess pressure of 20 lb., or more, in the main reservoir, as this is necessary to insure a uniformly satisfactory operation.

(C) The straight air or the independent brake valve should not be used for bunching the slack of the train previous to an automatic application; neither should it be used alone for making ordinary stops with a train.

(D) The reducing valves for the straight air and the independent brake and the safety valves for the locomotive brakes should be kept adjusted at the authorized pressures.

When a full application of the straight air or of the independent brake causes any of the safety valves to operate, it indicates that same is out of order, or too high adjustment of the reducing valve or too low adjustment of the safety valve, or leakage of same. Have the reducing and safety valves tested and adjusted.

7. *Brakes Applied from an Unknown Cause.*—If it is found that the train is dragging as though the brakes were applied without rapid falling of the pointer on the brake pipe air gage, the engineman must make an effort to release the brakes, which may be done as follows: First, if brake-pipe pressure is less than authorized amount and the required excess pressure is carried in the main reservoir, move the handle of the brake valve to release position for an instant and then return it to running position; second, should the brake pipe be fully charged, apply the brakes with a heavy service reduction, and release them in the usual way. In case the brakes can not be released in this manner, the train must be stopped and the trainmen notified.

If, however, the brakes go on suddenly with a rapid fall of brake-pipe pressure, it is evidence that (A) a conductor's valve has been opened; (B) a hose has burst or other serious leak has occurred, or (C) the train has parted. In such an event the engine throttle should be closed and the brake-valve handle immediately placed on lap or in emergency position, to prevent the escape of air from the main reservoir, and left there until the train has stopped and the signal to release has been given.

8. *Braking By Hand.*—Hand brakes must not be used, except in emergency.

9. *Cutting Out Brakes.—The engine and tender brakes must always be used automatically at every application of the train brake,* unless defective, except upon such grades as shall be designated by special instructions.

When necessary to cut out either the engine or the tender brake, it shall be done by closing the cut-

out cock, located between the brake pipe and triple valve, and opening the drain cock in the auxiliary reservoir, on locomotives so equipped. On locomotives having the ET or the LT equipment close the cut-out cock in the pipe leading to the respective brake cylinder.

10. *Double Headers.*—When two or more engines are coupled in the same train, the brakes must be connected through to and operated from the leading engine. Engineman of each engine, except the leading one, must close the double-heading cock below the automatic brake valve and carry the handle of brake valve in running position. He will run the compressor for the purpose of maintaining pressure on his engine, and of enabling him to assume charge of the train brakes should occasion require.

11. *Dead Engine Feature.*—Its purpose is to supply air to the main reservoir for operating brakes and other devices on engines where pump has failed, or on dead engines en route. In both cases the cut-out cock in this device must be kept open and handle of both brake valves on such engines left in running position, and the double heading cock below automatic brake valve kept closed.

The dead engine cut-out cock must be kept closed on all engines whose compressors are running.

C—INSTRUCTIONS TO TRAINMEN.

12. *Making Up Trains and Testing Air Brakes.*—After the locomotive has been coupled to the train, or after two or more sections have been coupled together, the brake and signal couplings must be united, the cocks in the brake and signal pipes must all be open, except those at the rear end of the last car, which must be closed, and the rear hose hung up in the dummy couplings, when cars are so equipped.

After the train has been coupled, stretched and fully charged, the engineman must be requested to apply the brakes. When he has done so, the brakes of each car must be examined to see if they are properly applied. When it has been ascertained that each brake has so applied, the engineman should be signalled to release.

In testing passenger-train brakes the train air signal whistle code for releasing must be used, and the signals to release must be given from the air signal apparatus on the rear car. The brakes of each car must then be examined to see that each is released, and the engineman informed as to the number of brakes in service and of their condition.

If any defect is discovered it must be remedied and the brakes tested again—the operation being repeated until it is ascertained that everything is right. The conductor and engineman must then be notified that the brakes are all right. Following the separation of couplings for local switching or when engine or train has been parted for any purpose, the above test need not be complied with other than to ascertain, by test, that the rear brakes are responsive to brake valve on engine, and that all brakes have properly released.

No passenger train must be started out from its terminal with the brakes upon any car cut out or in a defective condition. The air brakes must be relied upon to control all trains.

13. *Detaching Locomotive or Cars.*—First close the cocks in the brake and signal pipes at the point of separation, and then part the couplings by hand.

Couplings Frozen.—If the couplings are found to be frozen together or covered with ice, the ice must first be removed and then the couplings thawed to prevent injury to the gaskets.

14. *Brakes Sticking.*—If brakes are found sticking and can not be released from the engine, or if the brakes are applied to detached cars, the release may be effected by opening the release valve in the auxiliary reservoir until the air begins to release through the triple valve, when the valve must be closed.

15. *Train Braking in Two or More Parts.*—First close the cock in the brake pipe at the rear of the first section, and then signal the engineman to release the brakes. Having coupled to the second section, observe the rules for making up trains—first being sure that the cock in the brake pipe at the rear of second section has been closed, if the train has broken in more than two sections. When the engineman has released the brakes on the second section, the same method must be employed with reference to the third section, and so on. When the train has been once more entirely united the brakes must be inspected on each car to see that all are released before proceeding.

16. *Cutting Out the Brakes on a Car.*—When necessary to cut out the brake upon any car, close the cut-out cock in the cross-over pipe near the triple valve, and open the drain cock in the auxiliary reservoir, leaving it open on passenger cars.

On freight cars the release valve must be held open until all of the air has escaped from the reservoir, when an air-brake defect card must be applied. The conductor must notify the engineman of brake cut-out.

17. *Conductor's Valve.*—Should it become necessary to apply the brakes from the train, it may be done by opening the conductor's valve in any car so equipped. *The valve must be held open until the train comes to a stop, and then must be closed.*

This method of stopping the train must not be used except in case of emergency.

18. *Burst Hose.*—In the event of the bursting of a brake hose, it must be replaced and the brakes tested before proceeding, so as to ascertain that the rear brakes are responsive to the brake valve on engine. At least one extra air-brake hose complete should be carried by all crews, and in addition one extra signal hose complete carried by passenger crews.

19. *Brakes Not in Use.*—When the air brakes are not in use, hose should be kept coupled between the cars or hung to the dummy couplings when cars are so equipped.

20. *Pressure Retaining Valve.*—When this valve is to be used, the trainmen must, at the top of the grade, at the point authorized, test the brakes upon the whole train, and must then pass over the train and turn the handles of the pressure retaining valves upon all or upon a part of the cars, as may be directed, to proper position for retaining pressure. At the foot of the grade, the handles must be turned downward (lengthwise with pipe) again. Special instructions will be issued as to the grades upon which these valves are to be used.

21. *Train Air Signal.*—In making up trains, all couplings and car discharge valves on the cars must be examined to see if they are tight. Should the car discharge valve upon any car be found defective, it may be cut out by closing the cock in the branch pipe leading to it. The conductor must be notified when the signal has been cut out upon any car, and he must report the same for repairs.

In using the signal, pull down upon the cord during

one full second for each intended blast of the signal whistle, and allow three seconds to elapse between the pulls.

22. *Reporting Defects to Inspectors.*—Any defect in either the air brake or the train air signal apparatus must be reported to the inspector on arrival at terminal; or, if the defect be a serious one in passenger service, it must be reported to the nearest inspector, and such defect must be remedied before the car proceeds.

D—INSTRUCTIONS TO ENGINEHOUSE FOREMEN.

23. *General.*—It is the duty of the enginehouse foreman to know that the air brake and train air signal equipment is properly inspected upon each locomotive after each run, and that necessary repairs are made before leaving the engine house. Air gages must be tested at least once every thirty days, and date of testing shown.

24. *Air Compressors.*—The air compressors must be tested for efficiency by orifice test, and their condition determined.

Compressors must be started slowly with drain cocks open, these cocks to be left open until compressor is free from all condensation. They must also be left open while compressor is not working.

25. *Compressor Governor.*—The compressor governor should cut off the steam supply when the air pressure for which it is adjusted has been obtained, and promptly admit steam to the compressor when air pressure falls slightly below the authorized amount.

26. *Brake Valves.*—These valves must be kept clean and be known to be in working order in all positions of the handle before the engine leaves the engine house.

27. *Adjustment of Brakes.*—Engine brake piston travel should not be less than 4 nor more than 6 in.; for tender brake not less than 6 nor more than 8 in. When cam driver brake is in use piston travel should be not less than 2, nor more than 3½ in., and care must be taken to adjust both cams alike, so that the point of contact of the cams will be in line with the piston rod; the brake shoes should be correctly adjusted at equal distances from the wheel at the top and bottom of the shoe and in line with the tires.

28. *Brake Cylinders and Triple Valves.*—Engine and tender brake cylinders, plain triple valves and high-speed reducing valves should be cleaned, lubricated and tested, at least once in six months; when locomotive is equipped with distributing valve or control valve, or the tender has a quick action triple valve, these parts should be cleaned and tested at least once in three months. Time and place of cleaning to be stenciled according to standard drawings.

29. *Draining.*—The main reservoir, and also the drain cup and dirt collector in the brake pipe under the tender, must be drained of any accumulation after each trip. The auxiliary reservoirs and triple valves must also be drained frequently, and daily in cold weather, and the brake pipe under the engine and tender blown out.

30. *Train Air Signal.*—The train air signal apparatus must be examined and tested, both at front of engine and rear of tender, before every trip by means of a suitable appliance to which is attached an air gage for testing the pressure carried. It must be known that the whistle responds properly, also that the pressure-reducing valve maintains the authorized pressure.

E—INSTRUCTIONS TO INSPECTORS.

31. *General.*—It is the duty of all inspectors to see that the couplings, the pipe joints, the triple valves, the high-speed reducing valves, the conductor's valves, the air-signal valves, and all other parts of the brake and signal apparatus are in good order, of standard size for the car, and free from leaks. For this reason they must be tested under the full air pressure as used in service. No passenger train must be allowed to leave a terminal station with the brake upon any car cut out, or in a defective condition.

If a defect is discovered in the brake apparatus of a freight car, which can not be held long enough to give time to correct such defect, the brake must be cut out and the car properly carded, to call the attention of the next inspector to the repairs required.

Special rules will specify the smallest proportion of the total number of freight cars, with the air brakes in good condition, which may be used in operating the train as an air-brake train.

32. *Making Up Trains and Testing Brakes.*—In making up trains, the couplings must be united and the cocks at the ends of the cars all opened, except at the rear end of the last car, where the cocks must be closed; the inspector must know that the air is passing through the pipes to the rear end, and the hose couplings at the rear are properly attached to the dummy couplings on cars so equipped.

After the train is stretched and fully charged, the engineman must be requested to apply the brakes. After the brakes are applied they must be examined upon each car to see that they have the proper piston travel. This having been ascertained, the inspector must signal the engineman to release the brakes.

In testing passenger train brakes, the signal to release must be given from the discharge valve on the rear car. He must then again examine the brakes upon each car to note that all have released. If any defect is discovered, it must be corrected and the testing of the brakes repeated, until they are found to work properly. The inspector must then inform both the engineman and conductor of the number of cars with brakes in good order.

The examination must be repeated if any change is made in the makeup of the train before starting.

33. *Cleaning Cylinders, Triple Valves and Slack Adjusters.*—The brake cylinders and triple valves on freight equipment cars must be cleaned, lubricated and tested, at least once in twelve months, and the method of marking brake apparatus which has been cleaned, lubricated and tested, should be as shown in Rule No. 60, of M. C. B. Rules of Interchange.

On passenger cars, the cylinders, triple valves and slack adjusters must be cleaned and lubricated at least once in six months, and in case cars are equipped with high-speed brakes, the triple, high-speed valves and control valves must be cleaned at least once every three months, and date and place of last cleaning stenciled on these parts with white paint.

The triple valves and auxiliary reservoirs must be frequently drained, especially in cold weather, by removing the plug in the bottom of the triple valve and opening drain cock in bottom of reservoir.

34. *Adjustment of Brakes.*—The slack of the brake shoes must be taken up by means of the truck dead levers on cars having four-wheeled truck and at the turnbuckle nearest the center of the car on cars having six-wheeled trucks. In taking up such slack it must first be ascertained that the hand brakes are

released, and the slack is all taken out of the upper connections, so that the truck levers do not go within one inch of the truck timber or other stop, when the piston of the brake cylinder is fully back at release position.

When under a full application the brake piston travel is found to exceed 9 in. upon passenger or freight cars, the brake shoe slack must be taken up and adjustment so made that the piston shall travel not less than 6 in. In taking up the brake shoe slack it must never be taken up by the hand brakes.

Where automatic slack adjusters are applied to a car, such adjuster must be fully released before the slack is taken up elsewhere, and where cars are equipped with P. C. control apparatus it must be seen that both slack adjusters are evenly adjusted.

35. *Braking Force.*—Where the cylinder lever has more than one hole at the outer end and different holes are for use upon cars of different weights, it must be carefully ascertained that the rods are connected to the proper holes, so that the correct braking force shall be exerted upon each car.

36. *Repair Parts.*—Inspectors must keep constantly on hand for repairs supply of all parts of the brake and signal equipment that are likely to get out of order.

37. *Hanging Up Hose.*—Inspectors must see that, when cars are being switched or while standing in the yard, the hose is coupled between the cars or properly secured in the dummy couplings, where cars are so equipped.

38. *Responsibility of Inspectors.*—Inspectors will be held strictly responsible for the good condition of all the brake and signal apparatus upon cars placed in trains at their stations; they will also make examinations of the brakes, and make such repairs as may be required.

Air Brake and Train Air Signal Hose Specifications (M. C. B. Standard).

In 1901 specifications and tests for air brake hose were adopted as Recommended Practice. Advanced to Standard in 1903. Revised 1905. Revised 1913.

In 1911 detailed specifications of label were placed under the heading "Label for Air-Brake Hose." Modified and changed as to form in 1914. Modified in 1915.

I. MANUFACTURE.

1. *Scope.*—These specifications supersede all previous specifications for air brake and signal hose, including that for "woven and combination woven and wrapped air brake hose." Air brake hose of the woven and combination woven and wrapped type shall meet all tests of these specifications except that of friction, Section 4, on those constructions where friction can not be made.

2. All hose shall be soft and pliable and not less than four-ply. They shall be made of rubber and cotton fabric, each the best of its kind for the purpose.

II. PHYSICAL PROPERTIES AND TESTS.

3. Hose shall be subjected to the following tests, which must be made at a room temperature of not less than 65 deg. F.

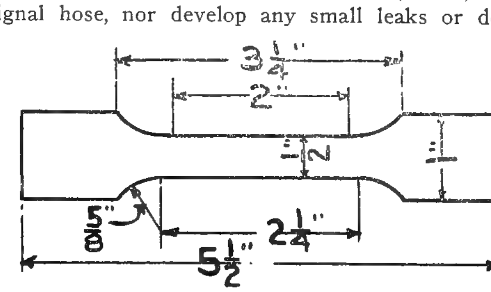
4. *Friction Test.*—The quality of friction shall be determined by suspending a 20-lb. weight from the separated end of the duck of one of the 1-in. test specimens described in Section 9, the force being applied radially. The separation shall be uniform and regular, and the average speed shall not exceed 8 in. in 10 min., the distance being measured while the weight is still in place.

5. *Stretching Test.*—Test specimens from tube and cover will be quickly stretched until the 2-in. marks are 10 in. apart and immediately released. They will then be re-marked as at first within 10 sec. after starting to release and again stretched to 10 in. between the new marks, remaining so stretched for 10 min. The specimens shall then be completely released, and within 30 sec. after starting to release the distance between the marks last applied will be measured, and the initial set must not be more than ¼ in. At the end of 10 min. the distance between the marks will again be measured, and the final set must not be more than ⅛ in. These test specimens may be cut from the tube and cover of the friction-test specimen, but shall not be used for tensile test.

6. *Tensile Strength.*—Test specimens from tube and cover shall be pulled in a tensile machine with a test speed of 20 in. per minute. The inner tube must have a tensile strength of not less than 800 lb. or more than 1200 lb. per sq. in., and the cover not less than 700 lb. or more than 1100 lb. per sq. in. The elongation shall be such that the marks, originally 2 in. apart, stretch to at least 10 in. before specimen breaks. If the tensile strength in lb. per sq. in. is greater than that required, the sample may be accepted, providing the per cent increase in elongation is equal to or greater than the per cent increase in tensile strength in lb. per sq. in. above the maximum figure.

7. *Porosity Test.*—The remaining 17 in. shall be mounted and placed in a test rack, the circumference will be measured and the hose filled with air at 140 lb. pressure per sq. in., the rubber cover shall be cut from clamp to clamp (taking care not to injure the duck) and this pressure maintained for 5 min. At the end of this time the hose will be submerged in water to determine whether the inner tube is porous. The escape of air through the tube shall be distinct enough so that the porosity will not be confused with the escape of air which is confined in the structure of the hose. In the event the hose fails on bursting test at the point at which cut was made for porosity test and a satisfactory hydraulic test is not obtained, the porosity and hydraulic test will be repeated on another piece.

8. *Bursting Test.*—The section of hose, which was used for porosity test, shall then be subjected to a hydraulic pressure of 200 lb. per sq. in., under which pressure it shall not expand in circumference more than ¾ in. for air-brake hose and 11/16 in, or air-signal hose, nor develop any small leaks or defects.



TEST SPECIMEN.

After the above test, this section shall then stand a hydraulic pressure of 500 lb. per sq. in. for 10 min., without bursting or developing any small leaks or defects, after which the hydraulic pressure shall be increased to a minimum of 700 lb. per sq. in. without bursting, at the rate of not less than 100 or more than 200 lb. per 5 sec.

9. *Test Specimen.*—(a) A hose shall be selected at random and a section 5 in. cut from one end. Two sections, each 1 in. long, shall be cut from the 5-in. section for making friction, stretching and tensile tests, the remaining 3-in. section shall be used for making additional tests, which may be desired on the tube and cover. Stretching and tensile test specimens shall be

cut from the tube and cover with a die having the dimensions shown.

(b) In measuring the thickness of the test specimen shown in Fig. 1 to determine the strength per square inch, a micrometer graduated to 0.001 in. having a shoe 0.24 to 0.26 in. diameter, exerting a pressure of from 8 to 10 oz. on the test specimen, shall be used.

10. *Number of Tests.*—For each lot of 200 pieces of hose one extra hose shall be furnished free of cost for test purposes.

III. PERMISSIBLE VARIATIONS.

	Length, In.	Outside Diameter, In.	Inside Diameter, In.	Thickness of Cap Vulcanized on, In.
AIR-BRAKE HOSE.				
Maximum........	22½	2⅛	1 7/16	3/32
Minimum........	22	2 1/16	1⅜	1/32
AIR-SIGNAL HOSE.				
Maximum........	22½	1⅞	1 3/16	3/32
Minimum.........	22	1 13/16	1⅛	1/32

IV. WORKMANSHIP AND FINISH.

11. *Workmanship.*—*(a) Tube.*—The tube shall be made either by hand or machine. It shall be free from holes and imperfections, and in joining must be so firmly united to the cotton fabric that it will meet the friction tests prescribed in Section 3. The tube shall be of such a composition and so cured as to successfully meet the requirements of tests given in Sections 4 and 5, the tubes to be not less than 3/32 in. thick.

(b) *Cover.*—The cover shall be of the same quality of rubber as the tube and shall not be less than 1/16 in. thick, and shall meet the requirements of tests given in Sections 4 and 5.

(c) *Duck.*—The canvas or duck used as a wrapping for the hose shall be made of long fiber cotton, loosely woven, and shall weigh not less than 22 oz. per lin. yd., 40 in. wide. The canvas or duck shall be frictioned with rubber on both sides and shall be applied on the bias and edges lapped at least ½ in. and not sewed.

12. *Finish.*—The hose shall be smooth and regular in size throughout its entire length.

V. MARKING.

13. *Serial Number.*—Each lot of 200 or less shall bear the manufacturer's serial number, commencing at 1 on the first of the year and continuing consecutively until the end of the year.

14. *Label.*—Each length of hose shall have vulcanized on it the label for airbrake hose of white or red rubber, as shown under the specifications for "Label for Air Brake Hose." This label shall be applied around the hose at a point 6 in. from the end (a variation of ⅛ in. either way will be permitted) and with the top of the lettering toward the center of the hose.

VI. INSPECTION AND REJECTION.

15. *Inspection.*—(a) The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection to be made at the expense of purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

16. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, or prior to being placed in service, develops weak spots or imperfections, or fails to pass any one of the tests herein required, within 60 days from date of shipment, will be rejected and shall be replaced by the manufacturer at his own expense.

17. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report to the manufacturer. In case of dissatisfaction with results of the tests, the manufacturer may make claim for a rehearing within that time.

Air Brake Appliances (M. C. B. Recommended Practice). Figs. 2910-2912.

In 1899 a Recommended Practice for the location of air-brake parts on different classes of cars was adopted, as follows:

1. Location of air-brake cylinders and triple valves on box cars and other clear bottom cars.

2. Location of air-brake cylinders and triple valves on hopper gondola cars and drop bottom gondola cars.

3. Arrangement of piping for clear bottom cars, or cars of the box car type.

4. Location of main air pipe at ends of cars.

5. As to the manner of fastening air-cylinder reservoirs, retaining valves, etc., to the framework of cars, the bolts fastening the cylinders and reservoirs should be either double-nutted or cottered, so as to prevent the same from working loose. The air pipes should be fastened to the framework of the car with a liberal number of clamps.

One elbow should be applied to the retaining valve pipe, it being located at the end sill of the car, where pipe turns upward.

One union should be applied as close to the triple valve as practicable to permit the easy removal of same, the pipe to be carried along under side of the intermediate sill when practicable, from the triple valve to end of car, and be supported by either staples or clamps, not to exceed six feet apart.

6. In 1902 the label for air-brake hose to show dates of application and removal, manufacturer's name and name of railroad company was advanced to a standard.

In 1904 the location of the main air pipe and angle cock was changed to standard.

Air Brake Appliances (M. C. B. Standard). Fig. 2845.

In 1913 10-inch air brake cylinders for freight cars weighing between 37,000 pounds and 58,000 pounds light weight were adopted as Recommended Practice.

In 1914 advanced to Standard and note made on drawing.

In 1913 the K^1 for 8-inch, and the K^2, for 10-inch equipment, were adopted as Recommended Practice.

In 1914 advanced to Standard and note made on drawing.

Air Brake, Cleaning and Testing (M. C. B. Standard).

In 1902 the following method for cleaning air brakes was adopted as Recommended Practice. Revised and advanced to Standard in 1911.

ANNUAL REPAIRS TO FREIGHT-CAR AIR BRAKES.

TRIPLE VALVE.

Inspection, Cleaning and Lubrication.

The triple valve should be removed from the car for cleaning in the shop, and should be replaced by a triple in good condition. It should be dismantaled and all the internal parts, except those with rubber seats and gaskets, cleaned with gasoline, then blown off with compressed air and wiped dry with a cloth.

The slide valve and graduating valve must be removed from the triple piston and retarded-release parts

from the body in order that the service ports in the slide valve and other parts may be properly cleaned

No hard metals should be used to remove gum or dirt or to loosen the piston-packing ring in its groove.

The feed groove should be cleaned with a piece of wood, pointed similar to a lead pencil. Rags or cloth should be used for cleaning purposes rather than waste, as waste invariably leaves lint on the parts on which is is used.

In removing the emergency-valve seat, care must be exercised not to bruise or distort it.

Particular attention should be given the triple-piston packing ring. It should have a neat fit in its groove in the piston, and also in the triple-piston bushing; once removed from the piston, or distorted in any manner, it should be scraped. The fit of the packing ring in its groove and bushing and the condition of the bushing should be such as to pass the prescribed tests.

The graduating stem should work in the guide nut. The graduating spring and the retarded-release spring in retarded-release triple valves must conform to standard dimensions and be free from corrosion. The thread portion of the graduating-stem guide should be coated with oil and graphite before reapplying it to the triple cap.

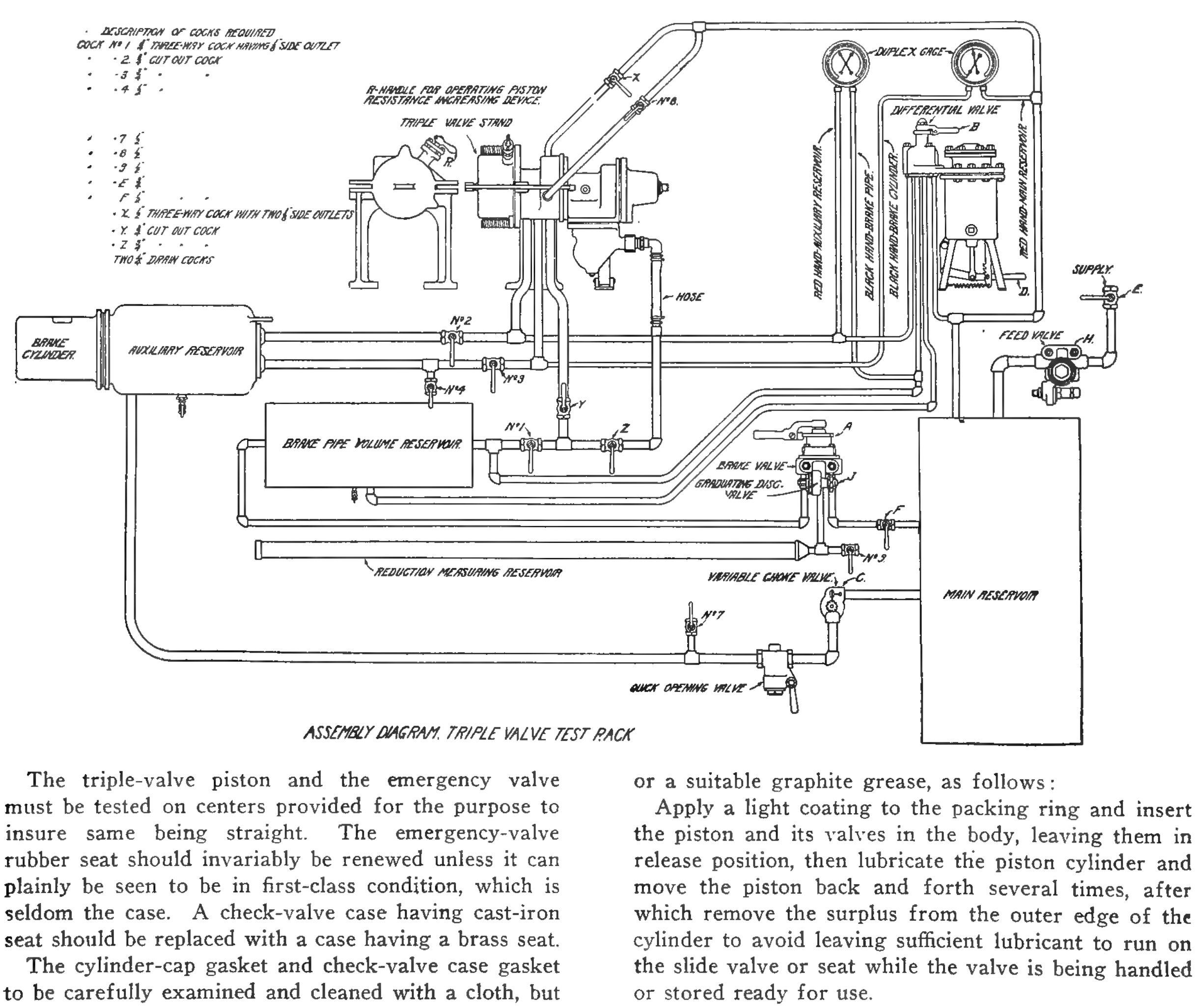
The tension of the side-valve spring should be regulated so that the contour of same is such as will bring the outer end ⅛ inch higher than the bore of the bushing when the outside end of the spring touches bushing when entering.

Before assembling the parts after cleaning, the castings and ports in the body of the triple valve should be thoroughly blown out with compressed air, and all parts of the triple, not elsewhere provided, known to be in good condition.

Lubricate the seat and face of the side valve and slide-valve graduating valve with high-grade very fine dry graphite, rubbing it onto the surface and the upper portion of the bushing where the slide-valve spring bears, so as to make as much as possible adhere to and fill up the pores of the brass, leaving a very thin coating of free graphite. The parts to be lubricated with graphite must be free from oil or grease.

Rub in the graphite with a flat-pointed stick, over the end of which a piece of chamois skin has been glued. At completion of the rubbing operation, a few light blows on the side valve will leave the desired light coating of loose graphite.

The triple-valve piston-packing ring and its cylinder should be lubricated with either a light anti-friction oil



ASSEMBLY DIAGRAM. TRIPLE VALVE TEST RACK

The triple-valve piston and the emergency valve must be tested on centers provided for the purpose to insure same being straight. The emergency-valve rubber seat should invariably be renewed unless it can plainly be seen to be in first-class condition, which is seldom the case. A check-valve case having cast-iron seat should be replaced with a case having a brass seat.

The cylinder-cap gasket and check-valve case gasket to be carefully examined and cleaned with a cloth, but should not be scraped. All hard or cracked gaskets to be replaced with new ones.

Standard gaskets as furnished by the air-brake manufacturers should be used. The use of home-made gaskets should be avoided, as the irregular thickness results in leakage and causes triple-piston stem to bend or break.

or a suitable graphite grease, as follows:

Apply a light coating to the packing ring and insert the piston and its valves in the body, leaving them in release position, then lubricate the piston cylinder and move the piston back and forth several times, after which remove the surplus from the outer edge of the cylinder to avoid leaving sufficient lubricant to run on the slide valve or seat while the valve is being handled or stored ready for use.

No lubrication to be applied to the emergency piston, emergency valve or check valve.

All triple valves, after being cleaned or repaired, must be tested, preferably on a rack conforming to the accompanying drawing, and pass the test prescribed under the subject of "Triple Valve Tests" before being placed in service.

Should any of the triple-valve bushings require renewing, such work should be done by the air-brake manufacturers.

Triples in which packing rings are to be renewed, slide valve or graduating valves renewed or faced, if the latter are of slide type, should be sent to a central point or general repair station for repairs.

When applying the triple valve to the auxiliary reservoir, the gasket should be placed on the triple valve, not the reservoir.

BRAKE CYLINDERS.

Cleaning, Lubricating and Inspecting.

First, secure the piston rod firmly to the cylinder head, then, after removing the non-pressure head, piston rod, piston head and release spring, scrape off all deposits of gum and dirt with a putty knife or its equivalent, and thoroughly clean the removed parts and the interior of the cylinder with waste saturated with kerosene.

Packing leathers must not be soaked in kerosene oil, as it destroys the oil filler placed in the leather by the manufacturers, opening the pores of the leather and causing them to become hard.

Particular attention to be paid to cleaning the leakage groove and the auxiliary tube. Triple valve must be removed when the auxiliary tube is being cleaned.

heads, and nuts on same to be drawn up tight before replacing the piston.

The inside of the cylinder and packing leather to be lightly coated with a suitable lubricant, using not more than 4 ounces nor less than 3 ounces per cylinder.

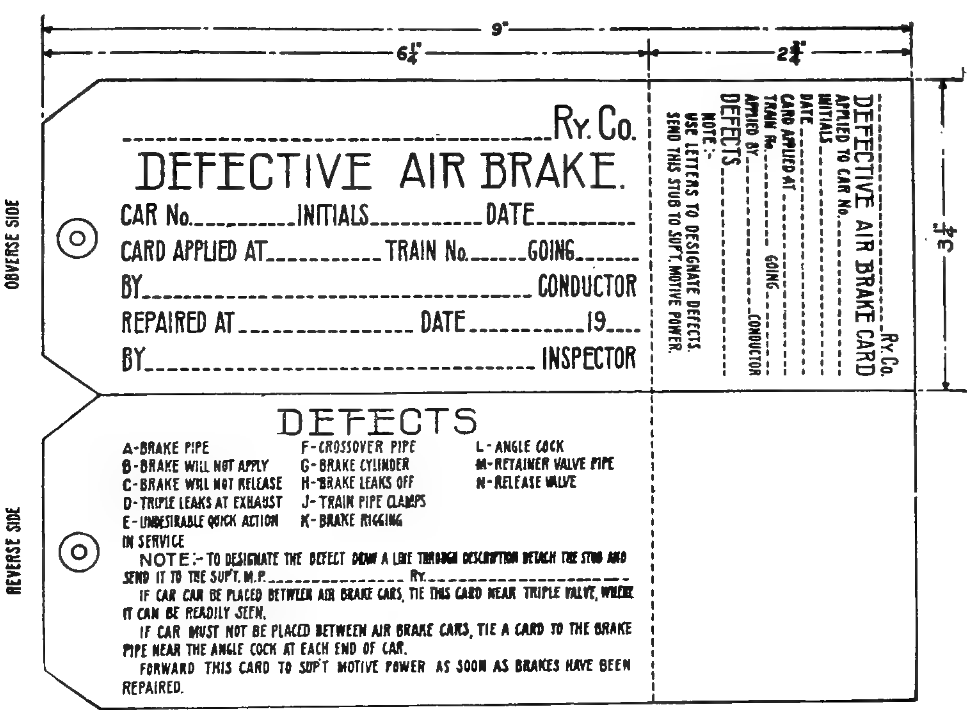
Part of the lubricant should be placed on the expander ring and the adjacent side of the packing leather, thus permitting the air pressure to force the lubricant into the leather at each application of the brake.

No sharp tools should be used in placing the packing leather in the cylinder.

After the piston is entered, and before the cylinder head is replaced, the piston rod should be slightly rotated in all directions, about 3 inches from the center line of the cylinder, in order to be certain that the expanding ring is not out of place.

In forcing the piston to its proper position in the cylinder, the packing leather will skim from the inner walls of the cylinder any surplus lubricant that may have been applied. It has been found good practice to again extract the piston and remove surplus lubricant.

All stencil marks to be scraped off or painted over with black paint. The place of cleaning, day, month and year, to be stenciled with white paint, preferably on both sides of the cylinder or auxiliary reservoir, or if same is not readily visible, in a convenient location near the handle of the release rod.


9"
6¼"
2¾"
3¼"

OBVERSE SIDE

________________Ry. Co.

DEFECTIVE AIR BRAKE.

CAR No.________INITIALS________DATE________

CARD APPLIED AT________TRAIN No.______GOING______

BY________________CONDUCTOR

REPAIRED AT________DATE________19____

BY________________INSPECTOR

DEFECTIVE AIR BRAKE CARD ________Ry. Co.

APPLIED TO CAR No.________

INITIALS________

DATE________

CARD APPLIED AT________

TRAIN No.________GOING________

APPLIED BY________CONDUCTOR

DEFECTS________

NOTE:-

USE LETTERS TO DESIGNATE DEFECTS.

SEND THIS STUB TO SUPT. MOTIVE POWER.

REVERSE SIDE

DEFECTS

A-BRAKE PIPE
B-BRAKE WILL NOT APPLY
C-BRAKE WILL NOT RELEASE
D-TRIPLE LEAKS AT EXHAUST
E-UNDESIRABLE QUICK ACTION IN SERVICE
F-CROSSOVER PIPE
G-BRAKE CYLINDER
H-BRAKE LEAKS OFF
J-TRAIN PIPE CLAMPS
K-BRAKE RIGGING
L-ANGLE COCK
M-RETAINER VALVE PIPE
N-RELEASE VALVE

NOTE:-TO DESIGNATE THE DEFECT DRAW A LINE THROUGH DESCRIPTION DETACH THE STUB AND SEND IT TO THE SUP'T. M.P.________Ry.________

IF CAR CAN BE PLACED BETWEEN AIR BRAKE CARS, TIE THIS CARD NEAR TRIPLE VALVE, WHERE IT CAN BE READILY SEEN.

IF CAR MUST NOT BE PLACED BETWEEN AIR BRAKE CARS, TIE A CARD TO THE BRAKE PIPE NEAR THE ANGLE COCK AT EACH END OF CAR.

FORWARD THIS CARD TO SUP'T MOTIVE POWER AS SOON AS BRAKES HAVE BEEN REPAIRED.

The expanding ring when applied in the packing leather should be a true circle and fit the entire circumference, and have an opening of from 3/16 to ¼ inch; when removed from the cylinder the ring opening should be 1½ to 1 9/16 inches, and with this opening, of course, will not be a true circle.

A packing leather which is worn more on one side than the other should be replaced with a new one of uniform thickness, or turned so as to bring the thin side away from the bottom of the cylinder. The piston should be turned each time the cylinder is cleaned. In putting a packing leather on piston, it should be so placed as to bring the flesh side of the leather next to the cylinder walls.

Follower studs to be firmly screwed into the piston

The bolts and nuts holding the cylinder and reservoir to their respective plates and the latter to the car, to be securely tightened.

The brake cylinder to be tested for leakage after cleaning, preferably with an air gage, which can be done by attaching the gage to the exhaust port of the triple valve before connecting the retainer pipe, or where the latest type retainers are used the gage can be connected to the exhaust port of the retaining valve. In either case, the gage will indicate cylinder leakage on releasing the triple valve after making an application, and when attached to the retainer valve it will also test the retainer and retaining-valve pipe.

Brake-cylinder leakage should not exceed five pounds per minute, from an initial pressure of 50 lbs.

Each time the triple valve and the brake cylinder are cleaned, the brake pipe, brake-pipe strainer and branch pipe should be thoroughly blown out and the triple-valve strainer cleaned before recoupling the branch pipe to the triple valve. If a dirt collector is used, the plug should be removed, the accumulation blown out and the threaded portion of the plug coated with oil and graphite before replacing.

All union gaskets should be made of oil-tanned leather. The use of rubber in unions should not be permitted.

Piston travel should be adjusted to not less than 5½ nor more than 7 inches.

ADDITIONAL INSPECTION AND REPAIRS TO CARS.

When the brake cylinder and triple valve are cleaned, the following additional work should be done to the car:

Retaining valve cleaned by removing the cap, wiping or blowing out all dirt and seeing that the valve and its seat are in good condition, the retaining position exhaust port open and that the valve proper is well secured to the car in a vertical position, pipe clamps applied where missing and tightened where loose, hose and angle cocks turned to their proper position. Pipe joints, air hose, release valves, angle and stop cocks should be tested by painting the parts with soapsuds while under an air pressure of not less than 70 pounds, preferably 80 pounds, and defective parts repaired or removed.

See that there are no broken or missing brake shoes, brake beams or foundation brake gear, and if the car belongs to a foreign road, a repair card should be made out covering all work that has been done and attached to the car, as per M. C. B. Rules.

The inspection and repairs which have been mentioned should be made to all cars at least once in twelve months.

TRIPLE-VALVE TESTS AND INSTRUCTIONS FOR OPERATING TRIPLE-VALVE TEST BACK.

Mounting Triple Valves for Testing.

With the triple-valve gasket applied to the face of the triple-valve flange, place the latter against the face of the stand in a vertical position and open cock "X," as shown on the piping diagram. Connect the brake pipe to the triple, then open cock "Z."

Before attaching triple valves suitable for use with 8-inch brake cylinders insert in the auxiliary reservoir end of the valve the friction-increaser extension piece, suitable for the valve under test.

Two triple-valve stand face plates are required for each test rack to permit the testing of all types of freight triple valves.

If it is found necessary to repeat any test which has necessitated a reduction of auxiliary reservoir pressure, valve "B" may be moved to position No. 2, which provides a by-pass around the triple valve from the brake pipe to the auxiliary reservoir, thereby permitting a quick recharge.

Test No. 1—Charging Test for Triple Valves.

Commencing the tests with cocks 2, 3, 7 and 9 open, all other numbered cocks closed, valve "B" in position No. 3 (lap), valve "A" in position No. 1, auxiliary reservoir empty and main reservoir pressure 80 pounds pressure, proceed as follows:

Close cock No. 7 and open No. 1, and with 80 pounds pressure in the brake pipe note the time required to charge the auxiliary reservoir to specified pressure, as given in the following table:

(NOTE.—If, during this test or Test No. 2 (Leakage Test), any considerable leakage is discovered, the charging test must be repeated.)

With brake-pipe pressure maintained at 80 pounds, the triple valves should charge the auxiliary reservoir as follows:

Charging Auxiliary Reservoir.

	From 0 to 30 Lbs. Seconds.		From 0 to 70 Lbs. Seconds.	
Westinghouse Triple Valve.	Min.	Max.	Min.	Max.
8-inch non-quick service.	21	28	58	78
10-inch non-quick service.	13	17	34	44
8-inch quick service.....	32	42	100	120
10-inch quick service.....	19	24	60	72

	From 0 to 30 Lbs. Seconds.		From 0 to 70 Lbs. Seconds.	
New York Triple Valve.	Min.	Max.	Min.	Max.
18-inch non-quick service.	..	..	61	82
80-inch non-quick service.	..	..	46	61
1-inch quick service.....	..	..	100	120
0-inch quick service.....	..	..	65	80

These tests give practically the same results, and the time of charging from 0 to 30 pounds is given simply to save time in making the test.

Test No. 2—Leakage Test.

Commencing each of the sections of Test No. 2 with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "B" in position No. 3 (lap), valve "A" in position No. 1 and auxiliary reservoir charged to 80 pounds, proceed as follows:

Sec. "A," Test No. 2—Westinghouse Triple Valves and New York Quick-service Triple Valves. Leakage at Exhaust in Emergency. Check Valve and Cylinder-cap Gasket Leakage.

Operate the triple valve two or three times in quick action by closing and opening cock No. 1; finally leaving it closed.

Coat the exhaust port of triple valve with soapsuds to ascertain if leakage exists past the slide valve or bushing to the exhaust with the piston and slide valve in emergency position.

Close cocks 2 and 3 and note the rate of fall of pressure indicated by the brake-cylinder gage hand, which is now connected only with the small volume between cocks 2 and 3 and the triple valve. A leakage greater than 5 pounds in 10 seconds indicates either excessive check-valve leakage or that the piston does not seal against the cylinder-cap gasket.

At the completion of this test, open cocks 2 and 3 in the order given.

*Sec. "B," Test No. 2—**Leakage at Exhaust in Release** Slide Valve of Emergency-valve Leaking.*

Open cock 1, and after the brake-cylinder pressure is exhausted close cock 3 and again coat the exhaust port with soapsuds to determine if there is any leakage from the auxiliary reservoir to the brake cylinder past the slide valve when the triple valve is in release position, or from the brake pipe to the brake cylinder past the emergency valve or its seat, when the differential on the emergency valve is high. Open cock 3, then paint the body of the triple valve with soapsuds to determine if leakage exists direct to the atmosphere through castings or gaskets.

If leakage is discovered at the triple exhaust in release position, determine if it is from the auxiliary reservoir or brake pipe in the following manner:

Move valve "A" to position No. 8 and open cock 7 until the brake pipe and auxiliary reservoir are empty; then with the valve "J" in position No. 3, place a soap bubble on the exhaust port and place valve "A" in posi-

tion No. 2. If no leakage is found at the exhaust, advance valve "J" by stages from position to position until a brake-pipe pressure of 10 pounds is obtained. Any leakage from the exhaust while the auxiliary reservoir is without pressure must be from the brake pipe, past the emergency valve. Therefore, if no exhaust leakage is found and leakage did exist while the auxiliary reservoir was charged, it indicates defective slide valve. At the completion of this test, close cock No. 7 and move valve "A" to position No. 1, recharging auxiliary reservoir.

Sec. "C," Test No. 2—Graduating-valve Leakage.

Move valve "A" to position No. 7 until a brake-cylinder pressure of from 20 to 30 pounds is obtained. Then return valve "A" to position No. 3 and close cock 3. If the brake-cylinder pressure then increases without leakage at the exhaust port, it is proper to assume that the graduating valve is leaking, providing it has been determined by the preceding tests that the emergency valve is tight. If leakage at the exhaust occurs during this test, which will be determined by placing a soap bubble on the exhaust, the leakage may be either from slide valve or graduating valve. The rate of rise of pressure on the brake-cylinder gage, resulting from graduating-valve leakage, must not exceed 5 pounds in 20 seconds. This comparatively rapid rate of rise is permissible owing to the extremely small volume of the section of brake-cylinder pipe into which the leakage is occurring.

At the completion of test, open cock 3 and move valve "A" to position No. 1.

Sec. "A," Test No. 2—Non-quick Service. New York Triple Valve Leakage at Exhaust in Emergency. Check-valve, Quick-action Valve and Cylinder-cap Gasket Leakage.

Operate the triple valve two or three times in quick action by closing and opening cock 1, finally leaving it closed.

Coat the exhaust port of triple valve with soapsuds to ascertain if leakage exists past the exhaust valve or bushing, with the piston and slide valve in emergency position. Close cocks 2 and 3. If the brake-cylinder gage now indicates leakage greater than 5 pounds in 10 seconds the leakage is excessive, and is usually due to imperfect seating of the check valve or quick-action valve, or to the main piston not making a tight joint on the main cylinder gasket. To locate the defect, place soap bubbles on the vent ports. No leakage at these points indicates that the leakage is past the main cylinder gasket. If leakage is found at the vent ports, open cocks 1, 2 and 3 and recharge the auxiliary reservoir to 80 pounds, then move valve "A" to position No. 7 until the brake-pipe pressure is reduced 10 pounds and return valve "A" to position No. 3. Close cock 2, and if the quick-action valve is leaking the brake will immediately release. If it does not, the leakage is past the check valve.

At the completion of this test, if no leakage is found, open cocks 1, 2 and 3, and if leakage is discovered open cock 2 and move valve "A" to position No. 1.

Sec. "B," Test No. 2—Exhaust-valve Leakage in Release; also Vent-valve and Quick-action Valve Leakage.

.Close cock 3 and coat the exhaust port with soapsuds to determine if there is any leakage from the auxiliary reservoir past the exhaust valve, or graduating valve or triples having this valve tandem with the exhaust valve, when the triple is in release position. If exhaust leakage is found, and the triple under test has tandem exhaust and graduating valves, determine which valve is leaking by making graduating-valve leakage test.

Sec. "C," Test No. 2—Graduating-valve Leakage.

Move valve "A" to position No. 7 until a brake-cylinder pressure of from 20 to 30 pounds is obtained. Then return valve "A" to position No. 3 and close cock 3. If the brake-cylinder pressure then increases without leakage at the exhaust port, it is proper to assume that the graduating valve is leaking. The rate of rise of pressure on the brake-cylinder gage, resulting from graduating-valve leakage, must not exceed 5 pounds in 20 seconds. This comparatively rapid rise is permissible owing to the extremely small volume of the section of brake-cylinder pipe into which the leakage is occurring.

If leakage at the exhaust occurs during this test, which will be determined by placing a soap bubble on the exhaust, the leakage is by the exhaust valve instead of the graduating valve.

At the completion of the test open cock 3 and move valve "A" to position No. 1.

Test No. 3—Test of Type "K" Triple Valves for Retarded-release Feature; for Both Westinghouse and New York Triple Valves.

Commencing the test with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, auxiliary reservoir changed to 80 pounds, valve "B" in position No. 3 (lap), lever "D" in position No. 2 and valve "A" in position No. 3 (lap), proceed as follows:

Move valve "A" to position No. 7 until brake-pipe pressure is reduced 20 pounds, then return it to position No. 3; place valve "J" in position No. 4; valve "B" in position No. 1 and valve "A" in position No. 2. This should move the triple-valve parts to normal (full release) position.

If the triple valve moves to retarded-release position, which is indicated by a contracted exhaust and slow release of brake-cylinder pressure, it indicates a weak or broken retarded-release spring, or undue friction in the retarding device.

Following this test, recharge the system to 80 pounds by moving valve "A" to position No. 1 and valve "B" to position No. 2.

When the brake pipe and auxiliary reservoir are charged to 80 pounds move valve "A" to position No. 7 until brake-pipe pressure is reduced 20 pounds, then return it to position No. 3. Place valve "J" in notch No. 8, lever "D" in notch No. 4, valve "B" in position No. 1 and valve "A" in position No. 2.

Under these conditons the triple-valve piston and slide valve should be forced to retarded-release position. If this does not occur it indicates that the retarded-release spring is not standard, or the retarding devices have excessive friction. Completing test, place valve "B" in position 3 and valve "A" in position 1.

Sec. "A," Test No. 4—Application Test for Both Westinghouse and New York Triple Valves.

If for any reason it is desired to make this test following an application and release produced by closing and opening cock 1, or the auxiliary reservoir has just been charged by opening cock 1, this test should be preceded by an application and release with valve "A," for the purpose of insuring the slide valve being in its normal position.

Commencing the test with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "A" in position No. 1 valve "B" in position No. 2 and lever "D" in notch 3, then with the auxiliary reservoir charged to 80 pounds, proceed as follows:

To test triple valves for 8-inch cylinder, place valve "B" in position No. 4 and valve "A" in position No. 5.

To test triple valves for 10-inch cylinder, place valve "B" in position No. 4 and valve "A" in position No. 6.

In all of these tests the triple valve should move to application position without causing a discharge of air from the vent port of valve "B."

A failure to apply under the conditions specified indicates either excessive friction, which will be shown by an exhaust from the vent port or valve "B"; a leaky packing ring, which will be discovered later by the packing-ring leakage test; too large a feed groove in the cylinder, or a combination of two or more of these defects. Should the triple valve fail to apply and no exhaust occur from valve "B," the indications are that the back flow of air from the auxiliary reservoir to the brake-pipe is too rapid to permit the required differential.

At the completion of this test move valve "B" to position No. 3 and valve "A" to position No. 1.

Sec. "B"—Quick-service Test (for Quick-service Triple Valves Only) for Both Westinghouse and New York Triple Valves.

Commencing the test with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 3 and auxiliary reservoir charged to 80 pounds, proceed as follows:

Close cock 9 and move valve "A" to position No. 7 for all 8-inch and 10-inch triple valves. The brake-cylinder pressure obtained should not be less than 5 pounds greater than that which will be obtained by subjecting to the same test triple valves which do not contain the quick-service features.

At the completion of this test move valve "A" to position No. 1 and open cock 9.

Test No. 5—Packing-ring Leakage Test for Both Westinghouse and New York Triples.

Release Test, Sec. 1.—Commencing with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 3 and the auxiliary reservoir charged to 80 pounds, proceed as follows:

Place the valve "A" in position No. 7 until the brake-pipe pressure is reduced 15 pounds, then return to position No. 3 (lap). Place valve "J" in position No. 2, lever "D" in notch No. 1 and valve "B" in position No. 1; close cocks 2 and 3 and move valve "A" to position No. 2. If the discharge does not occur promptly from the vent port of valve "B," advance valve "J" from position to position until the discharge begins, then note the rate of increase of pressure on the auxiliary reservoir gage, which must not exceed 5 pounds in 30 seconds.

During this test there must be a steady exhaust of air from the vent port of valve "B" to insure the proper differential being maintained on the triple-valve piston. If, in making this test, the triple valve for the 8-inch cylinder releases or indicates excessive ring leakage, make another test, beginning with moving handle "R" to the right after making the proper brake-pipe reduction and before starting to increase the brake-pipe pressure.

Immediately after the test is completed, handle "R" should return to its normal left position.

Should it occur that the friction of the triple valves for the 10-inch brake cylinder is so low as to continue to permit the triple to release, the reduction for the application may be changed from 15 to 10 pounds. When this is done, special attention should be given to determine if the graduating valve is right, as it must be, to permit an accurate test.

At the completion of this test place valve "B" in position No. 3, open cocks 2 and 3 and place valve "A" in position No. 1.

Test No. 6, Sec. 2—Friction Test. Release Test for Both Westinghouse and New York Valves.

Commencing the test with cocks 1, 2, 3 and 9 open and all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 3, auxiliary reservoir charged to 80 pounds.

Place lever "D" in notch 3 for all triple valves undergoing the test; proceed as follows:

Place valve "A" in position No. 7 until the brake-pipe pressure is reduced 10 pounds, then return it to position No. 3. Place valve "J" in position No. 1, valve "B" in position No. 1, and move valve "A" to position No. 2. Under these conditions the triple valve should release. A failure to release should be accompanied by a discharge at the vent port of valve "B," which indicates that the frictional resistance to the movement of the packing ring and slide valve is excessive.

If the triple valve does not release and valve "B" fails to open its exhaust, leakage is occurring from the brake pipe, which will necessitate advancing valve "J" from position to position, remaining in each position 30 seconds, until the triple valve releases or the exhaust in valve "B" opens.

At the completion of the test place valve "B" in position No. 3 and valve "A" in position No. 1.

Test No. 7, Sec. "A"—Service-port Capacity Test for Westinghouse Triple Valves and Quick-service New York Triple Valves.

Commencing with cocks 1, 2, 3, 4 and 9 open, valve "A" in position No. 1, valve "B" in position No. 3, place valve "C" in position required for the triple valve under test, as indicated:

Notch No. 1—For 8-inch triple valves.

Notch No. 2—For 10-inch triple valves.

During this test the brake-pipe pressure should not drop, except that in the case of the quick-service triple valves there will, of necessity, be a slight drop, which must not exceed 2 pounds.

Place valve "B" in position No. 2 and move valve "A" to position No. 3, open cock 7 until brake-pipe and auxiliary-reservoir pressures are reduced to 50 pounds, then close cock 7. Move valve "B" to position No. 3 and open combination cock 6 and quick-opening valve, leaving it open 3 seconds. This test should not produce quick action. If it does, it indicates a restriction in the service port, or a weak or graduating spring.

Sec. B.—Duplicate the tests specified under Sec. A, placing the wheel of valve "C" in the position as indicated.

Notch No. 3.—For 8-inch triple valves.

Notch No. 5.—For 10-inch triple valves, excepting Westinghouse non-quick service, with which use notch 7.

This should result in the triple valve moving to emergency position. Failure to do so indicates too close a fit of the emergency piston.

At the completion of the test close cock 4 and combination cock 6 and quick-opening valve, move valve "A" to position No. 1.

Test No. 7, Sec. "A"—Service-port Capacity Test for New York Non-quick Service Triple Valves.

Commencing with cocks 1, 2, 3, 4 and 9 open, valve "A" in position No. 1, valve "B" in position No. 3, place valve "C" in position required for the triple valve under test, as indicated.

Notch No. 1—For 8-inch triple valves.

Notch No. 2.—For 10-inch triple valves.

Place valve "B" in position No. 2 and move valve "A" to position No. 3. Open cock 7 until brake pipe and auxiliary reservoir pressure are reduced to 50 pounds, then move valve "B" to position No. 3 and open cock 6 quickly.

NOTE.—During this test the triple valve should move to service position, the brake-pipe pressure must not drop and there must be no discharge of air from the vent ports.

Should the triple valve move to emergency position, it indicates a restriction in the service ports or a weak vent-valve spring.

SEC. B.—Duplicate the test specified under Sec. A, placing the wheel of valve "C" in the position as indicated for the triple valve under test.

Notch No. 3.—For 8-inch triple valves.

Notch No. 5.—For 10-inch triple valves.

This should result in the triple valve moving to emergency position, causing a strong blast of air from the vent ports and a brake-pipe reduction of at least 3 pounds. Failure to do so indicates a too loose fit of the vent-valve piston packing.

Air Brake Cut-Out and Defect Card (M. C. B. Recommended Practice). See AIR BRAKE DEFECT CARD.

Air Brake Defect Card (M. C. B. Standard). In 1894 a Recommended Practice was adopted to use an air-brake repair card to report to division terminals such defects as are found by trainmen which require brake to be cut out. This was revised in 1898, and is now, as shown in the illustration, to be attached as near to the car number as possible.

In 1902 this was made a Standard of the Association.

In 1903 letters were substituted for figures to indicate the various defects.

In 1911 a revised defective air brake card was adopted and the use of the card defined as follows:

If car can be placed between air brake cars, wire this card near triple where it can be readily seen.

If car must not be placed between air brake cars, wire card to brake-pipe near angle cock at each end of car.

The color of defective air brake card to be red.

The size of defective air brake card to be 3¼ by 9 inches, including the stub, which is 3¼ by 2¾ inches.

Card to be fitted with eyelet, as shown, and each card supplied with suitable wire for attaching to car.

Air Brake Hose. (Figs. 1346, 1396, etc.) Laminated rubber and canvas tubing which is attached to a nipple that screws in the angle cock at the end of the brake pipe. The other end of the hose is fitted with a coupling which engages with a similar coupling on the adjoining car and thus forms a flexible connection between the brake pipes of the two cars through which the compressed air for operating the brakes is conducted. See ARMORED BRAKE HOSE.

Air Brake Hose Clamp. See HOSE CLAMP.

Air Brake Hose Coupling. Figs. 1346, 1388, 1392, 1506, etc. A contrivance for coupling or connecting the ends of a pair of brake hose together, so that the air by which the brakes are operated can pass from one vehicle in a train to another. The couplings for train air signal apparatus are similar to brake hose couplings, but are arranged so that they will not couple to the latter.

Air Brake Hose Coupling Case. A hollow casting which joins the main part of a coupling to which the hose is attached.

Air Brake Hose Coupling and Gaskets. (M. C. B. Standard). Fig. 2851.

In 1911 standard dimensions and contour for air brake hose couplings and gaskets were adopted.

In 1913 the following specifications were adopted as Standard for gaskets.

DIMENSIONS.

The dimensions of the gaskets must agree with those adopted by the Association in 1911, and all gaskets shipped must be uniform in size and section.

MATERIAL DESIRED.

Gaskets ordered under this specification should be made of such a compound that they will be tough and yet have enough elasticity to conform to the requirements for strength and elongation. They should sustain an ultimate load of 100 pounds, and show an elongation of original internal diameter of 350 per cent when tested as described below.

TESTING.

When the samples for test are received, they will be examined for size and workmanship. The gaskets will be tested in tension in a manner similar to that of the tensile test of a single link of a chain. The half-links used to pull on the gasket will each be provided with a 180 degree fillet of the same diameter at the original inner diameter of the gasket—that is, the two semi-circular fillets of the pulling links will just fill the inside of the gasket.

REJECTION LIMITS.

If any of the sample gaskets representing a lot should fail under a load of less than 90 pounds, or if the elongation is less than 250 per cent, the entire lot represented by the sample will be rejected. If the tensile strength of any sample tested is more than 125 pounds the lot will be rejected, unless the elongation obtained from such samples is more than 350 per cent.

If the dimensions vary more than 1/64 inch in any way from those adopted as Standard, the entire lot will be rejected.

Air Brake Hose Coupling Gasket Gage. (M. C. B. Recommended Practice). Fig. 2939.

In 1915 the hose coupling gasket gage shown in the illustration was adopted.

Air Brake Hose Label (M. C. B. Standard). Figs. 2851, 2852. In 1902 the label for hose, as shown in the specifications for air-brake hose, was made a Standard. Revised in 1903, 1911, 1912 and 1913. The specification for its use is as follows:

Each length of hose must have vulcanized to it a standard air-brake hose label of white or red rubber as shown. The following information must be branded on the label: On the top of the badge the initials or name of road or purchaser and date of manufacture;

on the bottom the name of manufacturer and serial number. In the center a monogram as shown. The label should be applied around the hose within 6 inches of one end, as shown on M. C. B. Sheet Q[1]. In mounting the air hose, the coupling should be applied to the end near which the label is located, so that the drawbar will not obscure the same when an inspector is on the right forward or left back side of the car.

Air Brake Hose Label (M. C. B. Standard). Fig. 2704.

Air Brake Hose Label, Location of (M. C. B. Recommended Practice). In 1911 a recommended practice that air-brake hose should be so mounted that the label will show toward the side of car in such a position that the car inspector can readily read it.

In 1912 the drawing showing position of air brake hose label on mounted hose was altered to correspond with the new design of hose label. Redesigned in 1913. Advanced to Standard in 1914. See Figs. 2851, 2852.

Air Brake Hose Nipple. Figs. 1389, 1501, 1503. A short metal tube fitting into the end of the brake hose and fastened by a suitable clamp and screws. One end is threaded and screws into the angle cock.

Air Brake Hose Specifications (M. C. B. Standard). Fig. 2704. In 1902 the label for hose, as shown, was made a standard. Revised in 1903, 1911 and 1912. The specification for its use is as follows:

Each length of hose must have vulcanized to it a standard air brake hose label of white or red rubber as shown. The following information must be branded on the label: On the top of the badge the initials or name of road or purchaser and the size, 1⅜ inches; on the bottom the name of manufacturer; on the left-hand end the month and year of manufacture; on the right-hand end the serial number and 2 inches removed therefrom a separate badge consisting of a band 1 inch wide encircling the hose and bearing in triplicate the letters "M. C. B. Std."; in the center field the letters "A" and "R" and the numerals for the month to show the date of application and removal. These letters must be clear and distinct, not less than ¼ inch in height, excepting name of manufacturer, which must not be less than ⅛ inch in height and stand in relief not less than 1/32 inch.

Letters and figures covering the application and removal of the hose must be so applied that they can be removed by cutting without endangering the cover.

Dimensions of label to be 3 9/16 by 2½ inches, as shown on the illustration, also a band 1 inch wide encircling the hose 2 inches to the right. Extensions may be made on right-hand end.

Air Brake Inspection. See Air Brake, Cleaning and Testing.

Air Brake Instruction Car. Figs. 197, 198, 239. A car, usually a passenger equipment car, in which is mounted the apparatus necessary to illustrate and explain the construction and operation of the air brake. It is used for the instruction of railroad employees and is stationed at different points along the line for a week or two at a time. Regular classes are conducted and lectures given by the instructor in charge, who is usually provided with living quarters in the car. See Car.

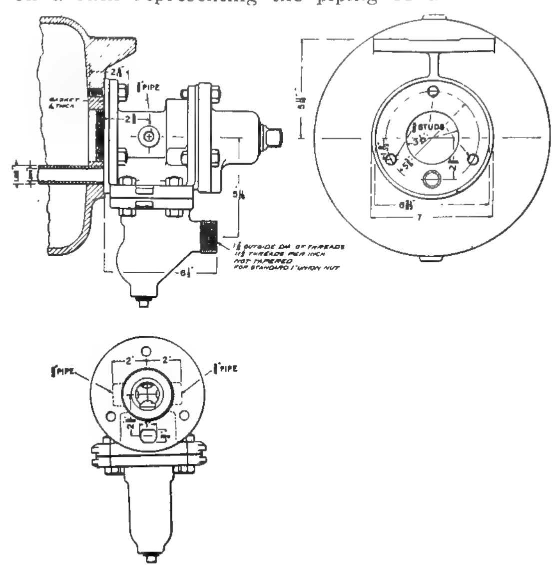
Air Brakes for Street Cars. See Traction Air Brake.

Air Brake, Testing. See Air Brake, Cleaning and Testing.

Air-Brake Tests. (M. C. B. Recommended Practice). In 1895 the following code for the guidance of the Committee on Air Brake Tests in testing triple valves was adopted as Recommended Practice for such tests. Revised 1911.

CONDITION OF TESTS.

Construction of Rack.—Triple valves will be tested on a rack representing the piping of a one-hundred



H-2. TRIPLE VALVE ON END OF 10-INCH FREIGHT RESERVOIR. D-15611.

(100) car train. All cocks, angles and connections will be as nearly as possible identical with those in train service. The rack shall conform to blue-print. No. C-11379 (Rev. 3-9-09) in the hands of the committee, which gives the proper fittings, piping, cylinders, auxiliary reservoirs, main reservoirs, automat. brake valves, etc.

Reservoir Capacity.—The main reservoir capacity shall be approximately 57,000 cubic inches.

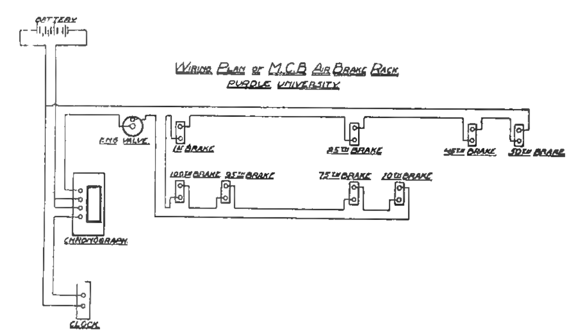


PLATE A.

The capacity of each auxiliary reservoir shall be such as will, with a pressure of 70 pounds, produce 50 pounds' pressure in its brake cylinder when fully equalized in service application with 8 inches piston travel.

Air Supply.—The air supply for the test rack shall be obtained from a locomotive type of air compressor having a capacity of from 80 to 120 cubic feet of free air per minute. The compressor to be controlled by a single top-pump governor adjusted to maintain 110 pounds main reservoir pressure.

Brake-Pipe Pressure.—Tests will be made with a brake-pipe pressure of 70 pounds, except when otherwise specified.

Brake-Pipe Leakage.—With brake-pipe and auxiliary reservoirs charged to 70 pounds, the section of branch pipe between the cut-out cocks and triple valves, also

the triple valves, should be tested with soapsuds and leakage eliminated.

Branch pipe cut-out cocks should then be closed and brake valve placed in lap position; brake-pipe leakage should then not exceed 2 pounds per minute.

Brake Cylinders.—Brake-cylinder packing leathers must be maintained in good condition and free from leakage.

Piston Travel.—All tests shall be made with 8-inch piston travel, except when otherwise specified.

Construction of Triple Valves.—Triples must be so constructed that they can be secured and operated on apparatus conforming to Diagram No. D-15611 (which shows triple-valve end of auxiliary reservoir, branch-pipe union and location of bosses for retaining-valve pipe, with detail dimensions of each, as well as detail dimensions between these parts when in the relative position they would occupy if triple valve were in place).

Gages and Recording Instruments.—The auxiliary reservoirs, brake pipe and brake cylinder of the 1st, 25th, 50th, 75th and 100th brakes shall be fitted with test gages. All gages must be calibrated and maintained in good condition.

Brake No. 1 shall be fitted with two recording pressure gages, one to be connected to the brake-pipe branch pipe, the other to the brake-cylinder, and brake No. 100 shall be fitted with a test gage connected to the brake cylinder.

The attachment of electric circuit closers, also the general arrangement of the electric circuit wiring, shall be as shown on Plate A and Plate A-1.

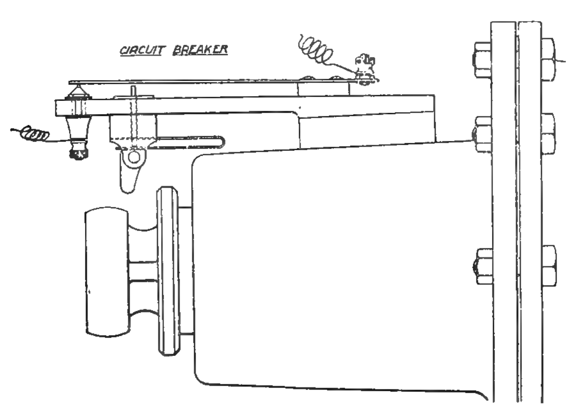


PLATE A1.

Repetition of Tests.—Tests shall be repeated three times under the same general condition, a record being taken of each test, also the average result of each three tests. The room temperature at the time of the tests shall be recorded, also humidity.

Triple-Valve Essentials.—The essentials of a quick-action triple valve are: first, charging; second, service application; third, graduation; fourth, release; fifth, quick action.

INDIVIDUAL TRIPLE-VALVE TESTS.

NO. 1—CHARGING TESTS.

TIME TO CHARGE AUXILIARY RESERVOIR.

Not less than three triples, selected at random, shall be tested, as follows:

With the triple valve cut out at the branch pipe cut-out cock, the auxiliary reservoir empty, and 90-pound brake-pipe pressure maintained, the triple valve should be cut in.

A. Under these conditions the auxiliary reservoir should be charged from 0 to 70 pounds in not more than 90 seconds nor less than 70 seconds.

B. When triple is in normal release position, the auxiliary reservoir should be charged from 0 to 70 lbs., in not more than 60 seconds and not less than 40 seconds.

NO. 2—SERVICE APPLICATION TESTS.

Section A.—To determine sensitiveness to Service Application.

1. Three valves, selected at random, shall be taken for this test and each tried separately. They will be tested on the first brake of the rack using the brake pipe only of the first car and locomotive, having the engine and tender brakes cut out.

2. These triple valves should apply in service when the brake-pipe pressure is reduced by direct discharge to the atmosphere through an orifice which will reduce brake-pipe pressure from 70 to 60 pounds, in 16 to 18 seconds, with brake valve and triple valves on locomotive and first brake cut out.

3. In preparing for this test, insert the required disk in union shown on Plate B with all cocks closed, after which open cock C and start test by opening cock B.

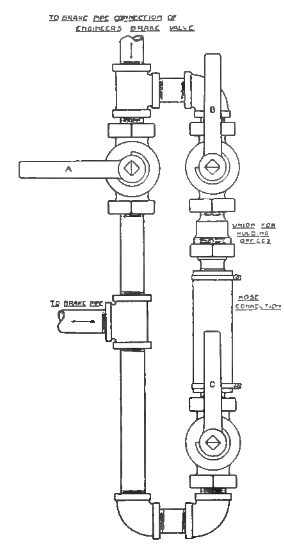


PLATE B

Section B.—Graduating Test.

1. Three valves, selected at random, shall be taken for this test and each tried separately. They will be tested on the first brake of the rack, using the brake pipe only of the first car and locomotive having the engine and tender brakes cut out.

2. The first admission to the cylinder should be made with a reduction of brake-pipe pressure not exceeding 5 pounds; each succeeding reduction should reduce the pressure in the auxiliary reservoir not to exceed 3 pounds, until equalization takes place. The pressure in the brake pipe should not be more than 3 pounds lower than the equalized pressure in the brake cylinder and reservoir at equalization.

Section C.—Holding Test.

Three valves, selected at random, will be taken for this test and each tried separately on the first brake on the rack, using the brake pipe only of the locomotive and the first car, having the triple valves cut out on engine and tender. The one brake will be applied, admitting as nearly as may be 15 pounds into the brake cylinder following a service application. Record of pressures in the auxiliary reservoir cylinder and brake pipe will be taken as follows:

First—At completion of application.
Second—In five minutes.
Third—In ten minutes.
Fourth—In fifteen minutes.
In this test, when a constant brake-pipe pressure is maintained, the brake-cylinder pressure must not be increased more than 5 pounds in 5 minutes.

Section D—Release Test.

Three triple valves, selected at random, shall be taken for this test and each tried separately. They will be tried on the first brake of the rack, using the brake pipe only of the first car and locomotive having the engine and tender brakes cut out. When the triple goes to normal release position it must exhaust the air from the brake cylinder from 50 to 0 pounds in not more than 15 seconds.

When the triple goes to retarded-release position it must exhaust the air from the brake cylinder from 50 pounds to 0 pounds in not more than 40 seconds.

NO. 3—EMERGENCY APPLICATION TESTS.
TO DETERMINE SENSITIVENESS TO QUICK ACTION.

Three triple valves, selected at random, shall be taken for this test and tried separately on the first brake of the rack. During this test the locomotive and tender triples are to be cut out.

Section A—These triple valves must give a quick-action application when the brake-pipe pressure is reduced by direct discharge to the atmosphere through disk with a 14/64-inch orifice.

Section B—These triple valves must not give a quick-action application when the brake-pipe pressure is reduced by direct discharge to the atmosphere through a disk with a 10/64-inch orifice.

Section C—Holding Test. Three triple valves, selected at random, shall be taken for this test and tried separately on the first brake on the rack.

The brake will be applied in quick action by moving the brake-valve handle to emergency position, where it must remain until completion of test for the purpose of insuring the discharge of all brake-pipe pressure. Record of pressure in auxiliary reservoir and brake cylinder will be taken as follows:
First—At completion of application.
Second—In five minutes.
Third—In ten minutes.
Fourth—In fifteen minutes.
In this test, the auxiliary reservoir and brake-cylinder pressure must not show a reduction of more than 5 pounds in 5 minutes.

RACK TESTS.
NO. 4—SERVICE APPLICATION TESTS.

Section A—Service Equalization.

With a service reduction of 25 pounds from brake-pipe pressure, a brake-cylinder pressure of not less than 48 pounds, nor more than 52 pounds, must be obtained.

Section B—Graduating Test.

1. A reduction of 5 pounds in brake-pipe pressure should apply lightly the 100 brakes. However, the brake-cylinder pressure may not be sufficient to show on all test gages.
2. A further reduction of 4 pounds to 6 pounds should increase the cylinder pressure of all brakes.
3. A further reduction, making a total of 25 pounds, should equalize the pressure between the auxiliary reservoirs and brake cylinders.

Section C.—Service application time.

Brakes will be applied by reducing brake-pipe pressure 10 pounds. There shall not be more than 25 seconds' difference in the time of obtaining 10 pounds' pressure in the cylinders of the 1st and 100th brakes.

NO. 5—EMERGENCY APPLICATION TESTS.

Section A—Quick action, time and pressure.

The 100th brake must be applied with at least 45 pounds' pressure in 6¼ seconds from the movement of the brake-valve handle to emergency 6¼ seconds from the movement of the brake-valve handle to emergency position and at least 55 pounds in 7 seconds. The final maximum pressure in this test must not be less than 15 per cent nor more than 20 per cent above the pressure given by the same brake in full service application.

This test will also be made to determine that quick action is obtained with:
First—Four inches piston travel.
Second—Twelve inches piston travel.

(NOTE.—The object of this test is to secure, as nearly as possible, uniformity of pressures in brake cylinders in an emergency application and uniformity of time required to obtain the pressures; to secure a minimum length of stop and a minimum of shock, and of trains parting.)

Section B—To determine whether quick action will follow a service application.

Using the one hundred brakes, make a service reduction such as will give 20 pounds' cylinder pressure on the first brake. Then place the brake-valve handle in emergency position, which should cause quick-action operation of all triple valves.

The pressure in the first cylinder will be increased or decreased by steps of about 5 pounds until the point at which quick action commences or ceases is determined.

Section C.—Quick-action jumping test.

With brakes Nos. 1, 2 and 3 cut out, quick action should be obtained with the remainder of the brakes by an emergency reduction, and the time, from the movement of the brake-valve handle to emergency position to obtain 45 and 55 pounds' cylinder pressure on the 100th brake, should not be increased more than one second over that required to obtain the same pressures with all brakes cut in.

This test should be repeated with groups of three brakes cut out, consisting of Nos. 2-3-4, 3-4-5, 4-5-6 and 5-6-7, and the time from the movement of the brake-valve handle to emergency position to obtain 45 and 55 pounds' cylinder pressure in the 100th brake should be the same as with all brakes cut in.

These tests will also be made with piston travel of 4 inches.

NO. 6—HOLDING TESTS.

Section A.—Following a service application.

The one hundred brakes will be applied, admitting, as nearly as may be, 15 pounds into the cylinder of the first brake. Record of pressures in the auxiliary reservoirs and cylinders will be taken at all record points as follows:
First—At completion of application.
Second—In five minutes.
Third—In ten minutes.
Fourth—In fifteen minutes.
In this test any increase of brake-cylinder pressure should be in proportion to the reduction in brake-pipe pressure due to leakage.

Section B.—Following a quick-action application.

The 100 brakes will be applied in quick action by placing the brake-valve handle in emergency position, where it will be left until completion of test, for the purpose of insuring the discharge of all brake-pipe pressure. Record of pressures in auxiliary reservoirs and cylinders will be taken at all record points as follows:

First—At completion of application.
Second—In five minutes.
Third—In ten minutes.
Fourth—In fifteen minutes.

The results of this test must not indicate an excessive amount of back leakage into brake pipe.

NO. 7—RELEASE TESTS.

Section A—Release Time.

The 100 brakes shall be applied with an 18-pound service reduction of brake-pipe pressure and brake valve then placed in release position. Time will be taken from the movement of the brake valve into release position until pressure is reduced to 5 pounds in the cylinder of the first brake.

The pressure in the cylinder of the first brake should not reduce to 5 pounds in less than 18 seconds nor more than 25 seconds.

(NOTE—Main reservoir pressure must be 110 pounds at time of release.)

Air Compressor. Figs. 1405, 1406, etc.; 1470. A motor driven air pump which supplies compressed air for operating the air brakes on electrically operated cars.

Air Compressor Cylinder (Motor Compressor). Fig. 1321. A hollow cast iron cylinder with a piston, which piston compresses the air required to operate the brakes. The pistons in the air cylinders are connected with connecting rods to a crank shaft geared to a small motor.

Air Compressor Cylinder Head (Motor Compressor). The cover for the lower end of the air cylinder of a motor driven air pump for an air brake.

Air Compressor Governor. Figs. 1420, 1423, etc.; 1469. An adjunct to the electrically driven air compressor, designed to open or close automatically the motor circuit when the air pressure in the reservoir exceeds or falls below certain predetermined limits; these limits are usually 95 and 80 pounds for automatic brake service and 65 and 50 pounds for straight-air brake equipments.

Air Compressor Governor, Synchronizing System. Figs. 1408, 1409.

An arrangement for insuring an equal division of work of furnishing compressed air for braking and other purposes among all the motor-driven air compressors in a train. The current supply to the motor of the motor-driven air compressor is controlled by a compressor switch operated by air pressure, as in the ordinary form of compressor governors, except that the cutting-in and cutting-out of this switch is controlled by the operation of a magnet valve. In addition, a master governor is used on each motor car or locomotive, similar in all respects to a compressor governor except that instead of controlling the current supplied to the motors of the motor-driven air compressors, it acts simply as a pilot or master switch to control the current to the magnets which operate the compressor switches. The magnets of the compressor switches are connected in parallel between the trolley (or positive battery terminal) and the synchronizing wire which runs the entire length of the train. The cutting-in of any master governor connects the synchronizing wire to ground (or negative battery terminal) and thereby operates all the compressor switch magnets. With all the compressors cut out and the pressures in the main reservoir line equalized, as soon as this pressure is decreased to a point at which any one of the master governor controlling mechanisms operates, the closing of this master governor switch supplies current to the magnets of each compressor switch in the train, causing them to operate so as to cut-in these switches and start all the compressors simultaneously. Whether one or more of the master governors cut-in at the same time is immaterial since the compressor will continue to operate and raise the pressure in the main reservoirs on each vehicle and in the main reservoir line throughout the train, until the controlling portion of the last master governor remaining cut-in operates to open the circuit to the compressor switch magnets, which causes all the compressor switches to cut out and stop the operation of all the compressors simultaneously. In this manner, all the compressors operate the same length of time, thus avoiding a condition in which some compressors are overworked while others are not working up to their full capacity.

Air Compressor Switch. See ELECTRO-PNEUMATIC COMPRESSOR SWITCH.

Air Connections. See STEAM AND AIR CONNECTIONS FOR PASSENGER EQUIPMENT CARS.

Air Gage (Air Brake). Figs. 1444, 1516. A gage to register the pressure of air in the reservoirs, brake pipe or brake cylinders, similar to an ordinary steam pressure gage. They are made either with a single pointer, or with two pointers, to indicate on one dial both the reservoir pressure and the brake pipe pressure. The latter type is called a duplex gage.

Air Gaps (Generators). The clearance between the body or iron core of the rotating armature and the stationary field poles or pieces of a generator. Small air gaps are beneficial in that they permit of smaller, lighter, slower speed and cheaper machines than is the case with large air gaps. On the other hand, the bearings of machines with small air gaps require closer attention and more frequent renewals and are more apt to give trouble at the commutators and brushes than machines with large air gaps.

Air Inlet. An opening for the admission of air to an air compressor or to a refrigerator car. The term includes both the air strainer and air pipe.

Air Pipe (Air Brake). More properly brake pipe. Often called train pipe.

Air Pipe Strainer. See BRAKE PIPE AIR STRAINER.

Air Pump. See AIR COMPRESSOR.

Air Pump Governor. See AIR COMPRESSOR GOVERNOR.

Air Signal. See BACK-UP AIR SIGNAL, TRAIN AIR SIGNAL.

Air Signal Reducing Valve. See REDUCING VALVE.

Air Space (Refrigerator Cars). A space left between the linings to aid in insulation. It is sometimes called dead air space in distinction from the ventilating passages, as the air in it is confined or dead and is not being constantly changed. Unless air is confined so that it does not continually change it is a poor insulator.

Air Strainer. See BRAKE PIPE AIR STRAINER.

Air Valve (Steam Heating). A small outlet valve which will pass air but not water, applied to the ends of storage heaters to allow the air to escape when the steam or hot water is turned on.

Aisle. The longitudinal passageway through a passenger car, between the seats.

Aisle Seat End. The end or arm of a transverse car seat next the aisle. See also WALL SEAT END.

Alcohol Burner. Used for heating refrigerator or produce cars when transporting perishable products during cold weather.

Alcohol Stove. See STOVE.

Alcove. A recess. See WATER ALCOVE.

Alcove Faucet. A faucet in a water alcove connected with a water cooler to supply drinking water.

Alley Apartment. Fig. 1879. A compartment in a passenger equipment car, reserved for mail, and serving the same purpose as a postal car on runs where an entire car is not required for mail. It occupies only a part of the width of the car and has an alley or passageway at one side.

Alley Lamp. A lamp placed in a recess in the side of a car. Also called Panel Lamp, as it is usually covered by a panel.

Alleyway. More properly a corridor. A narrow passage at the side of staterooms or compartments in parlor or sleeping cars.

American Continuous Draft and Buffing Apparatus. An apparatus by which the drawbars at both ends of the car are connected by two rods with loops at the ends, that hook over the ends of a bar or key passing through the shank of each drawbar. Each car is in this manner pushed from the rear end and all the pull is transmitted through the train by the draft rods. It has two buffer springs and two follower plates at each end of the car. Not now used in new construction.

Ammeter. An instrument for measuring electric current in amperes.

Ampere. The unit of electric current.

Ampere-Hour Meter. Figs. 2427, etc.

Angle Cock (Air Brakes). Figs. 1346, 1385, 1441, 1456. A cock placed in the brake pipe under each end of the car just back of the hose connection. This must always be open except at the rear end of the last car, where it must always be closed to prevent escape of air from the brake line and setting of the brakes.

Angle Cock Holder. A clamp or bracket for securing the angle cock at the end of a car.

Angle Iron or **Angle.** A general term applied by makers to iron or steel rolled in the form of an L.

Angle Manifold (Car Heating). See Fig. 2252 for typical example.

Anti-Friction Car Door Hanger. See DOOR HANGER.

Anti-Friction Center Plate. Devised to reduce the friction between the body and truck in curving. See ROLLER CENTER PLATE and BALL BEARING CENTER PLATE.

Anti-Friction Side Bearing. Devised to reduce the friction between body and truck in curving. See ROLLER SIDE BEARINGS, BALL BEARING SIDE BEARINGS, GRAVITY SIDE BEARINGS and ROCKER SIDE BEARING.

Anti-Slip Surface. See SAFETY TREAD.

Anti-Telescoping Device. A type of end framing in which the end sill is greatly strengthened by an end sill stiffening plate, an end sill stiffening angle bar, corner angle posts, and end plate strengthening angles or knee irons. Its objects is to prevent one car from entering or telescoping another in a collision. An anti-telescoping plate is intended for the same purpose. A device in use for this purpose on the New York subways has a corrugated face, into which the corresponding corrugations on the next car are forced.

Anti-Telescoping Plate. See ANTI-TELESCOPING DEVICF

Anvil (of Track Torpedoes). Interior pieces of iron placed directly over the fulminating powder to insure its ignition. Some track torpedoes have three anvils.

Arbor. "A spindle or axle for a wheel or pinion; a mandrel on which a ring or wheel is turned in a lathe."—Knight.

Arch (Elliptic Spring). The height from the center of the scrolls at the ends of the elliptics to the under side of the main leaf of the spring. Twice the arch of an elliptic spring, less the thickness of the spring bands, is the set and is the maximum amount which an elliptic spring can be compressed. In a half elliptic spring the arch and set differ only in the thickness of the spring band.

Arch Bars. 14 and 15, Fig. 989. The wrought iron or steel bars which form the top and bottom members of a diamond arch bar truck side frame. They are attached to the bolster guides or truck columns by column bolts and to the journal boxes by the journal box bolts. See also CENTER BEARING ARCH BAR.

Arch Bars, Column and Journal Box Bolts (M. C. B. Standard). Fig. 2846.

80,000-POUND CAPACITY CARS.—In 1897 a committee on this subject reported designs which were subsequently adopted by letter ballot as Recommended Practice.

In 1901 these were, by letter ballot, changed from Recommended Practice to Standard. Modified 1907.

In 1907 the following changes were made:

The journal bearing centers spaced to 5 feet 6 inches, the additional four inches being added to the total length.

The spacing of bends increased to 20-inch centers, and the horizontal distance between bends increased to 17½ inches.

The turned up lip on the ends of the tie bar was eliminated, the total length of tie bar remaining the same as arch bar, as follows: 78 inches over all.

The addition to the drawing of the following note:

A single nut with nut-lock or cotter may be used instead of double nuts.

Modified 1909.

100,000-POUND CAPACITY CARS.—In 1909 a design for arch bars, column and journal-box bolts for 100,000-pound capacity cars was adopted as standard.

Arched Roof. Figs. 128, 136, etc. A roof, the surface of which is curved, and which has no upper deck or clear story. It is sometimes used for passenger cars. See TURTLE BACK ROOF.

Argand Lamp. A lamp invented by Argand, a native of Geneva, about the year 1784. The burner consists of two concentric cylindrical tubes in which is the annular wick. The tube inclosing the wick is closed at the bottom and communicates by a pipe with the oil reservoir. The interior tube being open, free access of air is allowed to the interior and exterior of the flame, insuring more perfect and equal combustion. Some gas lamps are constructed on this principle.

Arm Cap. A metal plate, wooden cap, or piece of upholstery with which the top of a seat end, arm rest or chair arm is covered.

Arm Holder. (British). See ARM SLING.

Arm Pivot. See SEAT ARM PIVOT.

Arm Rest. A wooden or metal bar or ledge attached to the side of a car, and not, like an arm cap, to the top of a seat end, for passengers to rest their arms on.

Arm Rest Bracket. See ARM REST. A bracket supporting the arm rest.

Armature. The rotating part of a motor or dynamo. It consists of a laminated iron cylinder or core keyed to a shaft, and in the slots of which are wound the armature coils of insulated copper wire or ribbon. At one end of the core on the shaft is mounted the commutator, a copper cylinder composed of insulated segments, which are connected to corresponding armature coils.

Armature Spider (Electric Motor). Fig. 2674. A skeleton center fastened to the armature shaft and surrounded by the laminated iron core in which the armature coils are imbedded.

Armored Brake Hose. Fig. 1487. Brake hose covered with a woven wire fabric, steel, or other material, to protect it from injury or abrasion. Vacuum brake hose, for vacuum brakes, is usually lined with coiled wires on the inside to prevent collapsing, but such is not properly termed an armored brake hose. The M. C. B. standard brake hose is not armored.

Asbestos Felt. A preparation of asbestos in loose sheets similar to felt, for use as a non-conductor. It is largely used in refrigerator cars and is manufactured for that purpose in rolls about 42 in. wide, and weighs about 1 lb. per square yard. It must be handled with care to prevent tearing.

Asbestos Protected Metal. A material for use as roofing, side walls, partitions and ceilings in buildings; also for inside box car roofs, passenger car and locomotive cab roofs, head linings and interior finish for passenger cars.

Ash Receiver. Fig. 2042.

Asphalt Car Roofing. A saturated and coated felt applied in sheets.

Atmospheric Brake. See AIR BRAKE, VACUUM BRAKE. This term, but little used, includes both the air brake and the vacuum brake.

Automatic Air Brake. An air brake system with which the brake will be applied automatically in case of an accident which permits air to escape from the system. To accomplish this there is added to each vehicle equipped with the STRAIGHT AIR BRAKE (1) a reservoir called an auxiliary reservoir, in which a supply of compressed air is stored sufficient to operate the brake on that vehicle; (2) a device called a triple valve to which the brake pipe, auxiliary reservoir and brake cylinder are all connected. The brake is applied by reducing the pressure in the brake pipe below that in the auxiliary reservoirs. Such a reduction is caused by an opening made from the brake pipe, or its connections, to the atmosphere, and may be intentional, as when the engineer opens the brake pipe to the atmosphere through the brake valve, or accidental, as in case of a burst hose or broken pipe. The reduction in brake pipe pressure thus made destroys the equality of brake pipe and auxiliary reservoir pressures, which existed when the brake system was fully charged, and the auxiliary reservoir pressure, which is then higher than that in the brake pipe, causes the triple valve on each car to operate so as to apply the brakes by admitting compressed air from the auxiliary reservoir to the brake cylinder, where it exerts its pressure on a piston, pushing it outward and thus applying the brakes. The brake is released by admitting compressed air from the main reservoir on the locomotive through the brake valve into the brake pipe, thus increasing its pressure above that remaining in the auxiliary reservoir. This causes the triple valve parts to return to their original positions, again opening communication from the brake pipe to the auxiliary reservoir to recharge the latter and making a connection through which the compressed air in the brake cylinder escapes to the atmosphere, thus permitting the release spring in the brake cylinder to return the piston to its former position, thereby releasing the brakes.

Automatic Car Coupler (M. C. B. Standard). Fig. 2860. A form adopted as standard in 1887. Further details adopted in 1889 and 1893. Action of the Association in 1889 permits the use of a coupler 28 inches long instead of 30 inches, for use only on cars already in service and requiring such length coupler.

In 1909 a note was added that "The dimensions from the back of butt to inside face of knuckle be 30½ inches."

Automatic Car Coupler (M. C. B. Recommended Practice). Area of Lock-Bearing Surface on Tail of Coupler Knuckle. In 1910 a recommended practice was adopted that the minimum effective area of lock-bearing surface on knuckle tail shall not be less than 4 square inches.

Area of Bearing Surface of Lock on Coupler Wall. In 1910 a recommended practice was adopted that the effective area of bearing surface between the lock block and coupler wall shall be equal to or greater than the effective area of lock-block bearing on knuckle tail.

Automatic Car Coupler (Miscellaneous M. C. B. Standards). Figs. 2859, 2860.

SIDE CLEARANCE.—In 1889 the Association decided that the opening in carrier iron, where coupler enters, should be 5¾ inches vertically and 5½ inches horizontally.

Drawing revised in 1896.

The revision made in 1896 consisted in the elimination of the carrier iron from the drawing.

In 1899 the play of the shank of the coupler in the carry arm was changed to not less than ½ inch on each side.

In 1905 the total coupler side clearance was increased to 2½ inches.

In 1907 was modified to read: "That the total side clearance of the coupler be not less than 2½ inches," and adopted as standard. In 1909 was modified to read: "Total side clearance of coupler to be 2½ inches."

COUPLER YOKES.—In 1905 coupler yokes were adopted as Recommended Practice.

In 1907 the opening between the gibs of the yoke for 9⅛-inch butt coupler was made 6¾ inches instead of 7¾ inches, in order to increase the bearing of the present yoke on the coupler butt.

In 1909 a ⅛-inch radius was added to the inside of yoke lip. Advanced to Standard 1911.

In 1914 the car of coupler yoke was changed, to be formed with ⅞-inch radius at inside corners and fitted with 1-inch filler block, wrought iron or steel, having 1-inch radius ends, and secured by one ¾-inch countersunk rivet.

YOKE RIVETS.—In 1905 the use of 1¼-inch rivets for attaching yokes to coupler butts was adopted as Recommended Practice. Advanced to Standard in 1908.

In 1908 the diameter of rivet holes in coupler butts was changed from 1 3-16 inches to 1 5-16 inches.

Lock Set.—In 1903 a recommendation was made that for new equipment purchased after January 1, 1904, only such couplers as have a lock set on or within the head and which do not depend upon the uncoupling lever to hold up the lock should be specified. By letter ballot this was adopted as a standard.

Coupler Shank.—In 1901 a design of shank 5 by 7 inches back of the head was adopted as standard.

In 1905 an additional dimension "Not less than 20¾ inches" was added to plan view of 5 by 7 inch coupler to definitely locate the point at which shank shall measure 7 inches. Also the note, "Tail end for Continuous Draft," under the drawing of slotted-tail coupler, was omitted as being unsuited for present approved practice.

In 1907 a note was added to the effect that there should be no projections on the bottom of the shank from the line of the horn back for 12 inches, to provide for proper movement of shank on carrier iron.

In 1911 the clear surface without projection on bottom of coupler shank was increased ½ inch forward toward head of coupler.

Coupler Butt.—In 1905 a butt 5 by 5½ by 9⅛ inches for friction draft gear was adopted as recommended practice. Advanced to standard in 1907.

In 1907 the back wall of butt was changed to ¾ inch thick, owing to the fact that the tail pin had fallen into disuse.

The width of butt was changed to 5 inches on both sizes of coupler shanks to properly provide for securing yokes.

A dimension of not less than 1¼ inches was shown for the yoke gib shoulder of the 9⅛-inch butt to provide for the increased length of gib.

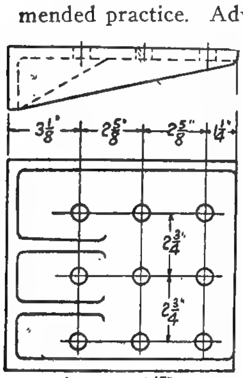
In 1909 a radius of 3-16 inch on the yoke gib shoulder of coupler butt was adopted.

Key Slot.—In 1910 the key-slot dimensions in the coupler butt were modified, making it available for use on all standard sizes of coupler butts.

In 1910 a recommendation was adopted that coupler manufacturers use a key 5 by 1⅛ inches as a gage in order to secure correctness and uniformity in the size of the key slot.

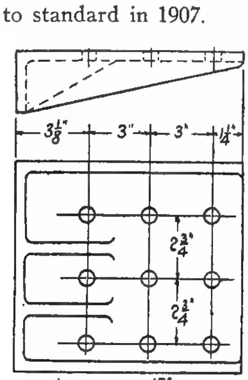
In 1911 design of key slot in coupler shank was changed.

Front and Back Stop.—In 1905, that front and back stops with rivet holes 15-16 inch in diameter be spaced, as shown herewith, was adopted as recommended practice. Advanced to standard in 1907.



Holes cored 15/16"

Drawing A.



Holes cored 15/16"

Drawing B.

FRONT AND BACK STOP.

Spacing Between Coupler Horn and Buffer Beam.—In 1905, that the spacing between coupler horn and buffer beam be 1¾ inches for all spring gear, and 2¾ inches for all friction gear, was adopted as recommended practice. Advanced to standard in 1907.

Automatic Car Coupler Contour Line and Limit Gages (M. C. B. Standard). Figs. 2859, 2860. Standard contour line was announced by Executive Committee under instructions from the Association, April 8, 1888. Limit gages for preserving standard contour line adopted in 1891.

These gages, properly proven by master gages, may be procured from Pratt & Whitney Company, of Hartford, Conn. A duplicate set of master gages is held in the office of the Secretary for reference.

In 1899 the contour line showing the length of the guard arm was extended about 1 inch.

In 1899 the M C. B. standard limit gage for new couplers was changed by moving the screw to a new position.

In 1902 the contour gage was strengthened by the use of a solid web in the weak part of the frame, and part of the outside flange increased to ¼ inch in thickness. The handhold was also reduced in size to give greater strength.

In 1903 the contour line of the M. C. B. coupler was changed as now shown on the drawing.

In 1904 the coupler and knuckle limit gages were changed to conform to the contour lines adopted in 1903 and to have raised figures "1904" cast on them.

Automatic Car Coupler Guard Arm (M. C. B. Standard). In 1899 the vertical dimensions of the end of guard arm was fixed at 7½ inches as a minimum.

Automatic Car Coupler Head (M. C. B. Standard). In 1899 the recommendation of the coupler committee that the horizontal plane containing the axis of the shank of the coupler bisect the vertical dimensions of the knuckle and end of guard arm was adopted as a standard of the Association.

In 1908 the following note was added:

That all new types of couplers put on the market after January 1, 1909, have a dimension of 9¼ inches from back of coupler horn to inside face of knuckle, and that the face or front wall of coupler have a minimum thickness of 1¼ inches.

Temporary Standard Coupler—Head. In 1911, by special letter ballot, the length of coupler head from back of striking horn to coupling face of closed knuckle was fixed at 12¼ inches for the M. C. B. Temporary Standard Coupler for existing cars.

Automatic Car Coupler, Height of (M. C. B. Standard). The standard height of couplers for passenger equipment cars is 35 inches from top of rail when car is light. Adopted in 1890.

In 1911 the order of the Interstate Commerce Commission, dated October 10, 1910, regarding the standard height of couplers, was adopted, reading as follows:

The maximum height of drawbars for freight cars measured perpendicularly from the level of top of rails to the center of drawbars for standard-gage railroads shall be 34½ inches and the minimum height of drawbars for freight cars on such standard-gage railroads measured in the same manner, shall be 31½ inches, and on narrow-gage railroads the maximum height of drawbars for freight cars measured from the level of tops of rails to the center of drawbars shall be 26 inches, and the minimum height of drawbars for freight cars on such narrow-gage railroads, measured in the same manner, shall be 23 inches, and on 2-foot gage railroads the maximum height of drawbars for freight cars measured from the level of the tops of rails to center of drawbars shall be

17½ inches, and the minimum height of drawbars for freight cars on such 2-foot gage railroads, measured in the same manner, shall be 14½ inches.

Adjusting Height of Couplers.—(M. C. B. Standard). In 1896 it was decided that in adjusting the height of couplers to meet the requirements of the United States law fixing the height from the top of rail to center of coupler for standard gage cars in interstate traffic, cars should be adjusted when empty, as far as possible. In order to justify a bill for work done under the Rules of Interchange, an empty car should be adjusted to 34½ inches, or within ¼ inch thereof, and when it is necessary to alter a loaded car it should be adjusted to 33½ inches or within ¼ inch thereof, or as near as possible to such height as will bring it to 34½ inches when the car is unloaded.

In 1901 this was changed from Recommended Practice to Standard, as a result of letter ballot.

This standard conforms to the order of the Interstate Commerce Commission dated October 10, 1910.

Automatic Car Coupler Knuckle. See KNUCKLE.

Automatic Car Coupler Knuckle Lock Lift. See COUPLER LOCK LIFTER.

Automatic Car Coupler (M. C. B. Standard Specification). In 1899 specifications and tests for M. C. B. automatic couplers were adopted as Recommended Practice. In 1903 they were revised.

In 1905 they were revised and adopted as a Standard. Revised 1909.

In 1911 the word "Coupler" was defined to include the bar and contained parts within the head.

In 1911 the manufacturer's mark was required on the head of the knuckle pivot pin.

In 1912 the specifications were changed to permit of an underneath unlocking device operating with an upward movement.

In 1913 the guard-arm test was readopted as a Standard in place of the face test and specifications revised as to form only, as follows:

Specifications revised in 1915 to take care of the number of samples being reduced from 13 to 8, by increasing the lots from 100 to 200 couplers.

In 1915 paragraph 39 was modified.

1. The couplers will be subject to the inspection and test of the railroad company as to their workings, general condition and strength.

2. *Place of Inspection and Test.*—The test and inspection will be made at the place of manufacture.

3. *Help.*—All necessary assistance and labor for making inspection, tests and prompt shipment shall be furnished by the manufacturer free of charge.

4. *Ordering.*—Couplers shall be ordered as far as practicable in lots of 1,000.

5. For each 1,000 ordered, the manufacturer shall furnish 1,008 and 6 additional knuckle pivot pins, and in the event of additional couplers or knuckle pivot pins being required to carry out the tests, they shall be furnished free of cost by the manufacturer.

6. *Definitions.*—The word "Coupler" as here used includes the bar itself and the contained parts within the head, such as locks, knuckle throws, etc.

I. MANUFACTURE.

7. *Manufacture.*—The couplers furnished under these specifications shall be made of steel in accordance with the best foundry methods and shall not be painted.

9. *Annealing.*—All parts shall be well annealed throughout.

II. PHYSICAL PROPERTIES AND TESTS.

10. *Drop-test Machine.*—The testing machine approved by the Master Car Builders' Association shall be used for the testing of couplers. For drop-testing machine and details, see Figs. 29, 29-A, 29-B, 29-D and 29-E.

11. *Test No. 1, Striking Test on Closed Knuckle of Completed Coupler, Taking Sample for Test No. 1.*—After the inspection by the manufacturer and the railroad inspector, as per sections 38 and 40, the latter shall select one complete coupler, taken at random from each of the lots as provided for in section 39 and subject them to the following test:

12. *Preparation for Test No. 1.*—As a preliminary, the coupler shall be marked on the bottom of butt with a center-punch line, parallel to the axis of the shank, this line to extend to the inner face of the knuckle (see Fig. 1). The coupler shall be rigidly fixed in the machine in a vertical position, with the axis of the coupler in the center line of drop, the pivot pin hole parallel to line through center of legs of machine and the butt blocked solidly on the anvil to prevent lateral motion, by means of steel fillers and wedges, the latter sledged down tight, this sledging repeated after each blow. The heights of support from bottom of butt end should not be greater than 10½ in.

13. *Striking Test.*—Blows to be struck directly on knuckle.

Three blows of 1,640 lb. falling 5 feet.

Three blows of 1,640 lb. falling 10 feet.

14. *Failure of Test No. 1.*—The coupler shall be considered as having failed to stand this test if it is broken before it has received three blows at 5 feet and three blows at 10 feet, or if any crack appears more than 1 inch long or open more than 1/16 inch or the center-punch line measured at the contour is distorted more than 1⅞ inches after having received three blows at 10 feet, or if the knuckle is closed more than ¾ inch from its original position, when pulled out against the lock by hand after receiving three blows at 5 feet, or if the knuckle will not open, or if the locking device is inoperative after test. For measuring axial distortion and knuckle closure see Figs. 1 and 2.

Note.—The knuckle should be pulled out against lock by hand as far as it will go and not pushed in to the extent of play when making the original measurement of distance from face of bar to pulling face of knuckle.

15. *Retest.*—If the coupler fails to stand the prescribed tests, but, before failing, stands three blows at 5 feet and one blow at 10 feet, a retest will be admissible, and a second coupler shall be taken from the same lot from which the first coupler was taken and tested as per Section 11. If it stands the test, that lot of couplers shall be accepted as far as test No. 1 is concerned; otherwise that lot of couplers shall be rejected and another lot substituted and tested in the same way.

16. *Taking Samples for Tests Nos. 2, 3 and 4.*—From each 1,003 couplers accepted by test No. 1, three complete couplers shall be selected by the inspector, one of which shall be subjected to test No. 2, one to test No. 3 and one to test No. 4 hereafter specified.

17. *Retest for Tests Nos. 2, 3 and 4.*—If any coupler fails to stand the prescribed test, but before failing stands a sufficient number of blows to make a retest admissible, a second coupler shall be taken from the same lot or lots from which the first was taken. For instance, if the coupler selected for test No. 3 has been taken from the fourth 200 couplers

and the failure allows a retest, a second coupler shall be taken from the fourth 200 couplers. If it stands the test, that lot of 1,000 couplers shall be accepted as far as that test is concerned, otherwise that lot shall be rejected and another lot of 1,000 couplers substituted.

18. *Test No. 2, Guard-arm Test of Drawbar.*—As a preliminary, pivot pin, knuckle and locking device having been removed, the coupler must be marked on bottom with a center-punched line (see points 1, 2 and 3 in Figs. 3 and 4) parallel to axis of shank and extending to the contour face; a center-punched mark must also be placed at the end of guard arm and on lug (see Fig. 3). The coupler must be blocked rigidly in a vertical position in the machine with steel fillers and wedges, the latter sledged down tight and the sledging repeated after each blow. The butt must rest solidly on the anvil and must be blocked to prevent lateral motion. The edge of guard arm must be on line through centers of legs of machine.

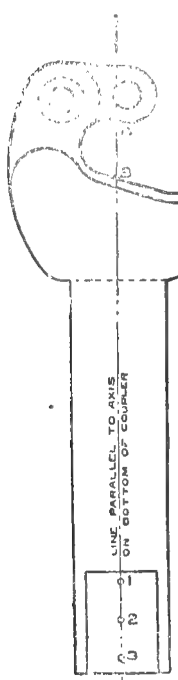


FIG. 1.
BEFORE TEST

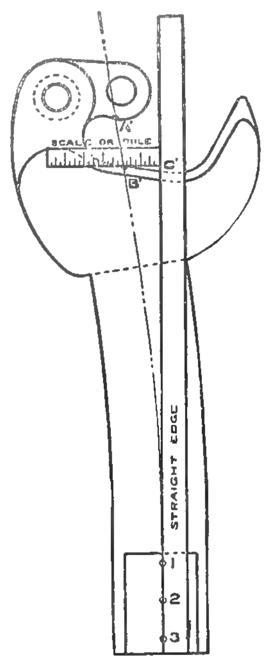


FIG. 2
AFTER TEST

METHOD OF MEASURING DEFLECTION IN TEST NO. [illegible] MEASURES AXIAL DEFLECTION AND MUST NOT EXCEED [illegible] CLOSURE AND MUST NOT EXCEED [illegible]

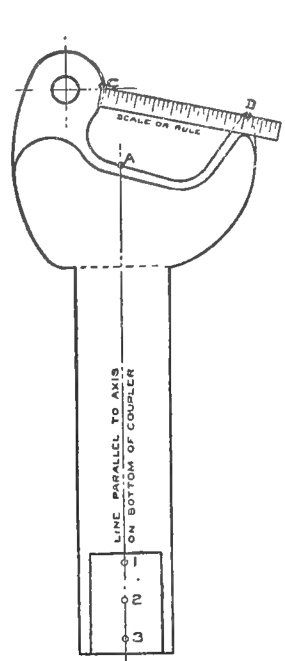


FIG. 3
BEFORE TEST

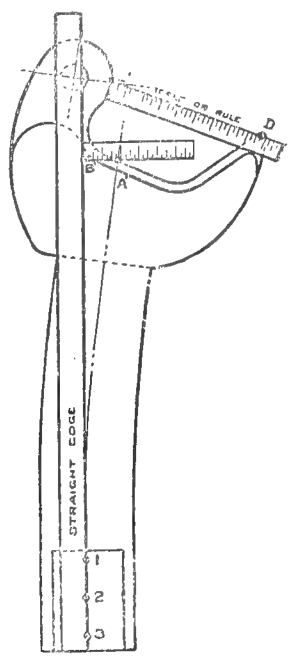


FIG. 4.
AFTER TEST

METHOD OF MEASURING DEFLECTION IN TEST NO. 2.
A B' MEASURES AXIAL DEFLECTION AND MUST NOT EXCEED 1½" FOR COUPLERS WITH 5×7 SHANK OR 1⅞" FOR COUPLERS WITH 5×5 SHANK
C'D—CD MEASURES GUARD ARM DISTORTION AND MUST NOT EXCEED 7/16

19. *Guard-arm Test.*—Blows to be struck directly on guard arm.

Three blows of 1,640 lb. falling 3 feet.

Four blows of 1,640 lb. falling 5 feet.

20. The coupler shall be considered as having failed to stand this test if it is broken before it has received three blows at 3 feet and four blows at 5 feet, or if any crack appears more than 1 inch long or open more than 1/16 inch or if the center-punched line is distorted more than 1½ inches for 5 by 7 inch shank, or 1⅞ inches for 5 by 5 inch shank couplers, or if the distance between center-punch marks on bottom of head has widened more than 7/16 inch. For method of measuring axial and guard-arm deflection, see Figs. 3 and 4. Should the bar before failing stand three blows at 3 feet and two blows at 5 feet, another coupler shall be provided and tested as per Section 17 governing retest for Tests Nos. 2, 3 and 4.

21. *Test No. 3, Jerk Test of Complete Couplers, Preparation.*—One coupler shall be placed in an inverted position in the yoke forging of test machine and equalizer bar placed so as to rest level, one end in the closed knuckle, the other resting central on the spring follower cap.

22. *Jerk Test.*—The weight shall strike the equalizer bar midway between the center line of coupler and the center line of the spring follower cap.

Three blows of 1,640 lb. falling 5 feet.

Three blows of 1,640 lb. falling 10 feet.

23. *Failure of Test No. 3.*—A coupler shall be considered as having failed to stand this test if it is broken before it has received three blows at 5 feet and three blows at 10 feet, or if any crack appears more than 1 inch long or open more than 1/16 inch or if the knuckle is open more than ¾ inch from its original position after the third blow at 10 feet, or if the equalizer bar will not stay in place when struck, or if the knuckle will not open or if the locking device is inoperative after receiving the full test. Should the coupler fail to stand the prescribed test, but stand three blows at 5 feet and one blow at 10 feet, another complete coupler shall be provided and tested as per Section 17 governing retests for Tests Nos. 2, 3 and 4.

24. *Test No. 4, Pulling Test of Complete Coupler.*—One complete coupler shall be supported in the machine by yoke forging and locked as in a running position to a dummy, the axes of the coupler and dummy to be in the same straight line. The dummy shall have the contour lines of an M. C. B. coupler, with the exception of the guard arm, which may be omitted. The coupler shall stand a steady pull of 150,000 pounds.

25. *Failure of Test No. 4.*—A coupler shall be considered as having failed to stand this test if it is broken before it has been pulled the prescribed number of pounds, or if any cracks appear more than 1 inch long or open more than 1/16 inch or if the knuckle has opened more than ⅝ inch from the original position, when pulled out against the lock, or if it slips apart from the dummy in the machine, or if the knuckle will not open, or if the locking device is inoperative after test. Should the coupler fail to stand the prescribed

test, but before failing stand a pull of 100,000 pounds, another complete coupler shall be provided and tested as per section 17 governing retest for Tests Nos. 2, 3 and 4. The measurement of the knuckle opening shall be obtained after the pressure is released.

26. *Failure of Parts.*—The final failure of any part to meet test shall not condemn the complete coupler, but only that part which fails, and such parts in all couplers represented shall be replaced, after which the test shall proceed, using new couplers, as if no part of the test had been made.

(a) *Note.*—Any part of any coupler which has been subjected to test is condemned for service.

27. *Test of Pivot Pins.*—If the lot of 1,000 couplers is accepted on test No. 1, the inspector shall take at random from the accepted couplers five pivot pins, and from the extra six pivot pins one, making a total of six, which shall be subjected to the requirements of the specifications for knuckle pivot pins. If these pins pass the required inspection and test, the couplers complete may be accepted.

28. *Failure of Pins.*—If the pins do not pass the inspection and tests prescribed in the specifications for knuckle pivot pins, the manufacturer will be required to present a new lot of 1,000 pivot pins, which shall be treated in accordance with the requirements of the specifications for knuckle pivot pins. If these are accepted, then the manufacturer will be required to remove all the former lots of pins in the couplers otherwise acceptable and substitute the lot of pins accepted.

III. DIMENSIONS AND GAGES.

29. *Dimensions.*—Couplers must conform to M. C. B. standard drawings and contour lines, and the dimensions of butt and shank shall be within the limits of variations shown by M. C. B. standard drawings.

30. *Gages.*—Standard M. C. B. gages shall be used in gaging all parts for which gages are provided.

IV. WORKMANSHIP AND FINISH.

31. *Workmanship.*—Bars, knuckles, locking pins or blocks and knuckle pivots pins shall be accurately made to gages furnished by the manufacturer. These gages shall govern all dimensions representing fitting surfaces, thereby insuring absolute interchangeability and freedom of motion between the assembled parts without adjustment or machining. When assembled, knuckles and locking pins or blocks must work freely, but the lost motion between knuckle and bars must not permit more than ⅛ in. vertical play, or between knuckles and locks must be such that the knuckle can not be pulled forward by hand beyond the proper contour line, but ¼ in. to ⅜ in. lost motion in opposite direction is desirable. Bars and knuckles shall not be accepted if distorted by improperly matched flasks or by any other defects due to molding.

32. *Finish.*—They shall be free from injurious shrinkage cracks, flaws, checks, and sand holes or blow holes.

33. *Holes, Drilled or Cored.*—The holes for pivot pins in lugs of bars and knuckles may be drilled, or if cored shall be broached out, and shall not be more than 1/32 inch larger than pin, and rivet holes in butt shall be drilled, or if cored, shall be broached out. The holes shall be parallel to the face of the bar or knuckle and at right angles to the axis of the bar or knuckle.

34. *Faces.*—The pulling and contact faces of couplers and knuckles shall be clean, smooth, and at right angles to axis of bar.

V. MARKING.

35. *Marking.*—The name of coupler shall be legibly cast on the top side of head of the bar. The knuckle shall also bear the name of the coupler and the manufacturer's name or identification mark legibly cast or stamped at some point where it will not be worn off. Knuckle pins shall bear the manufacturer's mark on the head of pin.

36. *M. C. B. Marking.*—Every coupler and knuckle made to comply with these specifications shall have a slightly raised plate or flat surface cast upon the head in plain view, where it will not be subject to wear. After a lot of complete couplers have successfully passed inspection and tests herein required, the letters M. C. B. shall be legibly stamped upon the plate at each coupler and knuckle, this mark to be evidence that the complete coupler is an M. C. B. Standard.

37. *Serial Number.*—Each knuckle and drawbar shall bear the serial number legibly stamped or cast on it.

VI. INSPECTION AND GROUPING.

38. *Manufacturer's Inspection.*—The couplers shall be thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness and dimensions of parts, etc., herein specified.

39. *Grouping.*—Couplers shall then be arranged in lots of 201 and 202 so as to provide for the necessary 1008 couplers specified in section 4. Where possible, care should be taken to put all couplers of the same melt number or numbers in the same lot or lots.

40. *Purchaser's Inspection.*—The inspector shall then inspect and gage each coupler as to its compliance with drawing sizes and for surface defects and proper contour lines. Any irregularities or swollen parts on the working or bearing faces shall be ground or chipped off before the couplers are accepted.

VII. MECHANISM.

41. *Operating Parts.*—Couplers shall have a lock set within the head of the coupler. They shall be so designed as not to part when the knuckle pin is broken or removed. They shall couple or uncouple with each other (with either or both knuckles open) and also with the master or sample coupler. They should lock easily when the knuckle is pushed in with the hand. They shall have steel pivot pins 1⅝ in. diameter of sufficient length to permit applying a ⅜ inch cotter pin through the pin below the coupler lug and in every way conforming to the requirements as stated in the specifications for knuckle pivot pins.

42. *Lock Lift.*—The lock lift shall be in the central longitudinal vertical plane of the coupler, located between the vertical plane of the striking horn and contour lines, and shall operate either from the top or bottom by an upward movement. The total lift of locking pin shall not be more than 6 inches.

SPECIFICATIONS FOR KNUCKLE PIVOT PINS—STANDARD.

In 1907 the following specifications were adopted as Recommended Practice and made Standard in 1909. Revised as to form in 1913. In 1914 specifications for heat-treated knuckle pivot pins were adopted as Recommended Practice.

1. The knuckle pivot pins will be subject to the inspection and tests of the railroad company for general condition and strength.

2. *Place of Inspection and Test.*—The inspection and test will preferably be made at the place of manufacture.

3. *Help.*—All necessary assistance and labor for making inspection, tests and prompt shipment, shall be furnished by the manufacturer free of charge.

4. *Ordering.*—Knuckle pivot pins shall be ordered as far as practicable in lots of 500.

The manufacturer shall furnish three extra pins with each order of 500 pins, and in the event of additional pins being required to carry out the prescribed tests they shall be furnished free of cost by the manufacturer

I. MANUFACTURE.

5. *Process.*—All knuckle pivot pins ordered under these specifications shall be made from open-hearth steel, properly forged and then annealed and shall not be painted.

II. PHYSICAL PROPERTIES AND TESTS.

6. *Drop-test Machine.*—The testing machine approved by the Master Car Builders' Association shall be used in the test of knuckle pivot pins.

7. *Sampling.*—From each lot of 503 pins, the inspector shall select three pins taken at random and subject them to the cross-bending drop test as hereinafter specified.

8. *Cross-bending Test.*—The cross-bending test will be made in a standard M. C. B. drop-testing machine. The pins resting on rounded supports held rigidly 10 in. center to center to be subjected to a blow by the standard weight of 1,640 lbs. falling at a height of 3 feet. The blow of the weight should be transmitted to the specimen by a block having a round lower edge resting on the specimen. The radius of all these round edges is to be ¾ in. All pins are to be tested cold and shall not show any cracks or fractures. The bend shall be directly under the nose of the plunger.

9. *Failure.*—Pins will be rejected if they crack, break or show a deflection less than 15 degrees or greater than 35 degrees.

10. *Retest.*—If one of the pins fails to stand the test herein required and the other two pass, three more pins shall be selected at random from the same lot from which the first pins were taken. If all three of these pins stand the prescribed tests, that lot of pins will be accepted, otherwise that lot of pins shall be rejected and another lot substituted and tested in same way.

III. DIMENSIONS AND GAGES.

11. *Permissible Variations.*—All pins shall not be more than 1 41/64 in. nor less than 1 39/64 in. in diameter determined by a suitable gage and shall not vary more than ⅛ in. above or below the proper length.

IV. WORKMANSHIP AND FINISH.

12. *Workmanship.*—The head shall be well formed and the pins which are not straight and true, and those which have blisters or surface defects of any kind, will be rejected.

13. *Finish.*—The lower end of the pin shall be cut off square and have at least ¼ in. bevel or chamfer. The cotter-pin hole to be properly drilled for ⅜ in. cotter.

V. MARKING.

14. *Marking.*—Pivot pins shall have the manufacturer's marks on the head of the pin.

VI. INSPECTION AND REJECTION.

15. *Manufacturer's Inspection.*—Knuckle pivot pins shall be thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness, dimensions of parts, etc., herein specified.

16. *Grouping.*—Knuckle pivot pins shall then be arranged in lots of 503, and, where possible, care should be taken to put all pins of the same melt number or numbers in the same lot or lots.

17. *Purchaser's Inspection.*—The inspector shall then inspect and gage each knuckle pivot pin as to its compliance with drawing sizes and for surface defects.

SPECIFICATIONS FOR SEPARATE KNUCKLES—STANDARD.

In 1904 the following specifications were adopted as Recommended Practice for separate knuckles and in 1907 advanced to Standard. Revised as to form in 1913.

1. Knuckles will be subject to the inspection and tests of the railroad company as to their general condition and strength.

2. *Place of Inspection and Test.*—The tests and inspection will be made at the place of manufacture.

3. *Help.*—All necessary assistance and labor for making inspection, tests and prompt shipment shall be furnished free by the manufacturer.

4. *Ordering.*—Knuckles will be ordered as far as is practicable in lots of 100 each.

For each 100 knuckles ordered the manufacturer shall furnish 102, and in the event of additional knuckles being required to carry out tests, they shall be furnished free of cost by the manufacturer.

I. MANUFACTURE.

5. *Manufacture.*—The knuckles furnished under these specifications shall be made of steel in accordance with the best foundry methods and shall not be painted.

6. *Annealing.*—All parts shall be well annealed throughout.

7. *Number Cast in One Melt.*—As many knuckles as possible shall be cast from the same melt.

II. PHYSICAL PROPERTIES AND TESTS.

8. *Drop-test Machine.*—The testing machine approved by the Master Car Builders' Association shall be used in the test of knuckles.

9. *Sampling.*—From each lot of 102 knuckles the inspector shall select two knuckles at random from lot or lots and subject one to test No. 1 and other to test No. 2.

10. *Test No. 1—Striking Test—Preparation.*—The striking test back block and knuckle supports are placed in the housing against the back and sides, the knuckle dropped in between the supports and held by inserting the pin through the holes in the knuckle supports. The knuckle is then adjusted by means of liners between the back block and the knuckle supports and between the knuckle supports and the housing. The striking block is then placed in the housing casting resting upon the knuckle. A fitting piece made to suit the type of knuckle is slipped into position between the tail and housing casting so that the striking face of the knuckle is in a horizontal position.

11. *Striking Test.*—Blows to be struck on striking block, through which they are transmitted to knuckle

3 blows of 1,640 lbs. falling 4 feet.

3 blows of 1,640 lbs. falling 8 feet.

12. *Failure of Test No. 1.*—The knuckle shall be considered as having failed to stand this test if it is broken before it has received three blows at 4 feet and three blows at 8 feet, or if any crack appears more than 1 inch long or open more than 1/16 inch.

13. *Retest.*—If this knuckle fails to stand test No. 1, but before failing stands three blows at 4 feet and one blow at 8 feet, a retest will be admissible and another knuckle shall be taken from the same lot and tested as per section 9.

14. *Jerk Test—Preparation.*—The jerk test back block and knuckle supports are placed in the housing against the back and sides, the knuckle dropped in between the supports and held by inserting the pin through the hole in the knuckle supports. The knuckle is then adjusted by means of liners between the back block and knuckle supports and between the knuckle supports and the housing. The striking block is then inserted, resting on the inner face of the knuckle and a block of suitable size inserted between the tail of the knuckle and striking block so that the striking face of the knuckle is in a horizontal position.

15. *Note.*—If preferred by manufacturers, an old coupler and lock of the same kind in which the knuckle fits properly and which may be suitably reinforced in order to endure as many tests as possible may be used in place of supporting casting for this test.

16. *Jerk Test.*—Blows to be struck on the striking block, through which they are transmitted to the knuckle.

3 blows of 1,640 lbs. falling 3 feet.
2 blows of 1,640 lbs. falling 6 feet.

17. *Failure Test No. 2.*—The knuckle shall be considered as having failed to stand this test if it is broken before it has received three blows at 3 feet and two blows at 6 feet, or if any crack appears more than 1 inch long or open more than 1/16 inch.

18. *Retest.*—If this knuckle fails to stand test No. 2, but before failing stands three blows at 3 feet, a retest will then be admissible, and another knuckle will be taken from the same lot and tested as per section 14.

III. DIMENSIONS AND GAGES.

19. *Dimensions.*—These shall be within the limits of variations shown by M. C. B. Standard drawings.

20. *Gages.*—Standard M. C. B. gages shall be used in gaging all parts for which gages are provided.

IV. WORKMANSHIP AND FINISH.

21. *Workmanship.*—Knuckles shall be accurately made to gages furnished by the manufacturer. These gages shall govern all dimensions representing fitting surfaces, thereby insuring absolute interchangeability without machining. Knuckles shall not be accepted if distorted by improperly matched flasks or by any other defects due to molding.

22. *Finish.*—They shall be free from injurious shrinkage cracks, flaws, checks and sand holes or blow holes.

23. *Holes, Drilled or Cored.*—The holes for pivot pins in knuckles should be drilled, or if cored shall be broached out, and shall not be more than 1/32 in. larger than 1⅝ in. diameter pivot pins. The holes shall be parallel to the face of the knuckle and at right angles to the axis of the knuckle.

24. *Faces.*—The pulling and contact faces of knuckles shall be clean and smooth.

V. MARKING.

25. *Marking.*—Each knuckle shall bear the name of the coupler, a serial number and the name of the manufacturer or identification marks legibly cast at some point where it will not be subject to wear.

26. *M. C. B. Marking.*—Each knuckle made to comply with these specifications shall have a raised plate or flat surface cast upon at the head in plain view where it will not be subject to wear. After a lot of knuckles have successfully passed the inspection and tests prescribed herein, the letters M. C. B. shall be legibly stamped upon the plate on each knuckle, this mark to be evidence that the knuckle is an M. C. B. Standard.

VI. INSPECTION AND GROUPING.

27. *Manufacturer's Inspection.*—The knuckles shall be thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness and dimensions of parts, herein specified.

28. *Grouping.*—Knuckles shall then be arranged in lots of 102 and, where possible, care should be taken to put all knuckles of the same melt number or numbers in the same lot or lots.

29. *Purchaser's Inspection.*—The inspector shall then inspect and gage each knuckle as to its compliance with drawing, sizes, and for surface defects and proper contour lines. Any irregularities or swollen parts on the working or bearing faces shall be ground or chipped off before knuckles are accepted.

Automatic Car Coupler. Specifications for Heat-Treated Knuckle Pivot Pins for Passenger and Freight Equipment Cars. (M. C. B. Recommended Practice.)

I. MANUFACTURE.

1. *Process.*—The steel shall be made by the open-hearth process.

2. *Heat Treatment.*—The pins shall be properly heat-treated to meet the requirements of the physical tests.

II. CHEMICAL PROPERTIES AND TESTS.

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	0.55—0.70	per cent.
Manganese	0.40—0.60	"
Phosphorus, not over	—0.05	"
Sulphur, not over	0.05	"
Silicon	0.15—0.25	"

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, to determine the percentage of carbon, manganese, phosphorus, sulphur and silicon. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 3.

5. *Check Analysis.*—A check analysis shall be made from the finished material representing each melt, by the purchaser or his representative, and shall meet the requirements specified in Section 3.

III. PHYSICAL PROPERTIES AND TESTS.

6. *Drop Tests.*—This test shall be made on a standard "M. C. B." drop test machine, the pins resting on rounded supports held rigidly 10 in. center to center, to be subjected to a blow by a standard weight of 1640 lb. falling from a height

of 3 ft., and shall show a deflection not less than 15 deg. or more than 35 deg. without cracking or breaking.

7. *Number of Tests.*—The manufacturers shall furnish, free of charge, one extra pin with each lot of 200 or less.

IV. PERMISSIBLE VARIATIONS.

8. The diameter of the pins shall conform to the standard M. C. B. limit gages for rounds. The length shall not vary more than ⅛ in. below or above that specified.

V. FINISH.

9. The finished pin shall be straight, have a smooth surface, be uniform in diameter and shall not be painted.

VI. MARKINGS.

10. The manufacturer's name or identification marks shall be stamped on the head of each pin.

VII. INSPECTION AND REJECTION.

11. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of costs, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

12. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, develops weak spots, cracks or imperfections, or is found to have injurious defects, will be rejected and shall be replaced by the manufacturer at his own expense.

13. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Automatic Car Coupler Striking Horn (M. C. B. Standard). In 1899 the vertical height of the stop shoulder, or horn of coupler was fixed at not less than 3½ inches.

In 1899 the recommendation of the Coupler Committee that the horn of the coupler be arranged to touch the striking plate before the back of the head of the coupler strikes the end of the draft timbers, was adopted as a standard of the Association.

Automatic Car Coupler, Uncoupling Arrangements for. See UNCOUPLING ARRANGEMENTS.

Automatic Car Coupler and Yoke Gages (M. C. B. Standard). Fig. 2858, 2859. In 1909 gages to insure proper fitting were adopted for both the coupler and yoke. Gage No. 1 is used on 6½-inch butt couplers to gage rivet holes and lug for yoke fitting, also length and height of butt. Gage No. 2 is used on 9⅛-inch butt couplers. Gage No. 3 gages the width and height of shank and width of butt on both 5 by 5 in. and 5 by 7 in. shank couplers. Gage No. 4 gages the length of shank from back of striking horn to back of butt on both 5 by 5 in. and 5 by 7 in. shank couplers. Gage No. 5 gages the rivet holes and the lips on all yokes.

GAGE FOR WORN COUPLERS.—In 1899 the Coupler Committee recommended a form of gage to define the contour lines more fully when worn. This gage was adopted as Recommended Practice.

In 1904 the committee on M. C. B. couplers recommended a modification of the wheel defect gage, which would make a more satisfactory worn limit coupler gage, which was adopted by letter ballot. Modified and adopted as Standard in 1905. Modified 1907.

Automatic Connector (Steam and Air Pipes). Figs. 1475-1481. A device by means of which the steam, air brake and signal pipes are automatically coupled by impact. Allowance is made for vertical and lateral movement, and arrangement is provided for interchange with cars not equipped with the device. See EMERGENCY HEAD BACK-UP CONNECTION.

Automatic Lubricator. A device for feeding at regular intervals a certain quantity of oil or lubricant to a cylinder or some mechanism requiring lubrication. See LUBRICATOR.

Automatic Reducing Valve. See REDUCING VALVE, AUTOMATIC.

Automatic Slack Adjuster. See SLACK ADJUSTER.

Automatic Switch (Electric Lighting). A device connected to the armature of the generator, by which the current is automatically turned onto the lights and batteries when the armature has reached a predetermined speed of rotation and consequent voltage output.

Automatic Train Stop. Fig. 1435. A valve mechanism mounted on the car or locomotive, operated by a track trip, and connected with the brake system so as to produce an automatic emergency application of the brakes at predetermined points when the conditions within any block are such as to forbid train movement into it.

Automatic Ventilator. Figs. 2267, etc. A ventilator which is self-adjusting, so as to exhaust air from a car if the train runs in either direction. See VENTILATOR.

Automatic Window Catch. A device to hold a window sash from being shoved up or down. See SASH LOCK.

Automobile Car. Figs. 19-21, 267, 268. A box car for carrying automobiles and having exceptionally large side or end doors. See CAR.

Auxiliary Belt Rail. A strip of wood nailed to the BELT RAIL as a reinforcement.

Auxiliary Brake Equalizing Lever (Six-Wheel Truck). A short lever to which the brake lever connecting rod is fastened, and which divides the power equally between the center pair of wheels and the outside pair of wheels.

Auxiliary Compression Beam Brace. The same as a CENTER COMPRESSION BEAM BRACE.

Auxiliary Contactor (Motor Cars). A CONTACTOR applied to a control system to open and close the main motor circuits at a point remote from the platform controller, thus eliminating heavy arcing in the controller.

Auxiliary Reservoir. Figs. 1346, 1352, etc. A cylindrical reservoir attached to the under side of a car or tender. It serves to hold a supply of compressed air to operate the brakes of each car, and is supplied from the main reservoir on the engine through the brake pipe.

Auxiliary Reservoir Hanger. A support for the reservoir.

Axle. See below and also CAR AXLE.

Axle (M. C. B. Standard). Fig. 2834. In 1899 it was decided that the standard axles should be known by letters.

In 1901 a designation was given the standard axles, whereby each shall be known to carry a definite weight instead of cars of particular capacity.

AXLE.—A. With journals, 3¾ by 7 inches. Designed to carry 15,000 pounds.

This axle is the standard of the Association for cars of 40,000 pounds capacity.

In 1873 a standard for car axle was recommended, the form and dimensions of which, excepting the diameter in the middle, were substantially the same as shown in this sheet. In 1884 the diameter at the middle was increased from 3⅞ inches to 4¼ inches, by letter ballot.

In 1901 the diameter of wheel seat was changed from 4⅞ to 5⅛ inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle; also a diagram showing location of borings to be taken from steel axles for analysis.

In 1902 further changes were made in the diameter of the tapered portion where it joins the fillet to the rough collar; also in the diameter of the rough collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to ¾ inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to ¼ inch.

AXLE.—B. With journals, 4¼ by 8 inches. Designed to carry 22,000 pounds.

This axle was adopted as a standard of the Association for cars of 60,000 pounds capacity, by letter ballot, in 1889.

In 1901 the diameter of wheel seat was changed from 5⅜ inches to 5¾ inches.

In 1901 a notation was added to the drawing of this axle, showing a straight taper between certain points on the axle; also a diagram showing location of borings to be taken from steel axles for analysis.

In 1901 the diameter of the middle was increased from 4⅝ inches to 4¾ inches.

In 102 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to ¾ inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to ¼ inch.

In 1910 the radius of dust-guard fillet was increased from ¼ inch to ⅝ inch, and the wheel seat fillet from ¾ inch to ⅝ inch.

AXLE.—C. With journals, 5 by 9 inches. Designed to carry 31,000 pounds.

This axle was adopted as recommended practice in 1896, and was made a standard of the Association in 1898.

In 1901 the diameter of wheel seat was changed from 6⅜ inches to 6½ inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle; also a diagram showing the location of borings to be taken from steel axles for analysis.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar; also in the diameter of the rough collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to ¾ inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to ¼ inch.

In 1910 the radius of the dust-guard fillet was increased from ¼ inch to ¾ inch.

AXLE.—D. With journals, 5½ by 10 inches. Designed to carry 38,000 pounds.

This axle was adopted as a standard of the Association in 1899.

In 1901 the diameter of wheel seat was changed from 6⅞ inches to 7 inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle; also a diagram showing the location of borings to be taken from steel axles for analysis.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar; also in the diameter of the rough collar.

In 1906 a ¾-inch radius was adopted between the wheel fit and the rough collar adjoining the inside hub of the wheel; also the radius between the dust guard and wheel fit was increased to ¼ inch.

In 1907 the center from which the radius of ¾ inch is struck was made coincident with the inside face of the hub of the wheel.

In 1910 the radius of the dust-guard fillet was increased from ¼ inch ¾ inch.

AXLE.—E. With journals, 6 by 11 inches. Designed to carry 50,000 pounds.

In 1910 an axle of the design and carrying capacity shown in the drawing was adopted as Recommended Practice advanced to standard in 1913.

Axle Collar. A rim or enlargement on the end of a car axle, which takes the end thrust of the journal bearing.

Axle Gages. Gages for fixing the lengths and diameters of an axle. Were at one time standards of the M. C. B. Association.

Axle Generator (Electric Lighting). Figs. 2428, etc. A small direct current generator usually mounted on a car or tender truck and driven by a belt, gear, or chain from the axle. These generators are always provided with some automatic device, forming either a part of the machine itself or being in the form of an auxiliary device mounted inside the car, for preserving the polarity of the terminals or leads of the generator.

The fact that a car may run in either direction and thereby cause rotation in either direction of the armature of the generator renders an automatic device of this kind absolutely necessary.

Axle Guard. 51 and 60, Figs. 991, 1010. A beam or bar supported by a truck frame and extending over the axles. Iron straps attached to this beam form a support for the axle in case of breakage. See END AXLE GUARD.

Axle Guard Truss. A wrought iron forged bar connecting the iron transoms of a six-wheel truck, and carrying the middle axle guard.

Axle Lighting. See ELECTRIC LIGHTING.

Axle Pulley. Figs. 2459, etc. The belt pulley mounted upon the car axle for driving the axle generator. When a chain is used the pulley is commonly termed a sprocket wheel.

Axle Pulley Bushing. A bushing or sleeve, split longitudinally and bored conically inside to fit the tapering car axle and turned cylindrically outside to fit the hub of the axle pulley.

Axle Safety Bearing (Passenger Car Trucks). The axle guard of a truck above the axle and the axle safety hanger below it, together forming a circle around the axle, are sometimes called axle safety bearing.

Axle Safety Hanger. 55, Figs. 991, 1010. A strap connected to an axle guard and passing under the axle to support it in case of breakage. See AXLE GUARD.

Axle Seat. The inside surface of the hole in a car wheel which comes in contact with the axle, and not the hole itself. The corresponding part of an axle is called the wheel seat or wheel fit.

Axle Specifications. (M. C. B. Standard.) Fig. M. C. B. 15.

SPECIFICATIONS FOR STEEL AXLES.

In 1899 the following specifications, including tests for steel axles for passenger and freight equipment cars were adopted as Recommended Practice:

In 1914 they were modified and revised as to form and advanced to Standard.

I. MANUFACTURE.

1. *Process.*—The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS.

2. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	0.38—0.52 per cent.
Manganese	0.40—0.60 "
Phosphorus, not over	0.05 "
Sulphur, not over	0.05 "

3. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, to determine the percentage of carbon, manganese, phosphorus, sulphur and silicon. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 2.

4. *Check Analysis.*—A check analysis shall be made from the finished material representing each melt, by the purchaser or his representative, and shall meet the requirements specified in Section 2.

III. PHYSICAL PROPERTIES AND TESTS.

5. *Drop Tests.*—The axles shall conform to the following drop-test requirements:

(a) The test axle shall be so placed on the supports that the tup will strike it midway between the ends. It shall be turned over after the first and third blows, and when required after the fifth blow. When tested in accordance with the following conditions, the axle shall stand the specified number of blows without fracture, and the deflection after the first blow shall not exceed that specified in Table No. 1.

(b) The deflection is the difference between the distance from a straight-edge to the middle point of the axle, measured before the first blow, and the distance measured in the same manner after the blow. The straight-edge shall rest only on the collars or the ends of the axle.

6. *Drop-Test Machine.*—The anvil of the drop-test machine shall be supported on 12 springs, as shown on the M. C. B. drawings, and shall be free to move in a vertical direction, and shall weigh 17,500 lbs. The radii of the striking face of the tup and of the supports shall be 5 in.

TABLE I.

Size of Axle, In.		Capacity of Cars, Lb.	Distance between Supports, Ft.	Weight of Tup, Lb. 1640			2200		
Journal.	Diam. at Center.			Hght. of Drop, Ft.	Number of Blows.	Max. Deflection, In.	Hght. of Drop, Ft.	Number of Blows.	Max. Deflection, In.
4¼ x 8	4¾	60,000	3	34	5	7½	..	..	..
5 x 9	5⅜	80,000	3	43	5	6¼	..	..	..
5½x10	5⅞	100,000	3	43	7	4½	..	.	..
6 x11	6 1/16	......	3	..	..	..	40	7	5¼

7. *Number of Tests.*—(a) One drop test shall be made from each melt. Unless otherwise specified, not less than 30 axles shall be offered from any one melt.

(b) If the test axle passes the physical tests, the inspector shall draw a straight line 10 in. long parallel with the axis of the axle, and starting with one end of it he shall prick-punch this line at several points. A piece 6 in. long shall be cut off from this same axle so as to leave some prick-punch marks on each piece of axle. Drillings for chemical analysis shall be taken by using a ⅝-in. drill and drilling in the cut-off end 50 per cent of the distance from the center to the circumference and parallel with the axis of the axle.

IV. WORKMANSHIP AND FINISH.

8. *Workmanship.*—All axles shall be made and finished in a workmanlike manner and all journals and wheel seats shall be rough-turned. In centering, unless otherwise specified, 60-deg. centers shall be used with large diameter of countersink not less than ⅞ in and with clearance drilled ½ in. deep.

9. *Finish.*—The axles shall be free from injurious defects and shall have a workmanlike finish.

V. PERMISSIBLE VARIATIONS AND WEIGHTS.

10. *Permissible Variation.*—The axle shall conform in size and shape to the standard M. C. B. drawings. Length shall not be less than shown and not more than 3-32 in. over.

VI. MARKING AND STORING.

11. *Marking.*—The manufacturer's name or brand, melt number and month and year when made shall be legibly stamped on each axle on the unfinished portion, unless otherwise specified.

12. *Storing.*—If, as a result of the inspection and tests, more axles are accepted than the order calls for, such accepted axles in excess shall be stamped by the inspector with his own name, and will then be piled and allowed to remain in stock at the works, subject to further orders from the purchasing agent. On receipt of further orders, axles once accepted will not be subjected to further test. In all cases the inspector will keep an accurate record of the melt numbers and the number of axles in each melt which are stored and will transmit this information with each report.

VII. INSPECTION AND REJECTION.

13. *Inspection.*—(a) The inspector shall examine each axle in each melt for workmanship, defects, and

to see whether the axles conform to the dimensions given on the order or tracing, or whether they conform to the specifications. All axles not satisfactory in these respects shall not be considered further. If in this inspection defects are found which the manufacturer can remedy while the inspector is at the works, he may be allowed to correct such defects.

(b) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(c) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(d) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

14. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, develops any imperfections, shall be rejected and shall be replaced by the manufacturer at his own expense.

15. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of the tests, the manufacturer may make claim for a rehearing within that time.

Axle Specifications (M. C. B. Recommended Practice).

SPECIFICATIONS FOR IRON AXLES.

In 1899 the following specifications, including tests for iron axles, were adopted as Recommended Practice:

Car axles for the use of this company will be ordered subject to the following conditions:

1. All axles must conform in shape and size to the dimensions shown on the blue-prints, which will be furnished by the.............. R. R. Co.

2. All axles must be cut off and faced to exact lengths, and be centered with 60 degree centers in the manner indicated in blue-prints, so as to prevent lathe centers from bottoming. Axles must be made of double-work fagoted scrap, 16 per cent of new bar iron worked into the center of the axles being allowed if desired. Axles must be well hammered and free from any clearly defined upon seams. They must finish in the lathe with journal free from flaws in the shape of holes, pieces shelled, out, or open seams large enough, so that with a knife blade scale or dirt can be removed from such seams, or open seams showing a clear opening of 1-32 inch or over, and being more than 1 inch long. The maker's name or initials must be stamped plainly on each axle.

3. All axles are to be inspected and tested at the works where they are made. The..............shall be notified when they are ready for inspection. Under no circumstances shall car axles be shipped from the works where they are made until they have been tested, inspected and accepted by a proper representative of the company.

4. For each one hundred axles or fraction thereof ordered, one additional axle must be furnished for test. This axle will be selected at random from the pile, and subjected to the prescribed drop test for iron axles of its class. If it stands the test the one hundred axles, or fractional part thereof that it represents, will be inspected, and only those accepted that are made in a workmanlike manner and are free from defects mentioned in these specifications. All axles received are subject to rejection if they do not finish in the lathe in accordance with the requirements herein given. The manufacturer must furnish, free of charge, the axles that are to be tested, the testing apparatus, and the assistance necessary to enable the inspector to make a satisfactory inspection test. Axles will not be accepted if the diameters fall below the dimensions for forged sizes given in the blue-prints, or if exceeding those dimensions by more than ⅛ inch. Car axles in the rough must not have less than the prescribed minimum weight, nor more than the prescribed maximum weight for axles of their class.

AXLE DROP TEST.

5. All axles will be tested physically by drop test. The testing machine must conform in its essential parts to the drawings adopted by the Master Car Builders' Association. These essential parts are: The points of support on which the axle rests during tests must be three (3) feet apart from center to center; the tup must weigh 1,640 pounds; the anvil, which is supported on springs, must weigh 17,500 pounds; it must be free to move in a vertical direction; the springs upon which it rests must be twelve in number, of the kind described on drawing, and the radius of the supports and of the striking face on the tup in direction of the axis of the axle must be five (5) inches. When an axle is tested it must be so placed in the machine that the tup will strike it midway between the ends, and it must be turned over after the first and third blows, and when required after the fifth blow. After the first blow the deflection of the axle under test will be measured in the manner specified below.

6. It is desired that the axles when tested as specified above shall stand the number of blows at the heights specified in the following table without rupture, and without exceeding, as the result of the first blow, the deflections given:

Axle.	No. Blows.	Height of Drop.	Deflection.
M. C. B. 4¼ by 8 inch journals	5	21½ ft.	7⅛ in.
M. C. B. 5 by 9 inch journals	5	29 ft.	6 1/16 in.
M. C. B. 5½ by 10 journals	5	36 ft.	5 7/16 in.

7. Axles will be considered as having failed on drop test and will be rejected if they rupture or fracture in any way, or if the deflection resulting from the first blow exceeds the following:

M. C. B. axle, 4¼ by 8 inch journals........	8⅛	inches.
M. C. B. axles, 5 by 9 inch journals........	8 1/16	inches.
M. C. B. axle, 5½ by 10 inch journals........	6 1/16	inches.

In order to measure the deflection, prepare a straight-edge as long as the axle by reinforcing it on one side, equally at each end, so that when it is laid on the axles the reinforced parts will rest on the collars of the axle, and the balance of the straight-edge not touch the axle at any place. Next place the axle in position for test, lay the straight-edge on it, and measure the distance from the straight-edge to the axle at the middle point of the latter. Then after the first blow, place the straight-edge on the now bent axle in the same manner as before, and measure the distance from it to that side of the axle next to the straight-edge at the point farthest away from the latter. The difference of the two measurements is the deflection.

B

Babbitt Metal. "An alloy, consisting of nine parts of tin and 1 of copper, used for journal boxes; so called from its inventor, Isaac Babbitt, of Boston. Some variations have been made, and among the published formulae are:

Copper	1	1
Antimony	1	5
Tin	10	50

"Another formula substitutes zinc for antimony.

"The term is commonly applied to any white alloy for bearings, as distinguished from the box metals or brasses in which copper predominates."—Knight.

Babbitt Metal Bearings. A style of bearing of which a great variety of forms exist, which in effect substitutes Babbitt metal in some of its many forms for brass as a bearing surface. Lead lined bearings are different in that they merely use a thin sheet of lead over the brass, to correct slight irregularities and give an even bearing surface.

Back Cylinder Head (Air Brake Cylinder). See NON-PRESSURE HEAD.

Back Face Plate (Steel Tired Wheels). The inner one of the two plates connecting the tire with the hub.

Back Guy (Steam Shovel). An iron rod running from the top of the "A" frame to an anchor over the body bolster under the boiler.

Back Seat Bottom Rail (Longitudinal Seat). A horizontal wooden strip at the back edge, to which a wooden seat bottom is attached.

Back Stop Timber. See BUFFING SUB-SILL.

Back-Up Air Brake. A device on the rear end of the train by which the brakeman can blow a warning whistle or apply the brakes when backing up.

Back-Up Air Brake Cock. Figs. 1483, 1484, 1515. A cock which is operated by the brakeman in applying the back-up air brake.

Back-Up Air Signal. A warning signal which can be operated at the rear of the train when backing up.

Baggage-Buffet Car. Figs. 222, 224. A passenger train car with club and dining facilities and a compartment for carrying baggage. See CAR.

Baggage Car. Figs. 124-131, 220-225, 371-374. See CAR. A car run in passenger service, having wide side doors for the admittance of baggage and with or without windows and end doors.

Baggage Car Generator. See ELECTRIC LIGHTING.

Baggage and Express Car. Fig. 128. See CAR. A car similar to a baggage car, used for either baggage or express matter.

Baggage and Mail Car. Figs. 129-131, 372-374. A car run in passenger service and providing facilities for both baggage and mail matter. See CAR.

Baggage Rack. See BASKET RACK.

Baggage Truck. A vehicle with a frame or rack for carrying baggage, used to move the latter by hand about railway stations.

Bail. A curved handle of a more or less semi-circular form for a pail, bucket, lantern or other utensil.

Baker Car Heater. Figs. 2111, etc. A heater arranged to heat water in a coil of pipe in the inside of the stove, and cause it to circulate through a series of pipes laid near the floor of the car. The fireproof heater has a single coil, 30 feet in length, or a double coil, in a flexible steel, jointless, fireproof safe, with no apertures large enough to permit the escape of live coals. This inner fire pot or safe is enclosed in a flexible steel outside casing, with asbestos sheets between the safe and casing, and between the ash pit bottom and sheet iron bottom; a safety plate covers the feed chute at the top, and a cinder-proof door effectually closes the ash pit at the bottom. The smoke pipe and smoke flue base may be destroyed and leave the fire pot practically fireproof.

Balance Hanger. See BRAKE BEAM ADJUSTING HANGER.

Balance Spring (Passenger Truck Brake Gear). A flat spring from which the brake beam adjusting hanger is suspended and which keeps the brake head balanced in its proper position.

Balance Valve Pressure Regulator. A valve for automatically regulating the pressure in the steam pipes in a car-heating system.

Balanced Side Bearing Truck. See SIDE BEARING TRUCK.

Ball-Bearing (Car Journals). Figs. 1072, 1073.

Ball-Bearing Butt Hinge. A butt hinge, the washer of which is a ball-bearing.

Ball-Bearing Center Plate. Figs. 1079, 1085. A center plate fitted with ball-bearings to reduce the friction in turning.

Ball-Bearing Side Bearing. A side bearing fitted with ball-bearings to reduce the friction in curving. See SIDE BEARING.

Ballast Car. Figs. 42-44, 329, 333, 334. See CAR. A car for carrying ballast for repair and construction work, usually of either the flat or gondola type.

Ballast Plow or **Ballast Spreader.** Figs. 208, 209, 213. See also BALLAST SPREADER. A plow for removing ballast either from cars or from the track. The plow shown in Fig. 209 is used on the tops of flat cars or gondola cars which have side doors and is hauled over the cars either by a locomotive and cable or a special winding engine which takes steam from the locomotive. The plows shown in Figs. 208, 213 are for plowing and spreading ballast from the center of the track and are drawn or pulled by a locomotive. The plows are raised or lowered by hand or compressed air.

Band (for Seat Backs). More properly SEAT BACK MOLDING.

Bar Sash Lift. A sash lift having a short horizontal metal bar attached to two flanged studs or stanchions; used for the large sashes of sleeping and parlor cars.

Bar Shackle (of a Padlock). A rectangular, instead of U-shaped, shackle.

Bars, Mild Steel, Specifications for, for Passenger and Freight Equipment Cars. (M. C. B. Recommended Practice.)

In 1915 the following specifications were adopted:

1. *Scope.*—This grade of material will be used for miscellaneous parts, such as arch bars, bolts, hand holds, steps and for general threading and welding material.

2. *Process.*—The steel shall be made by the open-hearth process.

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	Optional	per cent.
Manganese	Optional	"
Phosphorus, not over	0.05	"
Sulphur " "	0.05	"

This material may be used when so desired for rivet steel.

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken from the pouring of each melt, to determine the percentage of carbon, manganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirement specified in Section 2.

5. *Check Analysis.*—A check analysis shall be made from the finished material representing each melt, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section 2.

6. *Tension Tests.*—The steel shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in....50 000-65 000 for sizes smaller than 1 in. flats and 2 in. rounds.

Tensile strength, lb. per sq. in....50 000-60 000 for larger sizes.

Elongation in 8 in., per cent....1 500 001 tensile strength.

7. *Yield Point.*—The yield point as determined by the drop of the beam of the testing machine shall be one-half the ultimate tensile strength.

8. *Bend Test.*—The test speciment for rounds, squares and hexagon bars shall bend cold through 180 deg. without cracking on the outside of the bent portion, as follows: For material ¾ in. or under in thickness, flat on itself; for material over ¾ in. to and including 1¼ in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for material over 1¼ in. in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

9. *Test Specimen.*—Tension and bend-test specimen shall be of the full section of material as rolled, if possible; otherwise the specimen shall be machined from the material as rolled. The axis of the specimen shall be located at any point one-half the distance from the center to the surface of round bars, or from the center to the edge of flat bars, and shall be parallel to the axis of the bar.

10. *Number of Tests.*—(*a*) All bars of one size shall be piled separately. One bar from each 200 or less shall be selected at random and tested as specified.

(*b*) If any test specimen from the bar originally selected to represent a lot of material contains surface defects not visible before testing, but visible after testing, or if a tension-test specimen breaks outside the middle third of the gage length, one retest from a bar will be allowed.

11. *Permissible Variations.*—(*a*) *Round Bars.*—Round bars shall conform to the limits as given in Table No. 1.

Round steel 2 in. and over in diameter shall not be under size or more than 1/32 in. greater in diameter.

(*b*) *Flat Bars.*—Thickness shall not vary more than corresponding diameter for rounds; thus, 1 in. thick could vary from 0.9905 to 1.0095 in.

(1) Sizes under 3 in. wide shall not be more than 1/32 in. under or over size in width.

(3) Sizes 3 in. and over shall not be under size or more than 1/16 in. wider than ordered.

12. *Finish.*—The finished material shall be smoothly rolled and free from injurious seams, slivers, flaws and other defects, and shall have a workmanlike finish.

13. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

TABLE I.

Nominal Diameter of Steel, In.	Large Size End, In.	Small Size End, In.	Total Variation, In.
¼	0.2550	0.2450	0.010
5/16	0.3180	0.3070	0.011
⅜	0.3810	0.3690	0.012
7/16	0.4440	0.4310	0.013
½	0.5070	0.4930	0.014
9/16	0.5700	0.5550	0.015
⅝	0.6330	0.6170	0.016
¾	0.7585	0.7415	0.017
⅞	0.8840	0.8660	0.018
1	1.0095	0.9905	0.019
1⅛	1.1350	1.1150	0.020
1¼	1.2605	1.2395	0.021
1⅜	1.3860	1.3640	0.022
1½	1.5115	1.4885	0.023
1⅝	1.6370	1.6130	0.024
1¾	1 7625	1.7375	0.025
1⅞	1.8880	1.8620	0.026

(*b*) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

14. *Rejection.*—Material which, subsequently to above tests at mills or elsewhere and its acceptance, develops weak spots or imperfections, or fails to pass any one of the tests herein required, will be rejected, and shall be replaced by the manufacturer at his own expense.

15. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Bars, Refined Wrought Iron, Specifications for (M. C. B. Recommended Practice.)

In 1914, by letter ballot, specifications for refined wrought iron bars for passenger and freight equipment cars were adopted as Recommended Practice, as follows:

1. *Process.*—The finished product shall consist either of new muck-bar iron or a mixture of muck-bar iron and scrap, but shall be free from any admixture of steel. Muck bars shall be made wholly from puddled iron.

2. *Tension Tests.*—Unless otherwise specified, the iron shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in......47,000—53,000
Elongation in 8 in., minimum per cent..........22

3. *Permissible Variations in Physical Properties.*—(*a*) *Tensile Strength.*—Large sections reduced or flats and rounds of ½ in. or under may show a tensile strength of 45,000-52,000 lb. per sq. in.

(*b*) *Elongation.*—Twenty per cent of the test specimens representing one size may show the following percentage of elongation in 8 in.:

½ in. or over, tested as rolled.........20 per cent.
Under ½ in., tested as rolled..........16 per cent.
Reduced by machining................18 per cent.

Flat Bars:

⅜ in. or over, tested as rolled........18 per cent.
Under ⅜ in., tested as rolled.........16 per cent.
Reduced by machining................16 per cent.

4. *Bend Tests.*—(*a*) *Cold-bend Test.*—For round, square and hexagon bars under 2 sq. in. in section, and for flats less than ¾ in. thick, shall bend cold around a pin the diameter of which is equal to the diameter or thickness of the specimen. For rounds, flats and hexagon bars 2 sq. in. or over in section, and for all flat bars over ¾ in. in thickness, around a pin the diameter of which is equal to twice the diameter or thickness of the specimen.

(*b*) *Hot-bend Test.*—The test specimen, when heated to a temperature between 1700 and 1800 deg. F. (light cherry red), shall bend through 180 deg. without fracture on the outside of the bent portion, as follows: For round, flat and hexagon bars under 2 sq. in. in section, flat on itself; for round, flat and hexagon bars 2 sq. in. and over in section, around a pin the diameter of which is equal to the diameter or thickness of the specimen.

(*c*) *Nick-bend Test.*—The test specimen, when nicked 25 per cent around the round bar, and along one side for flat bars, with a tool having a 60-deg. cutting edge, to a depth of not less than 8 or more than 16 per cent of the diameter or thickness of the specimen, and broken, shall not show more than 10 per cent of the fractured surface to be crystalline.

5. *Test Specimen.*—Tension and bend test specimens shall be of the full section of material as rolled, if possible, otherwise the specimens shall be machined from the material as rolled; the axis of the machined specimen shall be located at any point one-half the distance from the center to the surface of round bars, or from the center to the edge of flat bars, and shall be parallel to the axis of the bar.

6. *Number of Tests.*—(*a*) All bars of one size shall be piled separately. One bar from each 200 or less shall be selected at random and tested as specified.

(*b*) If any test specimen from the bar originally selected to represent a lot of material contains surface defects not visible before testing, but visible after testing, or if a tension-test specimen breaks outside the middle third of the gage length, one retest from a bar will be allowed.

7. *Permissible Variations.*—(*a*) *Round bars* shall conform to the standard M. C. B. limit gages.

(*b*) *Flat Bars.*—Thickness shall not vary more than corresponding diameter for rounds: thus, 1 in. thick could vary from 0.9905 to 1.0095 in.

(1) Sizes under 3 in. wide shall not be more than 1/32 in. under or over size in width.

(2) Sizes 3 in. and over shall not be under size or more than 1/16 in. wider than ordered.

8. *Finish.*—The bars shall be smoothly rolled and free from slivers, depressions, seams, crop ends, and evidences of being burned.

9. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

10. *Rejection.*—Material which, subsequently to the above tests at the mills or elsewhere, and its acceptance, develops weak spots, cracks or imperfections, or is found to have injurious defects, shall be rejected and shall be replaced by the manufacturer at his own expense.

11. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Barrel Car. A flat car, racked so as to carry many empty barrels. They are made long, and the racks are very high in order to make up a carload weight.

Barrel Door Bolt. A door bolt made of a round metal bar and held in a round tube or "barrel." It is constructed so that when it is either engaged or disengaged from its keeper it can be turned by a short lever or knob and held in either position by suitable stops.

Barrow Truck. A term sometimes used to designate a two-wheel baggage truck.

Base Board Corner Molding. A light molding at the junction of the base board and the floor.

Base Plate (of a Derrick or Crane). A large plate placed on the floor of the car for supporting the mast. Another method of support is by mast pocket.

Base Washer (Passenger Equipment Car Platform Posts). A metal ring or plate, which forms a bearing for the post on the platform end timber.

Basin. Figs. 1760, etc. A hollow vessel made of porcelain or metal, and in cars usually fixed in a suitable stand with pipes and other attachments for filling it with water and emptying it. Such basins are used as lavatories in sleeping and other passenger cars. They are emptied at the bottom through a pipe connected to the basin by a basin coupling, or basin bushing, which is closed by a basin plug. The basin plug is attached to a basin chain, which again is fastened to a stanchion called the basin chain holder. For standard postal car basin see Fig. 1712. See also FOLDING LAVATORY.

Basin Bushing and Plug. Figs. 1727, 1729. See BASIN.

Basin Plug. Figs. 1727, 1729. See BASIN.

Basin Pump. Figs. 1751, 1752. A pump of peculiar construction for supplying the basin of sleeping and parlor cars from the tank carried under the slab. It is called single or double acting, according as the upward stroke only, or both the upward and downward strokes, eject water. Double acting is most used. The use of basin pumps has been practically discontinued on standard sleeping cars, the water being carried in tanks under the car and forced through the pipes by compressed air. They are still in general use, however, on tourist sleeping cars, chair cars and many day coaches.

Basin Valve. See BASIN. The valve which allows the water to escape from the basin is usually in the form of a plug or WASTE COCK.

Basket Rack. Figs. 1848-1858. A receptacle made of metal ends and rods, or a combination of rods and wire netting for holding parcels and hand baggage. They are attached to the sides of passenger cars, above the heads of the passengers, so as to be out of the way. Continuous basket racks extend the full length of the car, and are increasing in favor.

Basket Rack Bracket. A light metal support for the end or center of a basket rack.

Basket Rack Netting. Wire netting with very large meshes, which forms the bottom or back of a basket rack.

Basket Rack Rod. Small round metal bars which form the main portion of a basket rack, and to which the netting, when used, is fastened.

Batten. "A piece of board or scantling of a few inches in breadth."—Webster.

Battery. See STORAGE BATTERY.

Bayonet Catch. A general term derived from the manner of fastening on a bayonet to a gun, applied to the mode used in many forms of hardware and mechanical construction for connecting separate parts so as to be firmly united and yet easily removable. Many lamps are held in place by a form of bayonet catch.

Bead. "A small salient molding of semi-circular section. Also the strips on the sash frame which form a guide for the sash. These beads are known as the inside bead, outside bead and parting bead."—Knight. The term is frequently applied to any form of small, light molding of simple outline.

Beam. "The term beam is generally applied to any piece of material of considerable scantling, whether subject to transverse strain or not; as, for example, 'collar beam,' 'tie beam,' 'Brestsummer beam,' the two former being subject to longitudinal strains of compression and tension, respectively, and the latter to transverse strain."—Stoney.

"Any large piece of timber, large in proportion to its thickness and squared or hewed for use."—Webster.

A bar of metal of similar proportions is also called a beam.

"A bar supported at two points and loaded in a direction perpendicular or oblique to its length is called a beam."—Rankine.

By analogy the term has of late years come to be applied to similar pieces or bars of iron and steel. Thus we have iron I-BEAMS and DECK BEAMS to take the place of wooden beams in structures. The term is also used to designate such things as the beam of a balance or scales, a plow beam, the walking-beam of a steam engine, brake beam, etc.

Bearing. That which supports or rests on something, and is in contact with it. Thus a block or stone on which the end of a timber rests is called a bearing. The metal block or bushing in contact with a journal is called a bearing.

For M. C. B. Standard journal bearing see Figs. 2811-2833.

Bearing Casting (Tip Cars). A casting, one of a pair, attached to either the car body or to the truck which supports the car body and its loads. In tip cars it is pivoted or hinged so as to permit the body to tip or rock literally and to thus discharge its load.

Bearings, Journal. See JOURNAL BOXES AND DETAILS.

Bell Cord. See SIGNAL CORD.

Bell Crank. An L-shaped rectangular lever, often with the two extremities connected so as to be of triangular form, for changing the direction of motion by 90 degrees, more or less.

(Hand Car.) A crank attached to the propelling lever shaft, giving more favorable direction to the power applied to the levers.

Bell Rope. See SIGNAL CORD.

Belt Aligning Device (Electric Lighting). Mechanism consisting of screws and slip collars for adjusting the alignment of the belt, by shifting the generator so that its pulley shall be in the same vertical plane with the axle pulley.

Belt Molding. A molding passing entirely around the interior of a passenger car directly above the windows.

Belt Rail. 27, 57, Figs. 287, 288; 30, Fig. 410. A part of a passenger or street car frame below the windows on the outside, extending the whole length of the car body and attached to each post. It is usually framed into the posts and supports the window sills. The UPPER BELT RAIL is a similar strip directly above the window. See AUXILIARY BELT RAIL.

Belt Rail Cap. A strip of wood nailed to the top of a belt rail, and forming a seat for the window sill.

Belt Rail Stiffener. A reinforcing member riveted to a belt rail in steel passenger cars.

Belt Tension. Mechanism consisting of springs, rods and nuts for adjusting and maintaining the tension of a belt used for driving an axle generator.

Bench Cap. Transverse timbers resting upon the side sills of a coal or ore car, to tie the sills together and prevent spreading, and also to support the doors or winding shaft about which the winding shaft chain is wound.

Berth. Figs. 1594, 1598. 1, 2, 3, Figs. 1600, 1601. A bed in a sleeping car; also, the shelf or support on which the bed rests. There are two such beds in the space occupied by two double seats, which is called a section. The lower berth is made up on the seats and the upper one on a shelf, which can be raised or folded up out of the way in daytime.

Berth Arm. A BERTH BRACE.

Berth Brace. A metal rod, chain, or wire rope sometimes attached to the side and near the top of a sleeping car, and at the other end to the outer edge of a berth, which is supported by the brace. In the later designs it is done away with, the berth being supported by the berth chain.

Berth Brace Eye. A metal plate with suitable lugs for fastening the brace to the top of the car or to the berth.

Berth Bracket. A bracket on which an upper berth of a sleeping car rests when lowered.

Berth Chain. 10, Figs. 1600, 1601; Fig. 1613. A chain passing from the berth spring through the overhead pulley and to the corner of the upper berth to support it. The berth spring is attached to the chain to counteract the weight of the berth. The berth chain does the service of the berth spring rope and berth brace.

Berth Chain Pulley. 11, Figs. 1600, 1601; Fig. 1613. A pulley attached to the roof of a sleeping car, over which a berth chain runs.

Berth Curtain. 7, Figs. 1600, 1601. A curtain hung in front of a sleeping car section to afford privacy to occupants. A single curtain covers both berths, and is hung from the berth curtain rod.

Berth Curtain Hook. Figs. 1608, 1610. A metal hook attached to a berth curtain, and by which the latter is hung on a rod above the berths; usually covered with leather to prevent rattling.

Berth Curtain Pole. See BERTH CURTAIN ROD.

Berth Curtain Rod. 6, Figs. 1600, 1601. A rod usually made of metal tubing, fastened above a section of a sleeping car to support the berth curtains. They are now made in sections, supported by folding brackets, and swing into the upper berth out of sight, except

when berths are made up. See BERTH CURTAIN ROD BRACKET.

Berth Curtain Rod Bolt. A small vertical bolt, usually tipped with an ornament fastening the curtain rod in the coupling on the bracket.

Berth Curtain Rod Bracket. A metal bracket attached to the deck of a sleeping car, which forms a support for a berth curtain rod. Such brackets usually have a coat and hat hook attached to them. A hanger is sometimes used as a substitute for a bracket at certain points. The stationary bracket has been replaced by the folding curtain rod bracket, which folds, with the rod attached, into the upper berth and out of sight when the curtains are not in use. See CURTAIN ROD FOLDING BRACKET.

Berth Curtain Rod Coupling. A fastening by which a berth curtain rod of a sleeping car is secured to a bracket. It usually consists of a bolt or screw.

Berth Curtain Rod Socket. A metal flanged ring which supports the berth curtain rod. Also called berth curtain rod bushing.

Berth Front. The bottom or front of an upper berth.

Berth Headboard. See HEADBOARD.

Berth Hinge. A hinge or joint by which the back edge of an upper berth of a sleeping car is attached to the side of a car.

Berth Hinge Bushing. A hollow metal socket in which the spindle of a loose berth hinge works.

Berth Hinge Plate. A plate which takes the place of a berth hinge bushing.

Berth Lamp. 9, Figs. 1600, 1601; Figs. 2613, 2641, etc. A lamp for lighting a sleeping car berth.

Berth Latch. A device for holding the upper berth of a sleeping car up in its place when not in use. To obviate the danger of the berth shutting up in case of overturning of the car, the safety berth rope and attachments are used. Safety berth latches have also been used to obviate the necessity of using a safety rope. See SAFETY BERTH LATCH.

Berth Latch Bolt. A bar or pin of an upper berth latch which engages in a corresponding strike plate or keeper to hold the berth up.

Berth Latch Keeper. Also called STRIKE PLATE. See BERTH LATCH BOLT.

Berth Latch Lever. The part by which the berth latch handle operates the berth latch bolt; also called a berth latch rocker plate.

Berth Latch Rocker Plate. See BERTH LATCH LEVER.

Berth Lock. See BERTH LATCH.

Berth Lock or **Latch Handle.** Fig. 1607.

Berth Lock or **Latch Rods.** Fig. 1606.

Berth Mattress. The mattresses which cover the seat cushions of the lower berth and the springs of the upper berth. When the berths are made up for day travel the mattresses are stored in the upper berth.

Berth Numbers. Figs. 1600, 1601, 1614. Figures or numbers, usually made of metal or porcelain, for numbering the berths or sections of sleeping cars. They are frequently sewed to plush panels and hung from the berth curtain rods.

Berth Partition. The partition between the upper berths of two adjacent sleeping car sections. It is of the same outline as the upper berths' cross-section.

Berth Safety Rope. 13, Figs. 1600, 1601. A wire rope fastening the upper berth of a sleeping car to the fixed arms of the lower berth, to prevent accidental closing up of the upper berth in case of overturning of the car. The rope is fastened to the upper berth by a berth safety rope fastener and to the lower berth by inserting a knob into a berth safety rope holder. See SAFETY BERTH LATCH.

Berth Safety Rope Hook. Fig. 1609. A hook for holding a berth safety rope.

Berth Spring. Fig. 1613. A spring usually made in a spiral form, like a watch spring, coiled within a device called the berth spring fusee and attached to the upper berth of a sleeping car by a berth chain so as to counteract the weight of the latter and make it easy to raise and lower.

Berth Spring Frame. Fig. 1613. A metal support which holds a berth spring and fusee.

Berth Spring Fusee. See FUSEE.

Berth Spring Lug or **Clip.** The means by which the end of a berth chain is fastened to the upper berth, sometimes called a berth chain end plate.

Berth Striker Plate. A BERTH LATCH KEEPER.

Beveled Washer. A washer used to give an even bearing for rods which stand at an acute angle to the surface on which the nut or bolt head bears. Sometimes two such washers which come near together are cast in one piece, and are then called double beveled washers. See TRIANGULAR WASHER.

Bezel. "A term applied by watchmakers and jewelers to the groove and projecting flange or lip by which the crystal of a watch is retained in its setting. An ouch." —Knight.

Bibb Cock. Literally, a cock with a curved nozzle or spout, but commonly restricted to a cock with a plain valve without springs, moved by the hand only.

Billet Car. A low side gondola car, built of steel throughout for transportation of hot steel billets or other heavy material.

Bit (of a Key). The part of a key which enters the lock and acts upon the bolt and tumblers. The bit consists of the web and wards. The web is the portion left after the wards are cut out. The wards (of a key) consequently are those spaces which fit over the wards of a lock. Some bits have no wards.

Bleeding Valve or **Bleeding Cock.** Another term for RELEASE VALVE or RELEASE COCK. The operation of releasing the brakes when applied upon a car detached from the locomotive is sometimes called bleeding. The bleeding valve is located on the auxiliary reservoir, and the brakes may be released by opening it and allowing the air in the brake cylinder and auxiliary reservoir to escape.

Blind. A WINDOW BLIND. They are sometimes single, but usually double, distinguished as lower and upper. Flexible window blinds are rarely used now, having been displaced by window shades.

Blind Ceiling (Refrigerator Car). A layer of light boards next above the inside ceiling in the roof of the car.

Blind End Car (Passenger Equipment). A term sometimes used to designate non-vestibuled cars, but more properly a car without end doors, either non-vestibuled (dummy) or with open platforms.

Blind Floor (Refrigerator Cars). A layer of boards under the sub-floor and fastened to ceiling strips secured to the bottom of the sills.

Blind Lining (Refrigerator Cars). A thin layer of boards between the outside sheathing and the inside lining; also sometimes called intermediate lining.

Block. "A heavy piece of timber or wood, usually with

one plane surface; or it is rectangular and rather thick than long."—Webster.

A pulley or system of pulleys mounted on its frame or shell, with its band or strap. A block consists of one or more pulleys or sheaves, in a groove of which the rope runs, fastened in a shell or frame by pins, on which they revolve.

The interior wheels are termed sheaves, which latter term is often used to designate the whole block or pulley. A snatch block is a block with only one sheave, and with an opening at the side for the ready insertion and removal of the rope. Blocks without this opening, however, are also sometimes termed snatch blocks.

Block and Tackle. A general term applied to a pair or more of pulleys and accompanying rope. Also termed fall and tackle, or simply tackle.

Blocking. A mode of fastening together the vertical angles of woodwork by blocks of wood glued or nailed in the inside angle. The method is largely used in every form of carpentry, where great strength is not required in the joint. In car work, generally known as furring blocks.

Blocking, Continuous (Passenger Equipment Car Framing). A term used to designate planks or blocking used to strengthen the side frame.

Board. "A piece of timber sawed thin, and of considerable length and breadth, compared with the thickness, used for building and other purposes"—Webster.

Boarding Car. A term commonly applied to a car used as a place of lodging for workmen. In the case of wreck trains they are more often called dining and sleeping cars.

Body (of a Car). The main or principal part in or on which the load is placed. American cars usually consist of a body carried on two trucks.

(Of a Valve, Cylinder, etc.) The main or principal part, to which the other parts are attached, as cylinder body, etc.

Body Bolster. 5, Figs. 287, 288; 7, Fig. 291; 10, Fig. 314; 4, Fig. 335; 2, Fig. 340; 4, Figs. 351, 352; Figs. 483, etc. The transverse members of the underframe over the trucks which transmit the load carried by the longitudinal sills to the trucks through the center plates. A double body bolster is a wide bolster with two transverse members, and is used on cars equipped with six-wheel trucks.

Body Bolster Bottom Cover Plate. 7, Fig. 404; Fig. 478; 2, Fig. 490. The bottom cover plated used on a bolster of the built-up type. Also known as the Body Bolster Compression Bar and Body Bolster Tie Plate.

Body Bolster Compression Bar. The lower or compression member of a built-up body bolster. Also designated as the Body Bolster Bottom Cover Plate.

Body Bolster Cover Plate. Fig. 478. See BODY BOLSTER TOP COVER PLATE and BODY BOLSTER BOTTOM COVER PLATE.

Body Bolster End Pocket Casting. A cast cap that fits over the end of a combined wool and steel body bolster, through which the truss rods pass, and on which the truss rod nuts bear. It is a body bolster truss rod washer enlarged so as to cover the entire end of the bolster.

Body Bolster Filler. Fig. 478; 19, Fig. 490. A plate or casting forming the filling piece between the cover plates of a built-up body bolster. The term also applies to Truck Bolsters. Also frequently called Diaphragm and sometimes Spider.

Body Bolster Flitch Plates. Plates of iron or steel sandwiched between pieces of wood and bolted together to give a wooden bolster greater strength. Frequently called body bolster sandwich plates.

Body Bolster Sandwich Plate. See BODY BOLSTER FLITCH PLATES.

Body Bolster Tension Bar. The upper or tension member of a built-up body bolster. Also designated as the Body Bolster Top Cover Plate.

Body Bolster Thimble. 4, Fig. 490. See BOLSTER THIMBLE.

Body Bolster Tie Plate. 7, Fig. 404; Fig. 478. See BODY BOLSTER BOTTOM COVER PLATE.

Body Bolster Top Cover Plate. Fig. 478; 1, Fig. 490. The top cover plate used on a body bolster of the built-up type. Also known as the Body Bolster Tension Bar.

Body Bolster Truss Block. A block of wood or distance piece on the top of a wooden body bolster between the center floor timbers and underneath the bolster truss rods.

Body Bolster Truss Rod. A metal rod, used on some built-up body bolsters, which is tied to the ends and passes above the center of the bolster over the truss rod bearing, so as to form a truss; generally two are used for each bolster.

Body Bolster Truss Rod Bearing. See BODY BOLSTER TRUSS ROD.

Body Bolster Truss Rod Washer. An iron bearing plate on the end of a body bolster; often made to take two or more rods.

Body Brace. An inclined member of the body side or end framing. In the usual form of side framing for freight cars the braces are inserted in the panels between the bolster and the center of the car, inclining toward the center of the car, while the counter braces are framed in the panel between the bolster and the end of the car, inclining toward the end of the car. See BRACE and COUNTERBRACE.

Body Brace Rod. An inclined iron rod in the side or end of a car body frame, which acts as a brace. They are distinguished as end and side body brace rods. A brace straining rod is a short vertical rod in the side of a passenger car under the window.

Body Center Plate. 7, Figs. 287, 288; 11, Fig. 490. The center plate attached to the under side of the body bolster. See CENTER PLATE.

Body Check or **Safety Chain Eye.** An eye bolt or clevis for fastening a truck check chain or safety chain to the car body.

Body Check or **Safety Chain Hook.** An iron hook on the check chain, which enters into the check chain eye.

Body Counter Brace Rod. Usually an inclined iron rod in the side frame of a car body, between the bolster and the end of the car. It may be a diagonal brace rod in a Pratt truss, which runs counterwise with those rods which carry the load. It may then be between the bolsters.

Body Cross Tie. 31, Fig. 291. A metal bar extending across a hopper or other form of open-top freight car and fastened to the sides to prevent their bulging.

Body End Furring. Furring in the end of a car. See FURRING.

Body End Plate. A transverse member in the end of a car connecting the side plates. See END PLATE.

Body End Rail. See END RAIL.

Body Framing. Figs. 450, etc., and General Drawings. The framework of that part of a car above the underframe, so called to distinguish it from the underframe. It is commonly subdivided into side, end and roof framing.

Body Post (Freight Car Bodies). An upright timber which is framed into the sill and plate of a freight car. The body posts and corner posts form the vertical members of the side frame of a car body. See POST and SIDE POST.

Body Queen Post. See QUEEN POST.

Body Side Bearing. 6, Figs. 287, 288; 8, Fig. 404; Fig. 481; 9, Fig. 490. The upper one of the two side bearings, which is attached to the body bolster. See SIDE BEARINGS.

Body Transom. A name sometimes given to a NEEDLE-BEAM or CROSS TIE.

Body Truss Rod. 15, Fig. 490. A rod extending from end sill to end sill, passing over the body bolsters on truss rod saddles and under the truss rod queen posts hung from the cross tie timbers. With the sills they form a truss and support the car body, preventing the sills from sagging between the bolsters. In passenger cars truss rod anchor irons are sometimes used, which are fastened to the sills near the bolsters. The truss rods are then attached to these anchors and are not brought out through the end sills. Truss rods are distinguished as center, intermediate and side or outside truss rods.

Body Truss Rod Bearing. See QUEEN POST.

Body Truss Rod Hopper Strap. A term applied to a strap passing under and supporting the hopper of a gondola car, the ends of which are fastened to the body truss rods, which carry the stress to the end sills.

Body Truss Rod Saddle. 14, Fig. 490. A block of wood or a casting which forms a distance piece on top of a bolster, and on which a continuous body truss rod bears. Properly speaking, a saddle means a common bearing for a pair of rods with a central support, but it is not restricted to such use.

Body Truss Rod Washer. A heavy iron washer on the outside face of the end sill, on which the nut on the end of the body truss rod bears.

Bogie (British). A swiveling car truck. American eight-wheel cars are what are termed in Great Britain bogie carriages, or wagons.

Bogus Plate (Refrigerator Cars). A horizontal timber attached to the posts on the inside of the car, a short distance below the plate. The bogus plates support horizontal cross timbers, called meat timbers, or hanging bars, to which hooks are attached for hanging meat.

Bolster. A cross timber or beam on the under side of a car body and in the center of a truck, through which the weight is transmitted. The bolsters carry the body and truck center plates, the body bolster resting on the truck bolster.

Truck bolsters are either swing bolsters, admitting of lateral motion to mitigate shocks, or rigid bolsters, which permit no lateral motion. All passenger trucks have swing bolsters. In freight car service the rigid bolster has the preference, and rigid bolster trucks are the more numerous. See BODY BOLSTER, DOUBLE BODY BOLSTER, SWING BOLSTER and TRUCK BOLSTER.

Bolster Bridge (Six-Wheel Truck). See SIDE BEARING ARCH.

Bolster Center Casting. 16, Fig. 404; Fig. 479. A hollow rectangular-shaped casting placed between the center sills and body bolster plates; the king bolt passes through it. Sometimes called a bolster center filler.

Bolster Center Filler. See BOLSTER CENTER CASTING.

Bolster Chafing Plate. This is an iron plate attached to the side of the transom to prevent wear from abrasion by movement of the bolster. More properly, transom chafing plate. The corresponding casting on the side of the bolster, which is, strictly speaking, the bolster chafing plates, is commonly called friction block or friction plate.

Bolster Diaphragm. Fig. 478. See BODY BOLSTER FILLER.

Bolster Flitch Plate. The iron or steel plates of a built-up bolster, sandwiched between wood pieces. Rarely used now.

Bolster Guide Bars (Diamond Arch Bar Trucks). 37, Fig. 989. More commonly called columns. Posts between the arch bars, held in place by column bolts, which form a guide for the end of the bolster. These columns are sometimes also required to perform the office of a brake hangar carrier. An offset shoulder is then cast on the column near the top and on the inside with a jaw, to which the brake hanger is fastened by a pin. They are also often combined in one casting with the spring seats. (See Figs. 1171, 1184.)

Bolster Hanger. See SWING HANGER.

Bolster Hanger Carrier. A SWING HANGER PIN BEARING.

Bolster Jack Screw (Wreck Cranes). A jack screw attached to the spring plank for the purpose of taking the load off the springs and making the entire truck and car body one rigid structure when the derrick of the crane is in use.

Bolster Plate (Passenger Equipment Trucks). Wrought iron plates bolted to the sides of wooden bolsters to strengthen them.

Bolster Sandwich Plate. See BOLSTER FLITCH PLATE.

Bolster, Specifications for Cast-Steel (M. C. B. Recommended Practice).

In 1912 specifications were adopted for cast-steel bolsters. Modified in 1915.

1. When the manufacturer is ready to make a shipment of material he shall notify the purchaser of that fact and await the arrival of the purchaser's inspector, to whom he shall furnish free any assistance and labor needed to make satisfactory inspection test and prompt shipment.

2. The manufacturer shall protect all castings so that they do not become covered with rust.

3. *Cleaning.*—At his option the inspector may require that any or all castings be subjected to sand blast in order to make an examination of the surface for checks or cracks.

4. *Painting.*—They shall not be painted before being inspected unless otherwise specified.

5. *Process.*—Castings furnished under these specifications shall be made by the open-hearth process in accordance with the best foundry methods.

6. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition.

Carbon	not below 0.20 or above 0.30 per cent.
Manganese	not above 0.70 per cent.
Phosphorus	not above 0.05 per cent.
Sulphur	not above 0.05 per cent.

7. *Ladle Analysis.*—To determine whether the material conforms to the requirements specified in section 6, an analysis shall be made by the manufacturer from test ingot taken during the pouring of each melt. Drillings for analysis shall be taken not less than ¼ inch beneath the surface of the test ingot. A

copy of this analysis shall be given to the purchaser.

8. *Check Analysis.*—A check analysis may be made by the purchaser from a test coupon representing each melt, and this analysis shall conform to the requirements of section 6.

9. *Sampling for Chemical Analysis.*—From the coupon described in section 12 (a), which has satisfactorily passed the physical requirements, borings shall be taken for chemical analysis.

10. *Physical Properties.*—The physical properties of the steel shall be as follows:

Ultimate tensile strength, lbs. per sq. in., not less than 60,000.

Yield point (by drop of beam), not less than 50 per cent of the ultimate tensile strength.

Elongation in 2 in. per cent, not less than 1,400,000 divided by the ultimate tensile strength.

11. *Annealing.*—All castings shall be thoroughly annealed. Test coupons shall be annealed with the casting, before they are detached. To determine the quality of annealing, the inspector will have one of the test coupons mentioned in section 12 (b) cut half way through and broken off from the casting for examination of fracture. If, in his opinion, the annealing has not been properly done, he may require the castings to be reannealed, using the second test coupon for examination in this case. If after annealing or reannealing any casting is so much out of gage as to require heating in order to bring it within the gage, it shall again be annealed before it may be accepted.

12. *Sampling.*—For the purpose of determining whether the physical and chemical requirements are complied with, the inspector shall select at random one casting from each melt. From this casting the two physical and chemical test coupons shall be removed by the inspector, one of them shall be subjected to physical test, but if the coupon casting proves unsound the other coupon shall be used in its stead for this purpose.

(a) *Physical Test Coupons.*—The manufacturer shall have cast upon each bolster two test coupons having a cross section of 1⅛ by 1⅛ in. and 6 in. long. These coupons are to be used for physical and chemical test and their location upon the casting shall be specified by the purchaser.

(*b*) *Annealing Coupons.*—There should be two additional coupons of a cross section not less than the average cross section of the casting, which coupons are to be used to determine the character of the annealing as specified in section II.

13. *Limiting Weights.*—Bolsters shall conform to the weights given in table, which cover the bolster casting, either with center-plate cast integral or separate center plate, and do not include side bearings, fulcrum castings, or other attachments. In case the castings have met all requirements except that of overweight, they may be accepted at the maximum allowable weight specified.

Cast-steel truck bolsters with separate center plate. (Exclusive of weight of center plate, side bearings, fulcrum brackets or other attachments).

Car Capacity, Lbs.	Weight, Lbs. Minimum.	Normal.	Maximum.
80,000	660	680	700
100,000	740	765	790
140,000	945	975	1,005

Cast-steel truck holsters with separate center plate.

(Exclusive of weight of center plate, side bearings, fulcrum brackets or other attachments.)

Car Capacity, Lbs.	Weight, Lbs. Minimum.	Normal.	Maximum.
80,000	670	690	710
100,000	755	780	805
140,000	960	990	1,020

14. *Workmanship.*—They shall conform to the dimensions shown on drawings and shall be free from rust, scale, blowholes and shrinkage cracks.

15. *Marking.*—Each casting shall have the following markings cast upon it in raised letters and figures:

(a) Initials of Railroad Company.

(b) Month and year in which cast, thus, 6-12.

(c) Manufacturer's serial number and trade marks (or other designation).

(d) M. C. B. S.

16. *Rejection.*—In case the test pieces selected do not meet the specifications, all castings from the entire melt shall be rejected.

17. *Removal of S.*—From each casting rejected by the inspector under these specifications he shall cause to be chipped the "S" of the letters M. C. B. S. which are specified in section 15 (*d*).

Bolster Spring. 80, Figs. 989, 991, 1010; Figs. 1172, 1179, etc. The main spring of a car, carried on the spring plank and supporting the truck bolster, on which the weight of the car body rests.

Bolster Spring Cap. See Spring Cap and Spring Seat.

Bolster Spring Seat. See Spring Seat.

Bolster Thimble. 4, Fig. 490. A small filler sometimes used between the cover plates of a bolster when the main filler or web does not extend clear to the end of the bolster.

Bolster, Truck, Gages for Cast and Pressed Steel. See Truck Bolster.

Bolster, Truck, Cast Steel, 80,000, 100,000 and 140,000 Lb. Capacity Cars. (M. C. B. Recommended Practice.) Figs. 2925-2930.

In 1915 designs for cast-steel truck bolsters with center plate cast integral for 80,000, 100,000 and 140,000 lb. capacity cars, as shown on the drawings, were adopted.

In 1915 designs for cast-steel truck bolsters with center-plate separate for 80,000, 100,000 and 140,000 lb. capacity cars, as shown on the drawings, were adopted.

Bolster, Truck, Pressed Steel, for 80,000, 100,000 and 140,000 Lb. Capacity Cars. (M. C. B. Recommended Practice.) Figs. 2931-2933.

In 1915 designs for pressed steel truck bolsters for 80,000, 100,000 and 140,000 lb. capacity cars, as shown on the drawings, were adopted.

Bolster, Truck; Specifications and Tests for Pressed Steel, for 80,000, 100,000 and 140,000 Lb. Capacity Cars. (M. C. B. Recommended Practice.)

In 1915 a recommendation was adopted that the steel for pressed steel truck bolsters should conform to the requirements of the specifications and tests for structural steel for freight cars. See Steel, Specifications for Structural Sheets and Plates.

Bolt. A pin, rod or bar of metal used to hold or fasten anything in its place; ordinarily a bolt has a head on one end and a screw and nut on the other, while a rod has a nut on both ends.

Bolt Heads and Nuts. See Screw Threads, Bolt Heads and Nuts.

Bolt Heads, Square. In 1899 the following dimensions for square bolt heads were adopted as Recommended Practice:

The side of the head shall be one and one-half times

the diameter of the bolt, and the thickness of the head shall be one-half the side of the head.

In 1900 these dimensions were adopted as a Standard.

Bolted Commutator (Motor Cars). Fig. 2673. A motor commutator in which the segments and mica insulation are held in place between two retaining rings by bolts.

Bonnet (Passenger Cars). A PLATFORM HOOD.

Boom (Steam Shovel). The heavy swinging arm which carries the boom engine and ratchet beam. It is stepped at the foot of the "A" frame and held in its inclined position by boom guys.

Boom Cap Clevis (of a Derrick, Steam Shovel or Crane). A clevis sometimes attached to the upper end of the boom, to which the fixed end of the hoisting rope is attached. In other cases the clevis for this purpose is carried on the hoisting block.

Boom Engine (Steam Shovel). An engine mounted on the boom to operate the ratchet beam.

Boom Foot Sheave (Steam Shovel). A fixed sheave or pulley at the bottom of the boom over which the hoisting chain is passed.

Boom Guys (Steam Shovel). Iron rods from the point of the boom to the top of the "A" frame, holding the boom in its inclined position.

Boom Idler Sheave (Steam Shovel). A fixed sheave mounted on the boom, the purpose of which is to slightly change the direction of the hoisting chain.

Boom Point Sheave (Steam Shovel). The pulley at the outer end of the boom over which the hoisting chain runs. See BOOM SHEAVE.

Boom Sheave (of a Derrick, Steam Shovel or Crane). A sheave carried at the upper extremity of the boom, over which the hoisting chain passes.

Boom Shoe (of a Derrick or Crane). A casting carried at the foot of the mast and constructed so as to be able to revolve against the boom base. It is supported by boom shoe rods.

Boom Shoe Rods (of a Derrick or Crane). Iron rods attached to the head block or cap at the top of the mast and supporting the boom shoe.

Boom Shoe Rollers (of a Derrick or Crane). Rollers at the foot of the mast upon which the boom shoe revolves.

Boom Step and Trunnion (Steam Shovel). The socket in which the boom is seated and about which it turns.

Booster. A direct electro-motive force generator arranged to add its E. M. F. to that of another circuit, or "boost" the same. Direct opposite of bucker.

Boss or Hub (of a Steel Tired Wheel). The central portion, through which the axle passes. Boss is the usual British term, but little used in the United States.

Bottom Arch Bar. See ARCH BAR.

Bottom Chord (of Trusses). See LOWER CHORD. Neither term is regularly used to designate any part of car trusses, but the side sills are bottom chords in trussed side frames.

Bottom Connecting Rod. 97, Figs. 991, 1010. The brake rod connecting the bottom ends of the live and dead truck brake levers.

Bottom Door Rail. The lower transverse piece of a door frame.

Bottom Door Track. A door track below a sliding door. Usually a metal bar. Sliding doors are often provided with rollers or slides, which rest on the track. Freight car doors usually slide on a TOP DOOR TRACK.

Bottom Rod. See BRAKE ROD and BOTTOM CONNECTING ROD.

Bottom Truck Connection. See BOTTOM CONNECTING ROD.

Bow. See PLATFORM HOOD BOW.

Bowl. Figs. 2523-2531. A glass bowl used on center and vestibule gas lamps. See also BASIN.

Box. See JOURNAL BOX.

Box Car. Figs. 1-21, 109-115 and 259-290. A car with sides enclosed and with a roof; doors are placed in the sides or sides and ends. Used for general service and especially for lading which should be protected from the weather. See CAR.

Box Car Details. Fig. 482, etc.

Box Car Door. 33, Figs. 287, 288; Fig. 795, etc. See DOOR. Used on both the sides and ends of the car. See END DOOR.

Box Car End, Design and Strength. (M. C. B. Recommended Practice.)

In 1914 the following was adopted by letter ballot: New cars should have steel plate ends ¼ in. thick, reinforced between corner posts with the equivalent of either two vertical steel braces with a total section modulus of not less than 9; or one vertical and two diagonal steel braces with a total section modulus of not less than 10; or three horizontal steel braces with a total section modulus of not less than 10.

New cars may have the following alternative arrangement: Three or more steel braces, two of which run diagonally, with a total section modulus of not less than 12½, and wood lining 1¾ in. thick.

To concentrate strength at a point near floor line on vertical center line of car, diagonal braces should extend from the center sills to the side plates, and not from the bottom corner to the ridge.

The attachments for the braces and the members to which they are attached must be sufficiently strong to realize the full strength of the braces.

Hardwood or yellow pine may be considered equivalent to the steel members, if the section modulus is four times as great.

Wooden posts and braces should be set in metal pockets not less than 1½ in. deep, and must be held in place by adequate tie rods.

Lining at car ends should be supported at intervals not greater than 30 times the thickness.

Two 4 by 3 in. Z baro. 12.4 lb. per ft., have a total section modulus of 9.34.

Two 5-in. I beams, 9.75 lb. per ft., have a total section modulus of 9.6.

Three 4-in. I beams, 9.5 lb. per ft., have a total section modulus of 10.2.

Three 3-in. Z bars, 14.2 lb. per ft., have a total section modulus of 10.3.

Type of ends similar to VanDorn ends, made of ¼-in. plate, or Murphy ends, with the lower half made of ¼-in. corrugated plate, and the upper half with 3/16-in. corrugated plate, may be substituted for those described.

Box Car Side and End Door Fixtures. See DOOR FIXTURES.

Box Car, Ventilated. See VENTILATED BOX CAR.

Box Cars, Framing for (M. C. B. Recommended Practice). Fig. 2911.

In 1904 the style of framing shown on the drawing for cars of 60,000 pounds capacity was adopted as Recommended Practice.

In 1904 the style of framing shown on the drawing for cars of 80,000 pounds and 100,000 pounds capacity was adopted as Recommended Practice.

In 1904 the style of end framing shown on the drawing for cars of 60,000 pounds, 80,000 pounds and 100,000 pounds capacity, was adopted as Recommended Practice.

In 1904 the use of a plank lining 1¾ inches thick, on the inside of the ends of cars, extending from the floor to the underside of the carline, was adopted as a Recommended Practice.

Box Cars, Height and Width of (M. C. B. Recommended Practice).

In 1904 the following dimensions for box cars built on low trucks (3 feet 6 inches to top of floor) were adopted as Recommended Practice:

Height from top of rail to upper edge of eaves, 12 feet ¾ inch; width at eaves at above height, maximum, 9 feet 7 inches.

Box Cars, Inside Dimensions of (M. C. B. Recommended Practice).

In 1904 the inside dimensions of box cars approved by the American Railway Association, namely, 36 feet long, 8 feet 6 inches wide and 8 feet high, were adopted as a Recommended Practice.

Box Cover. See JOURNAL BOX LID.

Box Cushion. A cushion for passenger car seats made on a wooden frame. In distinction from a squab cushion, now little used, which is a loose pad on the seat. Box cushions are sometimes stuffed with hair or other elastic material alone, but usually steel springs are used in addition.

Box Fruit Car. See VENTILATED BOX CAR.

Box Guide. See PEDESTAL.

Box Lid. See JOURNAL BOX COVER or LID.

Box Packing. JOURNAL PACKING.

Box Section Bolster. Fig. 498. A bolster whose cross-section has a box of rectangular shape.

Box Steps. A term sometimes used to distinguish platform steps made with wooden stringers or sides from open steps.

Box Stock Car. An ordinary box car with large grated openings for ventilation, but excluding rain. Little used except for horses. See STOCK CAR.

Boxes, Journals and Details. See JOURNAL BOXES AND DETAILS.

Brace. 16, 18, Figs. 287, 288; 12, Figs. 351, 352. An inclined beam, rod, or bar of a frame, truss, girder, etc., which unites two or more of the points where other members of the structure are connected together, and which prevents them from turning about their joints. A brace thus makes the structure incapable of altering its form from this cause, and it also distributes or transmits part of the strain at one or more of the joints toward the point or points of support, or resistance to that strain. A brace may be subjected to either a strain of compression or tension. In the former case, in car construction it is called simply a brace; in the latter it is called a brace rod. They are called right or left handed, according to the inclination of their top to a person standing facing the car. See BERTH BRACE, BODY BRACE, BRAKE LEVER BRACKET BRACE, BRAKE SHAFT STEP BRACE, COMPRESSION BEAM BRACE, DOOR BRACE, END BRACE, ROOF BRACE, SIDE BRACE, SIDE BODY BRACE, SIDE LAMP BRACE.

Brace Pocket. A casting which forms a socket for holding the ends of the braces in the car body framing. See POST POCKET.

Brace Rod. An inclined iron rod which acts as a brace. A vertical rod acting in conjunction with a brace is called a sill and plate-tie rod, or, in passenger cars, for short rods below the window, brace straining rod. See BODY BRACE ROD, COUNTERBRACE ROD.

Brace Rod Washer. Fig 482. A bearing plate for the nut or head of a brace rod, sometimes made in a triangular or beveled shape, and sometimes a flat bar of iron bent to fit into a notch cut in the timber.

Brace Straining Rod (Passenger Car Framing). A vertical iron rod in the side or end frame of a car body by which the upper end of a brace is connected or tied to the sill of the car. The brace rods are members of the truss, of which the sill, braces, posts or plates, etc., form parts. Such rods often have hook heads at the upper ends, against which the braces bear, and nuts at the lower ends by which they are screwed up, and are thus brought into a state of tension and the braces into compression. An equivalent in freight service is the sill and plate-tie rod.

Brace and Tie Rod Washer. See BRACE ROD WASHER.

Bracket. "An angular stay in the form of a knee to support shelves and the like."—Webster.

(Framing for Bridges or Cars.) An L-shaped angle plate riveted to each of two members which it is desired to connect at right angles to each other, as an end sill bracket or sill knee iron. A stronger form, now used in car construction, is called a gusset plate.

(Cast Iron Wheels). The stiffening ribs cast on the plate.

Bracket Gas Burner. A gas burner attached to the side of a car. See BRACKET LAMP.

Bracket Lamp. Figs. 2302, 2632, etc. A lamp attached to a wall by a suspension in the form of a bracket.

Bracket Steps (Hopper Cars). Steps secured to the side of the car on the inside to serve as a substitute for a running board.

Brake or Brake Gear. The whole combination of parts by which the motion of a car is retarded or arrested. The foundation brake gear includes all the parts by which the pressure of the air in the brake cylinder is transmitted to the wheels. See HIGH SPEED AIR BRAKE, QUICK ACTION BRAKE, STRAIGHT-AIR BRAKE, FOUNDATION BRAKE GEAR, TRACTION AIR BRAKE, VACUUM BRAKE.

Brake Beam. 84, Figs. 989, 991, 1010; Figs. 1225-1293. Transverse members to which the brake heads and shoes are attached. They are either inside hung or outside hung, and are often trussed, especially in passenger service.

Brake Beam Adjusting Hanger. A link sometimes attached to a brake beam to cause the latter and the brake head and shoe to maintain the same relative positions when the brakes are released, so as to prevent the ends of the brake shoes from coming in contact with the wheel when the brakes are released. It is attached to the truck frame or truck bolster by a projecting brake beam adjusting hanger carrier, and to the brake beam by an eye or clip. Sometimes called a parallel brake hanger.

Brake Beam Chafing Plate. A plate attached to a brake beam against which a brake spring bears, designed to resist the wear due to the action of the spring.

Brake Beam Details (M. C. B. Standard). Figs. 2844, 2847.

In 1907 the following details regarding brake beams were adopted as Recommended Practice:

That brake hangers shall have an angle as near as

possible to 90 degrees from a line drawn from the center of the brake shoe to the center of the axle when the shoes are half worn.

In 1910 a Recommended Practice was adopted that all beams be inside hung beams.

In 1912 the practice was adopted that, in order to designate an M. C. B. brake beam, the letters "M. C. B." and the numerals "No. 1" or "No. 2," as the case may be, be cast, forged or stamped on the fulcrum, and that after January 1, 1913, this be cast on the fulcrum if the fulcrum be a casting, or forged on the fulcrum if the fulcrum be a forging.

In 1914 the marking of No. 1 and No. 2 beam was added to the drawing.

Brake Beam, Details and Capacities (M. C. B. Standard). Figs. 2844, 2847.

Certain dimensions and capacities of brake beams were adopted as standard of the association, by letter ballot, in 1889, and these standards, as modified by subsequent action, are shown on the drawing for iron brake beams.

Standard heights of brake beams, when measured from the tops of the rails to the center of the face of new shoes, were adopted in 1894, as follows:

For inside hung beams, 13 inches.

For outside hung beams, 14½ inches.

In 1907 the following details for brake beams and gages were adopted as standard:

All brake beams shall be 60¼ inches in length from center to center of brake head, with an allowable variation of ⅛ inch in either direction.

All brake beams shall be proven by gage shown on the drawing, which shall be the standard gage for that purpose.

Attachments for safety hangers shall be 51 inches from center to center.

The angle of the lever fulcrum shall be 40 degrees from the vertical.

The lever pin hole shall be either 2 inches or 3 inches in front of the top of the brake-head lugs. The variations in either direction from above measurements shall not exceed 1/16 inch. Holes should be made straight and true by drilling, reaming or broaching, and shall be not less than 1 3/32 inches nor more than 1⅛ inches in diameter.

All lever pin holes shall be proven by gage shown on the drawing, which shall be the standard gage for that purpose.

In 1908 the following detail regarding brake beams was advanced from Recommended Practice to Standard:

Brake beam hangers shall be ⅞ inch in diameter.

In 1908 two brake beams were adopted as standard, as follows:

Brake beam No. 1 to be suitable for cars weighing not over 35,000 pounds light weight.

Brake beam No. 2 to be suitable for cars exceeding 35,000 pounds light weight.

In 1909 the following was adopted to establish a uniform practice for designating right and left-hand brake beams:

When facing back of brake beam with center strut pointing away from observer, where the top of lever slot inclines toward the right it shall be known as right-hand beam, and where the top of lever inclines toward the left it shall be known as left-hand beam.

On cars built after September 1, 1909, it will not be permissible to hang brake beams from any portion of the body of the car.

In 1910 the drawing of the brake head was modified as regards the size and shape of the hanger hole.

In 1910 the following Recommended Practice was advanced to Standard:

The brake beam hanger bracket shall be attached to some rigid portion of the truck.

In 1911 the use of brake beam No. 2 was extended as follows: Beam No. 2 must be used on cars of more than 35,000 pounds light weight, and it may be used on cars of 35,000 pounds light weight or less.

In 1913 a spacing of 60 inches from center to center of brake heads, with an allowable variation of ⅛ inch in either direction, was adopted.

Brake Beam Eye Bolt. An eye bolt in the brake beam to which the safety hanger is attached.

Brake Beam Fulcrum. See BRAKE LEVER FULCRUM.

Brake Beam Gage A metal templet for ascertaining or regulating the several dimensions of brake beams.

Brake Beam Gage (M. C. B. Recommended Practice). Figs. 2844, 2847. In 1907 a brake beam gage was adopted as standard. In 1912 this gage was redesigned and adopted as Recommended Practice. It determines the following dimensions and adjustments: (1) Limiting outline of brake beam; (2) length of beam; (3), proper alignment of the heads in relation to each other; (4) proper location of pin hole and center of strut; (5) angle of lever fulcrum.

In 1913 the limiting outline gage was altered to suit the change in beam from 60¼ to 60 inches, center to center of head, and a new brake beam gage, with details, adopted as Standard.

Brake Beam Gage Limiting Outlines (M. C. B. Standard). Figs. 2844, 2847. In 1911 a limiting outline gage shown for No. 2 brake beams used on cars built after January 1, 1908, was adopted as Standard.

Brake Beam Hanger. A link or bar used in suspending a brake beam from a truck frame.

Brake Beam King Post. See BRAKE BEAM STRUT.

Brake Beam Release Spring. See RELEASE SPRING.

Brake Beam Safety Chain. 88, Figs. 991, 1010. A chain sometimes attached by eye bolts to a brake beam to act as a safety device in the same manner as a brake beam safety hanger.

Brake Beam Safety Chain Eye Bolt. 89, Figs. 991, 1010. An eye bolt attached to a truck or car body to hold a brake beam safety chain.

Brake Beam Safety Hanger. 90, Figs. 989, 991, 1010; Fig. 1327. A metal strap suspended from a truck frame and surrounding a brake beam, so that in case of a broken brake beam hanger the beam will not drop to the track.

Brake Beam Specifications and Tests (M. C. B. Standard).

In 1915 the following specifications and tests for brake beams were adopted in place of those heretofore approved.

1. *Initial Load.*—Apply an initial load corresponding to the number of the beam as in the second column of the accompanying table, then reduce to zero. Apply a load of 500 lb. and reset the deflection instrument to zero.

2. *Test Load.*—Apply a test load corresponding to the number of the beam as in the second column of the accompanying table, and under this load measure the deflection, which is desired to be 1/16 in. or 0.0625 but should not exceed 0.07 in.

3. *Test for Set Load.*—The beam must then be loaded to the load shown in the third column of the

table after which the permanent set shall not exceed 0.01 of an in.

4. *Total Deflection Test.*—The brake beam should stand a total motion of the head of the machine of not less than 2 in. without failure at any point.

Number of Beam.	Deflection Load.	Set Load.	Ratio.
1	6,500	14,000	47
2	12,000	24,000	50
3	18,000	30,000	60
4	24,000	36,000	66.7
5	30,000	42,000	71.2
6	36,000	48,000	75

5. SAMPLING.—For each 500 brake beams or less which pass inspection and are ready for shipment, one representative beam shall be taken at random and subjected by the company manufacturing the beams, in the presence of the railroad company's inspector, to the above test in a suitable machine.

6. *Number of Tests.*—In case a brake beam shall fail in test described herein, then a second beam shall be taken from the same lot and similarly tested. If the second beam stands the test, it shall be optional with the inspector whether he shall test a third beam or not. If he does not do so or if he does do so and the third beam stands the test, the 500 beams or less shall be accepted as filling the requirements of this test.

7. *Preparation.*—The beams shall be equipped with suitable heads and shoes, and the shoes placed in contact with castings representing the tread of the wheel. When mounted in this manner, the load shall be applied to the fulcrum in the normal line of pull.

8. *Rejection.*—A lot of 500 brake beams or less submitted for test that fail to meet the prescribed test will not be accepted.

9. Individual beams which do not conform to the standard dimensions and those that have physical defects will not be accepted.

Brake Beam Strut. Figs. 1293, 1318. A post or distance piece which forms a bearing for the truss rods of a brake beam. In metal brake beams the brake lever is attached to it, and it then becomes a brake lever fulcrum. For application to brake beams, see Fig. 1225, etc.

Brake Beam Truss Rod. A rod used to truss or strengthen a brake beam.

Brake Block. Another name for a BRAKE HEAD.

Brake Carrier. See BRAKE HANGER CARRIER.

Brake Chain. See BRAKE SHAFT CHAIN.

Brake Chain (M. C. B. Standard). Fig. 2855. In 1909 dimensions for brake chains were adopted as Recommended Practice. Advanced to Standard in 1911. See HAND BRAKE CHAIN.

Brake Chain Connecting Rod. An iron rod connecting the hand brake chain to one of the brake levers, usually the floating lever.

Brake Chain Drum. 51, Figs. 287, 288. The enlarged end of the hand brake shaft, on which the chain is wound.

Brake Chain Sheave. An iron wheel or pulley around which the brake chain passes.

Brake Chain Worm. A conical casting attached to the brake shaft with a screw-shaped groove for the brake chain. Its object is to produce a rapid motion at first and increase the power when the brake shoes are brought to a bearing.

A cylindrical casting with a screw-shaped groove, intended only to make the chain wind evenly.

Brake Clevis. A BRAKE LEVER FULCRUM.

Brake Connection. See BRAKE ROD.

Brake Connection Pin. A pin used for connecting brake rods and levers.

Brake Cord Guide. A guide similar to a signal cord guide for the air-brake cord, which passes through cars fitted with automatic air brake apparatus, and operates the conductor's valve.

Brake Cut-out Cock. Figs. 1300, 1339, 1359. A valve inserted in the branch pipe from the brake pipe to the triple valve, which can be closed and the brakes on that one car put out of action in case they are not working properly. The closing of this valve does not interfere with the operation of the brakes under any other car in the train.

Brake Cylinder (Air Brake). 15, Fig. 340; Figs. 1351, 1359, 1378, 1454, etc. A cast-iron cylinder attached to the frame of the car, containing a piston which is forced outwardly by the compressed air to apply the brakes, and when the air pressure is released is returned to its normal position by a release spring coiled about the piston rod inside the cylinder. On passenger cars the brake cylinder is fitted with two heads, the pressure head and the non-pressure head. For freight cars the brake cylinder and the auxiliary reservoir are usually combined, the reservoir being bolted to one end of the cylinder and forming one of the cylinder heads. The piston rod of the passenger brake cylinder, Fig. 1286, has a crosshead at its outer end, to which is attached the cylinder lever. The piston rod of the freight brake cylinder, Fig. 1289, is hollow and loosely encloses a push rod, which is attached to the cylinder lever. In the vacuum brake a somewhat similar cylinder is used.

Brake Cylinder Block. A block of wood shaped to fit over the curved surface of a brake cylinder and act as a filler between the cylinder and the sill to which it is attached.

Brake Cylinder Lever. Fig. 1307. See CYLINDER LEVER.

Brake Cylinder Lubricator. Fig. 1398. A device for lubricating the brake cylinder.

Brake Cylinder Pipe (Air Brake). The pipe which connects the brake cylinder with the triple valve.

Brake Cylinder Plate. Fig. 478. The steel plate to which a brake cylinder is bolted and by which it is attached to the sills.

Brake Cylinder Support. See BRAKE CYLINDER PLATE.

Brake Cylinders, Cleaning and Lubricating. See AIR BRAKES, CLEANING AND TESTING OF.

Brake Dog. A BRAKE PAWL.

Brake Foot Board. A BRAKE STEP.

Brake Gear. Figs. 1345, 1356, etc. See AIR BRAKES, GENERAL ARRANGEMENTS AND DETAILS; FOUNDATION BRAKE GEAR.

Brake Gear, Foundation. See FOUNDATION BRAKE GEAR.

Brake Guard Rail. A rail sometimes placed around the hand brake wheel on box and other house cars to prevent the brakeman falling off in case he misses his footing while applying the hand brakes.

Brake Handle. Figs. 623, 625. A BRAKE LEVER.

Brake Hanger. 86, Figs. 989, 996, 1010. A link or bar by which brake beams and attachments are suspended from a truck frame or car body. It is attached to the truck or car body by a brake hanger carrier.

Brake Hanger Carrier. 87, Figs. 991, 1010. An eye or U-bolt, a casting or other fastening by which a brake hanger is attached to the truck or body of a car.

Brake Hanger Pin or **Bolt.** A pin passing through the brake hanger carrier and brake hanger, and supporting the hanger.

Brake Head. 83, Figs. 989, 991, 1010; **Figs.** 1290, 1292, 1295, 1296, 1328. A casting attached to a brake beam which carries the detachable brake shoe. For application to brake beams see Fig. 1154, etc.

Brake Head Gage (M. C. B. Standard). Fig. 2841.

In 1907 a brake-head gage was adopted as standard. In 1912 a brake-head gage was adopted for gaging the top and bottom slot in the head.

Brake Head and Shoe (M. C. B. Standard). Fig. 2843.

The brake head and shoe shown on this drawing, known as the Christie brake head and shoe, were adopted as a standard of the Association, by letter ballot, in 1886, with the exception of some slight modifications in details made since that date. Drawing revised in 1896, 1898 and 1907.

The revision made in 1896 consisted in the modifications of the designs of brake head and shoe so as to secure increased clearance at the ends of shoe and equal clearance both above and below the central lug on the back of the shoe; also, the addition of brackets to support the lower bridge lug of brake head similar to the brackets formerly used to support the upper bridge lug. The taper of the shoe was altered so that it would correspond with the taper of the standard wheel tread, by increasing the thickness of the inner edge of the shoe from 1 3/16 inches to 1 5/16 inches.

The revision made in 1898 consisted in reducing the clearance allowed on either side (above and below) the central lug of brake shoe and adjacent lugs of brake head from ⅛ inch to 1/16 inch—the change being made wholly in the head and no change in the shoe.

In 1907 the drawing was further revised to show only the standard dimensions of the brake head, and also in the combined drawing of the brake head and shoe.

The drawing showing the shoe was also revised in part, as well as the drawing showing the relation of ends of head and shoe.

In 1908 the projection, top and bottom, at back of brake shoe, which forms spacer between lugs of brake head, was increased to 9/16 inch in depth.

In 1909 the center lug, and recess for same, in brake head was changed so that the width of lug comes flush with side face of shoe to provide better bearing for center lug of brake shoe and also to prevent twisting of head.

In 1910 a standard was adopted that all inserts in brake shoes must extend in new shoes to a depth equal to at least one-half of the total shoe depth.

In 1912 the drawing was redrawn.

Brake Hose. See Air Brake Hose.

Brake Jaw. Fig. 1308, etc. Jaws which may be fastened to standard rods to form brake rods.

Brake Lever (Air Brakes). Figs. 477, 598, 623, 625; 92, Figs. 989, 991, 1010; Fig. 1356. A general term designating all the levers in the Foundation Brake Gear. Also a lever used for applying the hand brake in vestibuled passenger-equipment cars where there is not room for the use of a brake wheel. See also Dead Lever, Live Lever, Floating Lever, Cylinder Lever.

Brake Lever Bracket. Fig. 1313. A knee on the under side of a car, to which the fulcrum of a brake lever is sometimes attached.

Brake Lever Bracket Brace. A diagonal wrought iron brace to stiffen the brace lever bracket.

Brake Lever Clevis. A Brake Lever Fulcrum.

Brake Lever Coupling Bar (Inside Hung Brakes). See Bottom Connecting Rod.

Brake Lever, Designation of. Fig. 1356. See Foundation Brake Gear.

Brake Lever Fulcrum. Fig. 478; 93, **Figs.** 991, 1010; Fig. 1299, etc. A forked iron attached to a brake beam, by means of which a brake lever is connected to the beam. The form shown in Fig. 977 forms a fulcrum for and also connects the two center levers of a six-wheel truck. In a trussed metal brake beam the king post of the brake beam becomes the brake lever fulcrum. For application of brake lever fulcrums, see Fig. 1225, etc.

Also a bracket attached to an underframe to support a brake lever, and to which the lever is held by a pin in such a manner that it moves about the pin.

Brake Lever Fulcrum Tie Plate. Fig. 478. A U-shaped plate, riveted at both ends to a plate which acts as a bracket. The brake lever is inserted in the opening between the two and held in place by a pin passing through all three. See Brake Lever Fulcrum.

Brake Lever Guide. An iron bar which guides the upper end of a brake lever. Further distinguished as live lever and dead lever guides, the latter provided with pins for readjustment as the brake shoes wear, and also called a brake lever stop. See Dead Lever Guide.

Brake Lever Jaw. A Brake Lever Fulcrum.

Brake Lever, Marking of. See Foundation Brake Gear.

Brake Lever Pin Hole Gage (M. C. B. Standard). **Fig.** 2847. In 1907 the lever pin hole gage shown on the drawing was adopted as standard.

Brake Lever Stop. See Dead Lever Guide.

Brake Lever Strut. A break lever coupling bar or bottom rod connection.

Brake Mast. See Brake Shaft.

Brake Pawl (Hand Brake). Fig. 482. A small pivoted iron bar for engaging in the teeth of a brake ratchet wheel to prevent the wheel turning backward, and thus releasing the brakes. It is placed in such a position as to be worked into engagement by the foot or a brake pawl weight, and out by the foot.

Brake Pawl Carrier. See Brake Pawl and Brake Ratchet.

Brake Pawl Weight. Fig. 482. A pivoted casting serving as a weight to throw up the brake pawl so that it will engage with the ratchet when the latter is located on the under side of the brake ratchet wheel. Also sometimes applied to an eccentric which holds a pawl against a ratchet wheel.

Brake Pin or **Brake Lever Pin.** A small metal pin used in the brake lever connections.

Brake Pipe (Air Brake). 18, Fig. 340; Figs. 1346, 1351, etc. A pipe extending from one end of the car to the other under the car body and connected to the pipes on adjoining cars by flexible brake hose. The air from the air pump or compressor is conveyed through the brake pipe to the auxiliary reservoir under each car. The brake pipe is normally filled with compressed air at 70 pounds pressure and the auxiliary reservoirs with air at the same pressure. A reduction of this pressure in the brake pipe of from 5 to 20 pounds causes the triple valves to open communication between the auxiliary reservoir and the brake cylinder, so that the compressed air stored in the reser-

voir acts on the piston and brake levers and applies the brakes. This is called a service application. In case the train parts or a hose bursts, the air is suddenly and completely released from the brake pipe and the triple valves automatically apply the brakes as before, only with more speed and greater power at first. In an emergency application the full main reservoir pressure of 90 to 110 pounds is turned into the brake pipe and this increase of pressure causes the triple valves to open communication from the brake pipe direct to the brake cylinder, applying the brakes with great force and very suddenly. To release the brakes the brake pipe pressure is restored to normal and the triple valves equalize the pressures in the auxiliary reservoirs and the brake pipe, at the same time opening the brake cylinder to the atmosphere and releasing the brakes. This pipe is sometimes called train pipe, train line, or train brake pipe, but its proper name is brake pipe to distinguish it from the signal and steam heating pipes.

Brake Pipe Air Strainer. Figs. 1387, 1445. A wire strainer inserted in the brake pipe to prevent foreign matter from entering the brake apparatus under the car. See also CENTRIFUGAL DIRT COLLECTOR.

Brake Ratchet (Hand Brake). 50, Figs. 287, 288; 26, Fig. 291; Figs. 482, 1519, etc. A wheel attached to a brake shaft, having teeth shaped somewhat like saw teeth, into which a pawl engages, thus preventing the wheel and shaft from running backward. In some forms the ratchet wheel has the ratch on the under side, instead of on the edge, the brake pawl being automatically pressed upward against the teeth by a Brake Paul Weight, and without being adjusted by the foot of the brakeman. The brake pawl is pivoted in the Brake Pawl Carrier, the latter being bolted to the roof of the car.

In 1879 the M. C. B. Convention recommended that the practice of placing the ratchet gear on a small platform or brake step be discontinued, and that it be fastened to a suitable casting on the roof. Their recommendation has not been universally adopted, though it is a very common practice.

Brake Ratchet Wheel. See BRAKE RATCHET.

Brake Rod. Fig. 478; 97, Figs. 991, 1010; Figs. 1294, 1309, 1317, 1325, etc. A rod connecting brake levers and through which the braking force is transmitted.

Brake Rod Guide. Figs. 477, 480. A wrought iron bracket attached to an underframe as a support for a brake rod.

Brake Rods and Levers, Designation of. See FOUNDATION BRAKE GEAR.

Brake Safety Strap. See BRAKE BEAM SAFETY HANGER.

Brake Shaft. 45, Figs. 287, 288; 14, Fig. 291; 17, Figs. 314, 340; 7, Figs. 351, 352; Fig. 477. An iron shaft, usually vertical, and having a hand wheel on one end, by means of which a chain connected to the brake levers may be wound on the shaft and the brakes applied. It is sometimes made horizontal. See also SAFETY APPLIANCES, DROP BRAKE SHAFT, and BRAKE STAFF HEIGHT.

Brake Shaft Bearing. 47, Fig. 287, 288; Fig. 478; Fig. 481. A metal eye by which a brake shaft is held in its place, and in which it turns. Sometimes called brake shaft guide. See BRAKE SHAFT STEP, LOWER BRAKE SHAFT BEARING, UPPER BRAKE SHAFT BEARING.

Brake Shaft Bevel Gear Wheel. A bevel gear on the lower end of the brake shaft engaging with a similar gear on the horizontal brake chain worm.

Brake Shaft Bracket. A support for holding a brake shaft in its place.

Brake Shaft Chain. Fig. 477. A chain connecting the brake shaft with the brake levers through the brake shaft connecting rods, to the end of which it is attached. The force exerted on the shaft is transmitted by this chain.

Brake Shaft Chain Sheave. A roller over which a brake shaft chain passes. A sheave attached to the end sill for the chain of a horizontal brake shaft to work in.

A sheave or pulley is sometimes attached to the end of the hand brake connection and the brake chain, secured at one end to the end sill of the car, is passed around this sheave and back to the brake shaft winding drum. It thus doubles the power of the hand brake, but also doubles the amount of chain to be wrapped and is objectionable from this standpoint.

Brake Shaft Connecting Rod. A rod which is attached at one end of a brake chain and at the other to one of the levers in the foundation brake gear.

Brake Shaft Gear Wheel. A bevel gear wheel attached to the brake shaft, by which the power applied to the brake hand wheel is conveyed to a horizontal winding shaft or worm, called a brake chain guide casting.

Brake Shaft Guide. See BRAKE SHAFT BEARING.

Brake Shaft Holder See BRAKE SHAFT BEARING.

Brake Shaft Sleeve. That part of a brake shaft on which the brake chain is wound.

Brake Shaft Step. 46, Figs. 287, 288; Figs. 480, 1536, etc. A bearing which holds the lower end of a brake shaft. It usually consists of a U-shaped bar of iron, the upper ends of which are fastened to the car body, with a hole in the bar which receives the end of the shaft. The brake shaft step should not be confounded with a brake step, which latter is a shelf on which the brakeman may step when applying brakes.

Brake Shaft Step Brace. A wrought iron brace sometimes attached to the brake shaft step to resist the pull of the brake chain.

Brake Shaft Thimble. An iron bushing attached to the end of the car to form a bearing for a brake shaft.

Brake Shoe. 98, Figs. 991, 1010; Figs. 1340, 1344. A piece of metal shaped to fit the tread of a car wheel and attached by a key or otherwise to a brake block or brake head. The brake shoe rubs against the tread of the wheel when the brakes are applied. See also WHEEL TRUING BRAKE SHOE.

Brake Shoe Back. Steel backs are often used for cast shoes to reinforce and strengthen them.

Brake Shoe Gage (M. C. B. Standard). Fig. 2841. In 1910 a brake shoe gage shown on the drawing was adopted as standard.

Brake Shoe Key. Fig. 1315. A key or wedge by which a brake shoe is fastened to a brake head.

Brake Shoe, Specifications for (M. C. B. Standard).

In 1901 specifications for brake shoes were adopted as standard as a result of letter ballot. In 1990 they were replaced by the following:

1. Shoes shall be tested for coefficient of friction and for wear upon the Master Car Builders' Association testing machine, or upon a machine with equivalent characteristics.

Coefficient of Friction.

2. Shoes shall develop upon the *cast-iron wheel,* in effecting stops from an initial speed of 40 miles per hour, a mean coefficient of friction of not less than 22 per cent when the brake-shoe pressure is 2,808 lb.;

16 per cent when the brake-shoe pressure is 6,840 lbs.

3. Shoes shall develop upon the steel or *steel-tired wheel*, in effecting stops from an initial speed of 65 miles per hour, a mean coefficient of friction of not less than 12½ per cent when the brake-shoe pressure is 6,840 pounds; 11 per cent when the brake-shoe pressure is 12,000 pounds. No limitation is placed upon the rise in coefficient of friction at the end of the stop.

Shoe Wear.

4. Shoe wear shall be determined upon the *cast-iron wheel* by making not less than 100 applications of the shoe to the wheel, under a pressure of 2,808 pounds, and at a constant peripheral speed of the wheel of twenty miles per hour. At each application the shoe shall remain in contact with the wheel during 190 revolutions of the latter, and between applications the shoe shall remain out of contact during 610 revolutions of the wheel.

Under these conditions, the shoe shall lose in weight not more than 0.8 of a pound for each 100,000,000 foot-pounds of work done.

5. Shoe wear shall be determined upon the steel or *steel-tired wheel* by making not less than ten stops from an initial speed of sixty-five miles per hour and under a pressure of 12,000 pounds. Ten minutes shall intervene between successive applications of the shoe.

Under these conditions, the shoe shall lose in weight not more than 4.0 pounds for each 100,000,000 foot-pounds of work done.

NOTE.—When a shoe not entirely metallic in its composition is tested for wear, its actual loss in weight shall be increased in the ratio which the density of cast iron bears to the mean density of the abraded parts of the shoe, in order to determine the weight which is to be compared with the specifications.

6. That the back of the shoe be made to conform to the gage shown in Fig. M. C. B. 17.

7. In 1912 the drawing of the brake head was changed to show the hanger hole straight with a radius of ⅜ inch at each end, to accommodate the straight hanger with filleted corners.

Brake Slack Adjusters. A device to take up any slack in the brake gear between the air brake cylinder and the brake shoe, so that the piston travel shall not be too great. See SLACK ADJUSTER.

Brake Spool. See BRAKE SHAFT SLEEVE.

Brake Spool Step (Logging Cars). A U-Shaped strap inclosing the brake spool, and equivalent to a brake shaft step.

Brake Spring. See RELEASE SPRING.

Brake Staff. See BRAKE SHAFT.

Brake Staff Carrier Iron (M. C. B. Standard). In 1908 a Recommended Practice was adopted to use a "U"-shaped carrier iron for brake shaft bow for new cars, so that the half yoke now largely used would not be extended to new cars. Advanced to Standard in 1910.

Brake Staff, Height of (M. C. B. Standard). In 1907 a standard maximum height of brake staff, for standard box cars, from top of rail to top of brake staff of 14 feet was adopted.

Brake Step. 48; Figs. 287, 288; 25, Fig. 291; 18, Fig. 314; 19, Fig. 340; Fig. 1520. A small shelf or ledge on the end of a freight car near the top, on which the brakeman stands when applying the brake from the top of a car. Also called a brake footboard. A brake step should not be confounded with a BRAKE SHAFT STEP, which is a bearing for the lower end of a brake shaft.

Brake Step Bracket. 49, Figs. 287, 288; Fig. 480. An iron bracket to support a brake step.

Brake Strut. A compression bar or strut between the live and dead levers of a truck with inside hung brakes. Probably the term brake strut is more common than brake lever coupling bar. Brake strut should not be confused with brake beam strut. A bottom connection rod.

Brake Treadle (Hand Cars). A lever for applying brakes with the foot.

Brake Valve (Air Brakes). Figs. 1413, etc., 1472. The valve operated by the motorman to apply and release the brakes. Also called operating valve and motorman's brake valve.

Brake Van (British). American equivalent, caboose, or baggage car. A covered vehicle in which the guard (conductor) of a train travels, and which is fitted with a powerful screw hand brake. On passenger trains it carries the passengers' luggage (baggage), etc. On goods (freight) trains it is weighted with pig iron, and is primarily used as a source of brake power. Also called guard's van.

Brake Wheel Fig. 1523. See HAND BRAKE WHEEL.

Brake Windlass. A term sometimes used to designate the brake shaft, with all its attached parts.

Brakeman's Step. A step on the inside of a wide vestibule for the use of trainmen in applying hand brakes.

Branch Pipe (Air Brake). Figs. 1346, 1347. A pipe extending from the triple valve to the brake or train pipe.

Branch Pipe Strainer. A strainer used in the branch pipe.

Branch Pipe Tee (Air Brake). Figs. 1346, 1347, 1395. A tee used to connect the branch pipe to the brake or train pipe.

Branding Steel Wheels. See WHEELS, STEEL; BRANDING OF.

Brass. An alloy of copper and zinc. A term commonly used to designate a JOURNAL BEARING.

Bridge. In car construction the term bridge means a timber, bar or beam which is supported at each end.

Bridging (Passenger Equipment Car Framing). Short transverse distance blocks between the sills of an underframe to keep the sills from displacement or buckling. A sill tie rod is usually employed to keep the sills drawn tightly against the bridging. It is toenailed and sometimes tenoned into the sills with small tenons.

Broad Gage. A term applied to a gage when the distance between the head of the rails is greater than 4 ft. 9 in. See NARROW GAGE, STANDARD GAGE.

Broiler and Oven. Figs. 1715, etc. Those illustrated are adapted for use in parlor and buffet cars and use gas as a fuel.

Bronze. An alloy composed of copper and tin, sometimes with a little zinc and lead.

Brush. Figs. 2444, etc. A device bearing on an armature, and through which current is supplied to an electric motor and received from an electric dynamo or generator.

Brush Holder. A support for the brushes of an electric motor, providing by means of springs for a constant pressure of the brushes on the commutator.

Brush Rigging. Figs. 2444, etc. The apparatus pertaining to the brushes of a motor or generator.

Bucker (Electric Lighting). A machine somewhat like

a small dynamo which has a field and a revolving armature and which is used for automatically maintaining a constant predetermined voltage in the lamp circuit regardless of the speed of the dynamo or the demand for lights.

Buffer. Fig. 509, page 411, etc. An elastic apparatus or cushion attached to the end of a car to receive and absorb the shocks caused by other cars running against it. The term is generally applied to those attachments in which springs are used to give the apparatus elasticity.

Buffer Beam (Freight Cars). See DEAD WOOD.
(Passenger Cars.) See PLATFORM END SILL.

Buffer Beam Extension. 22, Fig. 404. A buffer block on the platform end sill of a passenger car.

Buffer Block. Usually one of a pair of buffing devices placed on either side of the coupler to receive severe shocks and prevent damage to the car. It also acts in the same capacity as a Dead Wood, the latter sometimes being termed Buffer Block. See DEAD WOOD.

Buffer Block Face Plate. A metal plate bolted to the face of a wooden buffer block or dead wood to protect the wood from wear. Usually called striking plate.

Buffer Plate (Passenger Equipment Cars). An iron or steel plate (usually bolted to the end of the buffer stems) which bears and rubs against the opposing plate of the next car of the train. The vestibule face plate is bolted or riveted to, and carried by, the buffer plate.

Buffer Safety Lug. A projecting horn cast on top of freight couplers to bear against a buffer block and relieve the draw gear from excessive compressive strains. COUPLER HORN is the more common name.

Buffer Shank. The square part between the buffer head and buffer stem.

Buffer Sill. Fig. 509, Page 411, etc. See BUFFER and PLATFORM END SILL.

Buffer Spring (Passenger Equipment Cars). The springs that resist the compression of a train or the impact when they come together as in coupling. In passenger equipment this thrust is not taken by the drawbar alone, but by the buffers, which transmit it to the buffer springs, which absorb or transmit it to the car body.
(Freight Cars.) A draft spring.

Buffer Stem (Three-Stem Couplers). The round bar which passes through the buffer springs. The term is sometimes applied to the buffer bar, which includes the round stem and the square shank.

Buffer Stem Guides. Iron bushings inserted in the platform end sill, in which the buffer stems work. They are to protect the wood from abrasion and wear.

Buffet Car. See CAR. The cars in which a buffet are most used are parlor, sleeping, observation, library and smoking cars, and in such cases the cars are termed buffet-sleeping, buffet-observation, or observation-buffet, buffet-library and buffet-smoking cars.

Buffing Sub-Sill. A sub-sill bolted to the center sills on the underside and forming a continuous buffing sill in conjunction with the draft timbers. They are bolted and keyed to the center sills with key blocks and bolts. Also called back stop timber.

Bulkhead (Refrigerator Car). 10, Figs. 351, 352; Fig. 884, etc. A partition which separates the ice chamber from the part of the car in which the lading is placed.
(Passenger Equipment Cars.), Fig. 1588. A partition which divides the car into rooms or compartments.

Bull's-Eye. A convex glass lens, which is placed in front of a lamp to concentrate the light so as to make it more conspicuous for a signal.

Bumper. A term sometimes used to designate a buffer.

Bunk. 24, Fig. 364. A rough form of sleeping berth built against the side of a car.
(Logging Cars.) Figs. 1145-1147. A cross piece similar to a body bolster, on which timber is loaded.

Bunk Apron. A board attached on the deck sill of a sleeping car and projecting below it to cover the edge of the upper berth when it is closed. In the later sleeping cars it is not used.

Bunk Panel. A panel below the cornice and behind the upper berth in sleeping cars, shutting off the upper part of the side windows.

Bunk Truss (Logging Cars). An iron strap to stiffen the bunk.

Burlap. A coarse canvas used in upholstery.

Burner. Fig. 2058, etc. "That part of a lighting apparatus at which combustion takes place."—Knight, Fig. 897. See LAMP BURNER.

Burner Cock (Pintsch System of Gas Lighting). A cock used for wall lamps. It is opened and closed with a key.

Bushing. Usally a metal cylindrical ring which is inserted in an opening and forms a bearing for some other object, as a shaft or valve. Often contracted to bush.
(Pipe Fitting.) A short tube with a screw cut inside and outside, used to screw into a pipe to reduce its diameter. Generally, a bushing has a hexagonal head by which it is turned, and is more commonly termed reducer.

Business Car. A term frequently applied to a car used by railway officials while traveling. See CAR and PRIVATE CAR.

Butt Hinge. A hinge for hanging doors, etc., which is fastened with screws to the edge of a door, so that when the latter is closed the hinge is folded up between the door and its frame. A hinge the two parts of which are so fastened together that they cannot readily be detached is called a fast joint butt hinge. A loose pin butt hinge (Fig. 1828) is one having a removable hinge pin, and a loose joint butt hinge (Fig. 1829) is one with which the doors may be lifted off of the hinges when desired.

By-Pass Valve. A valve which, either through manual control or automatically, will pass a gas or fluid through a direct route or an alternate route, as may become necessary in connection with the operation of the particular apparatus to which it is applied.

C

Cabin Car. Figs. 116-123, 363-370. A term sometimes applied to CABOOSE CARS, but more particularly to the four-wheel type. See CABOOSE.

Cabin Door Hooks. Fig. 1813. See DOOR HOOK.

Cabinet Lock. It may be applied either to the inner edge of the door or drawer or be set into a mortise. Cabinet locks vary from the cheapest type to the pin-tumbler type which gives the highest possible security.

Caboose or **Caboose Car.** Figs. 116-123, 363-370. A car which is attached to the rear of freight trains for the accommodation of the conductors and trainmen, and for carrying the various stores, tools, etc., required on freight trains. Sometimes called conductor's car, cabin car, train car, way car or van. See CAR and WAY CAR.

Caboose Deck or **Cupola Lamp.** Fig. 2051, etc. A signal lamp used in a caboose cupola.

Café Car. Figs. 169, 172, 173. A passenger equipment car having a kitchen, usually in the center, and one end arranged as a café or dining room, the other being generally fitted for use as a parlor or smoking room. See CAR.

Café Coach. Figs. 163, 164. A combined day coach and café car. See KITCHEN CAR and LUNCH COUNTER CAR.

Café-Parlor Car or **Parlor-Café Car.** Figs. 169, 172, 173. A combined café and parlor car.

Cam. A device used to convert rotary into reciprocating motion; commonly an eccentric disc.

Camber. The upward deflection or bend of a beam, girder, or truss.

Candelabra. A term applied to an ornamental lamp; sometimes shaped like a candle stick.

Candle. A special candle of large diameter called car candle was at one time used for lighting passenger cars and burned in CANDLE LAMPS.

Candle Bracket Lamp (Pintsch System). Fig. 2306. For use in emergency, as in case gas gives out. May be attached to wall or to any center lamp at will.

Candle Lamp.. A lamp for burning candles, sometimes elaborated into a chandelier with two or three burners. Candles, however, are now almost never used except in emergency bracket lamp, to be used when the gas or electric lights fail.

Canopy. See LAMP CANOPY. A term sometimes applied to the SMOKE BELL of a lamp. A platform hood is sometimes called a canopy.

Cant Rail (British). American equivalent, plate. A horizontal timber running along the top of the upright pieces in the sides of the body, and supporting the roof and roof timbers. Its upper edge is cut to the bevel of the roof; hence its name.

Cantilever. A term sometimes, but not desirably, applied to a Cross Bearer. See CROSS BEARER.

Cantilever Cover Plate. See CROSS BEARER or CROSS TIE COVER PLATE.

Cantilever Diaphragm. See CROSS BEARER DIAPHRAGM.

Cantilever Truss (Overhang of Underframe). An inverted truss which bears upon the side sill directly over the body bolster. The inner end is connected by a tie rod to the inner end of the truss at the other end of the car body, while the outer end supports the overhang of the underframe by a vertical tie rod and by a diagonal brace rod similar to the overhang truss rod of the old Pullman wooden framing.

Canvas. A coarse cloth, made of cotton, used for upholstering seats, and sometimes for the finish of the ceiling of passenger cars when it is painted or otherwise decorated. Roofing canvas is also used for covering passenger equipment cars.

Car. See BOX CAR, AUTOMOBILE CAR, etc.

A vehicle used on railways for the transportation of passengers or material.

CLASSIFICATION OF CARS.

M. C. B. Recommended.—In 1910 a committee considered the question of harmonizing the terms used in designating the different kinds of cars in each class according to their physical requirements and submitting the following definitions, which were adopted by letter ballot, as Recommended Practice.

In 1912 the designations RS, RA, RB, VS and VA were adopted.

In 1913 the following designations were adopted: BM, ES, GB, MBE, XI, MWX, MWE, MWJ, MWP, MWR, MWN, SH. Revised 1915.

DEFINITIONS AND DESIGNATING LETTERS OF GENERAL SERVICE PASSENGER EQUIPMENT CARS.

In 1915 the following definition was submitted by the American Railway Association:

A passenger train car is defined as a car suitably built to operate in passenger trains, its characteristics being: passenger type of truck passenger brake, air signal, steam train line, in accordance with definition and designating letters for general passenger equipment cars as follows:

CLASS B.

"BA"—Baggage Car. — A car constructed and equipped to render it suitable for passenger train service having wide side doors for the admittance of baggage, with or without windows or end doors.

"BE"—Baggage Express.—A car similar to baggage, used for either baggage or express matter.

"BH"—Horse or Horse and Carriage Express.—A car constructed and equipped to render it suitable for passenger train service for the transportation of fine stock, fitted with stalls (movable or stationary) and space left for carriage or horse equipment.

"BM"—Milk Car.—Exclusively for the transportation of milk, being a car for this purpose and fully equipped for handling in passenger trains.

"BR"—Refrigerator Express.—A car constructed and equipped for passenger train service and fitted with ice bunkers or boxes, and suitable to carry produce, oysters, fish or any commodity requiring icing in transit.

"BX"—Express Car.—Constructed and equipped for passenger train service and used for express matter, having suitable side doors, with or without end doors or windows.

CLASS C.

"CA"—Combined Car, Baggage and Passenger.—A car having two compartments, one suitable for transporting baggage, the other fitted with seats for passengers, the two compartments separated by bulkheads.

"CS"—Combined Smoking and Baggage Car (Club Car).—A car having two compartments, separated by bulkheads, one compartment suitable for transporting baggage, the other fitted with seats or chairs and used as smoking car; at times equipped with buffet or bar.

"CO."—Combined car having three separate compartments, separated by bulkheads, one compartment suitable for transporting baggage, one for mail fitted with suitable apparatus for sorting and classifying mail, and the other fitted with seats for the transportation of passengers.

"CB"—Business Car.—A special type of car for the convenience of business men, used as smoker and fitted with tables or desks, carrying stationery and fitted with typewriters and carrying regular stenographers.

CLASS D.

"DA"—Dining Car.—Regular dining car, for the use of passengers in transit, with regular kitchen, tables, chairs or seats, with or without bar, carrying cooks and waiters.

"DB"—Buffet Car.—Car for the transportation of passengers and fitted with small broiler or buffet to serve simple meals to passengers; cooking and serving

done on removable tables by regular porter in charge of car. With or without facilities for serving liquor.

"DC"—Café Car.—A car fitted with kitchen, usually in center of car, one end used as café where meals are served, also liquor and smoking allowed, the other end of car fitted with either regular dining room or smoking and card room; carrying cooks and waiters.

"DG"—Grill Room Car.—Very similar to café car.

"DO"—Café Observation Car.—Car fitted with café at one end, kitchen in center or extreme end, having observation compartment fitted with stationary or movable tables and observation platform at rear.

"DP"—Dining and Parlor Car.—A car fitted with dining compartment, kitchen and compartment for passengers, fitted with chairs, stationary or otherwise, carrying regular cooks and waiters.

CLASS E.

"EA"—Electric Street Railway Service Car.—Direct current, for transportation of passengers; without automatic couplings.

"EP"—Electric Passenger Car.—For long hauls or suburban service, multiple unit and fitted with automatic couplings and air brakes. Third rail, trolley or pantagraph contact.

"EB"—Electric Baggage Car.—For long hauls or suburban service, multiple unit with automatic couplings and air brakes and suitable for the transportation of baggage. Third rail, trolley or pantagraph contact.

"EM"—Electric Mail Car.—For use in United States Mail Service, fitted with side doors, with or without mail hook, and suitable apparatus for the sorting and classifying of mail en route. With or without end doors or windows.

"EC"—Electric Combined.—A car for long hauls or suburban service, multiple unit with automatic couplings and air brakes. This car is made up of two compartments, separated by bulkhead, one suitable for the transportation of baggage and the other fitted with seats or chairs for the use of passengers. Third rail, trolley or pantagraph contact.

"EG"—Gasoline Motor Propelled Car, for inspection or private use, or use in suburban service, hauling one or more trailers.

"ED"—Gasoline Motor Car.—Gasoline engine or engine serving to run dynamo to furnish electricity for axle motors. Car to be used for inspection, private use, or as motive power to haul trailer or trailers; fitted with storage cells and with or without booster.

"ES"—Electric Passenger Car.—For long hauls or suburban service; multiple unit, and fitted with automatic couplings and air brakes. Operating power, storage battery.

CLASS M.

"MA"—Postal Car.—For use of United States Mail Service, fitted with side doors, with or without mail-bag hook, and having suitable apparatus for the sorting and classifying of mail in transit, with or without end doors or windows.

"MB"—Baggage and Mail.—A car having two compartments, one for baggage and one for mail, separated by bulkheads; the mail end fitted with suitable apparatus for sorting and classifying mail, and with or without mail-bag catchers, with or without end doors or windows, and having suitable side doors.

"MP"—Postal Car.—Suitable for transporting newspapers or large mail packages for United States Mail Service, having side doors and fitted with stanchions, with or without end doors or windows.

"MR"—Postal Storage Cars.—For United States Mail Service, suitable to carry mail in bulk, without appliances for sorting or classifying, fitted with side doors and stanchions and with or without end doors or windows.

"MS"—Mail and Smokers.—A combined car having two separate compartments, separated by bulkheads, one compartment suitable for the transportation, sorting and classifying of mail, the other fitted with seats or chairs, to be used by passengers as smoking car.

"MBE"—Combination Baggage, Mail and Express Car.—A car having three compartments, each entirely separate from the other, for handling its individual class of business.

CLASS P.

"PA"—Passenger Car.—A car for ordinary short haul suburban service, with seats and open platforms.

"PB"—Passenger Car.—A vestibule (wide or narrow) car for through service, fitted with seats or reclining seats, and having toilet rooms for men and women, also wash basins.

"PE"—Emigrant or Colonist Car.—A second-class passenger car, with floors either bare or fitted with matting, used expressly for emigrant trade on trains where low rate of fare is charged.

"PS"—Sleeping Car.—A car for passenger service having seats that can be made up into berths, and usually having one or more separate stateroom compartments, also toilet and washroom facilities for men and women, and smoking compartments for men. Some cars of this class are all compartments, and some compartment and observation combined.

"PN"—Passenger car used exclusively as smoking car, with seats or chairs and fitted with cuspidors or having matting or bare floor.

"PO"—Observation Car.—A car having observation compartment at one end and fitted with either berth facilities, parlor chairs or compartments, usually run in first-class service.

"PV"—Private cars used as officers' or private individual's car and railroad pay car—usually composed of sleeping compartments, dining compartments, observation end and with kitchen, servants' quarters and toilet and bathroom.

"PT"—Tourist Car.—A second-class sleeping-car, fitted usually with cane seats convertible into berths and used mostly on transcontinental trains; cars fitted with smoking compartment, toilet and washroom.

"PC"—Passenger, Parlor or Chair Car.—A car fitted with individual stationary or movable chairs, used on trains for daylight runs and having toilet and washrooms.

CLASS I.

"IA"—Instruction Cars.—For use of employees; usually run from one point to another in passenger trains.

NOTE.—If it is so desired, a small letter "E" can be placed after the larger designating letters to indicate electric lighting, and small "G" for gas lighting; also figures showing approximate length of car or length of baggage or mail compartment.

Definitions and Designating Letters of General Service Freight Equipment Cars.

CLASS X.

"XM"—Box Car.—General service, suitable to lading which should be kept from the weather. A box car is a closed car having side and end housings

and roof, with doors in sides or sides and ends.

"XA"—Automobile Car.—Box car of similar design to general service car, having exceptionally large side doors or end doors.

"XF"—Furniture Car.—Box car of similar design to general service car, except usually greater capacity in cubic feet.

"XV"—Box Car, Ventilated.—Similar to ordinary box, only having ventilation, and suitable for the transportation of produce or other foodstuffs not needing refrigeration.

"XI"—Box Car, Insulated.—A box car having walls, floor and roof insulated, not equipped with ice bunkers or ice baskets. This car ordinarily used for transporting vegetables, fruit, etc.

"XT"—Box Car Tank.—A box car without doors, metal lined, or inclosing tank for the shipment of water or other liquids.

CLASS R.

"RA"—Meat and Provision Refrigerator.—A car with body, doors and hatch plugs equipped with insulation and brine ice tanks and without ventilating devices.

"RB"—Beer and Ice Refrigerator.—A car with body and doors equipped with insulation, having no ice tanks or ventilating devices.

"RM"—Refrigerator or Produce Car.—A car suitable for carrying commodities that need icing in transit. This car is equipped with two or more ice bunkers or baskets and suitable means for draining off melted ice or briny water. This car has body, door and hatch plugs equipped with insulation, with trap door in the roof for admission of ice and salt; also water seals inside of car.

"RS"—Standard Refrigerator.—A car with body, doors and hatch plugs equipped with insulation, with ice tanks and either with or without ventilating devices.

CLASS V.

"VA"—Vegetable Ventilator.—A car equipped with insulation, but having common box car end and side doors which afford no protection against heat or cold.

"VS"—Standard Ventilator.—A car equipped with insulation, including insulated side, end and top openings, and ventilating devices without ice tanks.

CLASS S.

"SM"—Stock Car.—This car is for transportation of stock on the hoof, and is equipped with roof, slatted sides and side doors, and single or double deck. With or without feed or feed and water troughs.

"SD"—Stock Car.—Composite having drop doors in floor and means of housing in sides and making drop-bottom box car.

"SP"—Stock Car.—Used in poultry trade, fitted with roof and sides usually of wire netting, fitted with shelves for storing crates of poultry and leaving space for poultrymen, feed bag and watering facilities.

CLASS G.

"GA—Gondola Car—This car has sides and ends; open at top, and drop bottom; suitable for general coal or ore trade, stone or general trade.

"GE."—Gondola car having drop bottoms and drop ends; suitable for general coal or ore or mill trade.

"GC"—Gondola Coke Car.—Gondola car fitted with coke racks and having drop bottoms.

"GD."—Gondola car having side-dump arrangement.

"GM"—Gondola Car.—Suited to mill trade, having solid bottom, low sides and drop ends to facilitate twin shipments.

"GB"—Gondola Car.—A car with solid bottom, sides and ends, and open on top; suitable for mill trade.

"GF"—Gondola Car.—A car equipped with coke racks and having solid bottoms.

"GS"—Gondola Car.—A car with fixed sides and ends, and flat bottom composed of dump doors hung at inside edge, and dumping to the side of track.

CLASS H.

"HM"—Hopper Car.—Similar in general design to gondola car, having sides and bottom ends and open at top, equipped with hopper bottom and self-cleaning.

"HT"—Hopper (Twin).—Similar to ordinary hopper, only equipped with two or more hopper doors instead of one.

"HD."—Hopper car equipped with side-dump hoppers.

"HC."—Hopper car equipped with coke racks.

Note.—If any of these hopper cars are provided with roof or cover for protection of contents, the letter "R" should be affixed to the regular symbol to designate its special class of service.

CLASS F.

"FM."—Ordinary flat car for general service. This car has flooring laid over sills and without sides or ends.

"FG."—Flat or gun truck car for special transportation of heavy ordnance.

"FW."—Flat well-hole car for special transportation of plate glass, etc. This car is a flat car with hole in middle to enable lading to be dropped down on account of clearance limits.

"FB."—Flat car having skeleton superstructure, suitable for carrying barrels, known as "Barrel Rack Car."

"FL."—Flat logging car or logging truck. This is either an ordinary flat car, or car consisting of two trucks fitted with cross supports over truck bolsters; the trucks connected by a skeleton or flexible frame and logs loaded lengthwise on cross supports.

CLASS T.

"TM."—Tank car for general service. This car is for general oil or liquid service, and consists of a steel tank mounted on frame or mounted directly on cradles over truck bolsters. It is equipped with one or two safety release valves, and is emptied by valves or valve at bottom. At the top is a dome, with or without manhole, and openings through which the tank may be filled.

"TA"—Acid Tank.—Of same general construction as oil tanks.

"TG."—Tank car having glass-lined tanks, for use in hauling mineral waters and other special products.

"TS."—Tanks for special commercial service.

"TW"—Tank car having wooden tank, instead of steel, and used for water, pickles, etc.

CLASS N.

"NM."—Freight train service caboose for convenience of trainmen. This caboose is mounted on four wheels and has lookout at top over roof. It is fitted with bunks or benches and a stove for cooking and heating purposes, also tank for storage of drinking and washing water, and small tool storage boxes.

"NE."—Caboose mounted on eight wheels and longer than four-wheel caboose, but of the same general design.

CLASS Y.

"YM"—Yard Poling Car.—This car used in hump

classification and flat-yard classification. This car is usually fitted with small house or protection and benches, tool box and stove, a counterweighted pole on each side and running board or step near the ground for convenience of yardmen. It is protected with safety appliances and, when in use, coupled to an engine.

"YA."—Yard pick-up car for use of car droppers and yardmen in performance of their duty. It might be termed a "Car Dropper's Car." It is protected by a house, around which runs a platform and railing, a long running board on sides near ground, and is fitted with benches, tool box and stove.

NOTE.—The capacity of car can be shown by affixing two figures after designating letter: For instance, "80" would mean 80,000 pounds capacity; "10" would mean 100,000 pounds capacity; "60" would mean 60,000 pounds capacity. Where tanks are in question the capacity numbers should indicate capacity in gallons instead of pounds.

GENERAL SERVICE MAINTENANCE OF WAY EQUIPMENT CARS.

Any of the following classes of equipment, having special heating appliances for the protection of commodities against freezing, to be covered by affixing the letter "H" to the designating symbol.

"SH"—Horse Car.—A car specially fitted for the transportation of horses in freight service.

Weed Burner.—A car equipped with machinery for propelling itself, or otherwise, and burning weeds along the track as it proceeds.

Ditching Car.—A car equipped with machinery for propelling itself, or otherwise, and excavating ditches along the sides of the track as it proceeds.

Rail Saw.—A car equipped with machinery for sawing track rails and similar material.

Rail Bender.—A car equipped with machinery for bending track rails and similar material.

Grass Cutter.—A car equipped with machinery for propelling itself, or otherwise, and cutting grass along the track as it proceeds.

Track Layer.—A car equipped with machinery for propelling itself, or otherwise, and laying the track ahead of it as it proceeds.

"MWB"—Ballast Cars.—All descriptions of cars used for the purpose of carrying ballast for the laying of new right of way and repairs. The car used generally for this work is of the gondola type, with side or center dump.

"MWD"—Dump Cars.—On the type of contractors' car used for building up fills; the body of the car dumps, being raised by means of counterweight, air or hand power.

"MWF"—Flat Car.—Used for transporting rails, ties or ballast and for storage of wrecking trucks, or gathering scraps along right of way. These cars are at times equipped with low sides, about 10 or 12 inches high.

"MWS"—Steam Shovel.—Car equipped with donkey engine housed in. Having a boom of wood or steel and the end of which is a shovel or scoop. It may be propelled by its own power or by means of a locomotive and run as a car in freight trains, being equipped with safety appliances. The cubic capacity of shovels, in yards, can be indicated by figures after classification letters.

"MWW"—Wrecking Derrick.—A derrick used for wrecking purposes, having donkey engine to raise and lower booms and hoists; engine housed in and on separate platform with boom, is pivoted in center of car frame in order that it can be worked on either sides or ends; usually fitted with anchor beams to be used for heavy lifting. Fitted with safety appliances and propelled by means of locomotive. Lifting capacity in tons shown by means of figures.

"MWU"—Wrecking Derrick.—This derrick has boom and hoist fitted to frame of flat car and lifting done by means of hand power; propelled by locomotive.

"MWV"—Wrecking Derrick.—This derrick has boom and hoist fitted to flat car and having drum at one end to furnish means of hoisting; steam furnished to donkey engine, running drum, by means of flexible steam line from attached locomotive; propelled by locomotive.

"MWT"—Tool and Block Car.—A car used for carrying all descriptions of tool equipment and blocking. This car has side and end housings and roof, also end platforms. There are doors in sides and ends and usually windows. It is fitted inside with proper racks and boxes for storage of tools.

"MWC"—Caboose and Tool Car.—Similar to tool car, but having one end fitted up as a caboose, with bunks, stove and water storage, with or without lookout, and is used in either work or wrecking trains.

"MWH"—Hand Car.—This car is flat and mounted on four wheels and propelled by means of pushing; known as "Push Car."

"MWL"—Hand Car.—This is a small flat car, with or without seats, mounted on four wheels and propelled by means of cranks or hand levers.

"MWG"—Section Gang or Track Inspection Car.—Flat car, with or without seats or tool boxes, and equipped with single or double cylinder gasoline engine serving as motive power.

"MWX"—Boarding Outfit Car.—This includes cars used for boarding, sleeping or cooking purposes in construction and similar work.

"MWE"—Ballast Spreader and Trimmer.—A car with blades or wings for spreading or trimming ballast.

"MWJ"—Ballast Unloader.—A car equipped with machinery for pulling a plow through cars loaded with ballast.

"MWP"—Pile Driver.—A car equipped with machinery for pile driving.

"MWK"—Snow-removing Car.—A car equipped with any special device for removing snow from between or alongside of rails.

"MWM"—Store-supply Car.—A car equipped for handling material to be distributed for railway use.

Car Axle. 2, Figs. 989, 991, 1010. A shaft made of wrought iron or steel to which a pair of car wheels is attached. The wheels are usually rigidly fastened to the axle by making a hydraulic press fit. The following are the names of the parts of an axle: Center of Axle, Neck of Axle, Wheel Seat or Fit, Dust Guard Bearing, Collar, Journal.

In a few cases in steam railroad service where roller bearings have been used the axle does not rotate but

is fixed and the wheels turn on the roller bearings. See also AXLE.

Car Box. A JOURNAL BOX.

Car Closet. See DRY CLOSET and WATER CLOSET.

Car Discharge Valve (Train Air Signal Apparatus). Figs. 1354, 1394, 1428, 1437. A valve placed in the end of the car and connected with the signal cord. When the cord is pulled the car discharge valve is opened and air escapes, resulting, through the construction of the apparatus, in the blowing of the signal whistle in the locomotive or motorman's cab. See TRAIN AIR SIGNAL APPARATUS.

Car Door Sheave. See DOOR SHEAVE.

Car Drain Cup (Air Brake). An attachment to the brake pipe of a car to collect the water of condensation, which is drawn off from time to time through a hole at the bottom closed by a plug; it is usually combined with an air strainer and so called.

Car Heater. Fig. 2211, etc. Any apparatus for heating cars by convection; that is, by conveying hot water, steam or warmed air into, or through, the car. It generally refers to any arrangement for warming cars other than stoves. With most steam heating systems the steam is taken from the locomotive, but in many cases a heater is supplied to the car to take care of emergencies. See BAKER CAR HEATER.

Car Inspectors, Rules for Examination of. See EXAMINATION OF CAR INSPECTORS.

Car, Lettering. See LETTERING CARS.

Car Moldings. See MOLDINGS.

Car Receptacle. A device placed on a car for use in charging storage batteries. A connector carries the current from a charging plug to the car receptacle, from which it enters the batteries.

Car Replacer. Fig. 2781, etc. A device for getting a derailed truck back on the track. It usually consists of an inclined plane or a curved surface, by which the wheels are raised when the car is pulled, so that the flange of the outside wheel can ride upon and over the rail.

Car Roof. 39, Figs. 287, 288; 17, Figs. 351, 352; 914-950. A covering for a car supported by carlines and purlins. Several types of roofs are used on freight cars. A double board roof may be built, with or without felt or other material between the boards. Inside metal roofs are formed of metal protected by a covering of roughly matched boards. Outside metal roofs have a metal covering over a single layer of roof boards. Metallic or all-metal roofs use metal only in their construction. See PLASTIC CAR ROOF.

Passenger car roofs are usually covered with canvas, tin, galvanized iron or steel sheets. See ARCHED ROOF, "A" CAR ROOF.

Car Seal. Figs. 844, 845. A device to secure freight car doors against opening by making it impossible without destroying the seal.

Car Seat. Figs. 1646-1705. The complete set of fixtures on which passengers sit in a car. It ordinarily consists of a seat frame, seat cushions, seat back, arm rest, foot rest, and their attachments. Ordinarily, the seats in American cars are placed crosswise of the car, and are made for two passengers. The backs of the seats are generally made reversible The seats of parlor cars are commonly called chairs, and are usually revolving. In private and parlor cars, sofas, placed longitudinally against the side of the car, are sometimes used. In order to give an inclination to the seats which makes them more comfortable, various devices have been introduced. See GLIDEOVER SEAT, PARLOR CAR CHAIR, RECLINING CHAIR, REVERSIBLE CAR SEAT, ROCKER CAR SEAT, WALKOVER SEAT.

Car Seat Moldings. Metal bands, usually used to finish seat backs. See MOLDINGS.

Car Signal Valve (Train Air Signal Apparatus). A CAR DISCHARGE VALVE.

Car Sills, Uniformity for Section of. See SILLS, UNIFORMITY FOR SECTION OF.

Car Spring. A general term applied to springs on which the weight of a car rests. See BOLSTER SPRING, ELLIPTIC SPRING, SPIRAL SPRING, SPRING.

Car Steps. See PLATFORM STEPS.

Car Washer. A brush made for washing the outside of passenger cars.

Car Wheel. 28, Fig. 291; 1, Figs. 989, 991, 1010; Fig. 1185, etc. See WHEEL.

Carburetor. Fig. 2364. See VAPOR SYSTEM.

Card Rack. A small receptacle on the outside of a freight car to receive cards giving shipping directions.

Carline. 36, Figs. 287, 288; 18, Fig. 364; 35, 36, Fig. 404; Figs. 475, 914, 915, 926, 934, etc. A bar of wood or iron which extends across the top of a car or from one side to the other, and which supports the roof. In passengers cars carlines are divided into main carlines, passing entirely across the car; short carlines or deck carlines, which are confined to the upper deck, and rafters, which are confined to the lower deck. The main carlines are usually compound, i. e., built up of wood and iron. They sometimes pass directly from side to side of the car across and under the upper deck, when they are termed continuous or straight carlines, but usually they are bent to the outline of the clear story and are termed profile carlines. Other carlines having special names are: COMPOUND CARLINE, END CARLINE, PLATFORM HOOD CARLINE, PLATFORM ROOF CARLINE, PLATFORM ROOF END CARLINE.

Carline Knee Iron. An angle iron which connects the end carline to the plate. Also termed inside corner iron.

Carpet Eyelet. See EYELET.

Carpet Knob. An EYELET NAIL.

Carriage Bolt. A bolt made square under the head so as to prevent it from turning when in its place. They have button-shaped heads and are used for fastening wooden pieces together.

Carrier Iron, Brake Staff. See BRAKE STAFF CARRIER IRON.

Carry Iron. See DRAWBAR CARRY IRON, DRAFT GEAR CARRY IRON.

Carry Case (Fusees and Torpedoes). A metal receptacle sometimes kept in cabooses for the use of flagmen.

Cars, Reinforcing of Existing Wooden Freight. (M. C. B. RECOMMENDED PRACTICE.)

In 1915 the following minimum strength requirements for the reinforcement of existing wooden cars were adopted.

1. The draft attachments, including draft arms, if used, must be of metal, either integral or riveted construction.

2. The strength value of the draft attachments and center-sill construction must be equivalent to at least 10 sq. in. of steel in tension and compression, 6¼ sq. in. of rivet-bearing area and 12½ sq. in. in shear. The ratio of unit stress to end load must not exceed 0.15.

3. Metal draft arms applied to wooden center sills must extend at least 30 in. beyond center line of bolster, toward center of car, must be securely fastened to bolster and center sills, and where possible should butt against compression members placed between draft arms and needle beams and also between the needle beams.

Hardwood or yellow pine center sills may be considered equivalent to steel in center-sill construction between bolsters, if they have four times the specified unit values, namely, 40 sq. in. tension and compression area, and a ratio of unit stress to end load not exceeding 0.0375.

Where wooden members are reinforced with metal (composite construction), either the steel or the wood must alone meet the strength requirements.

Where horn of coupler is allowed to come in contact with the end sill, the latter must be provided with a striking plate of sufficient strength to resist its proportionate load without deformation.

4. The draft-gear capacity is indirectly governed by the rules in paragraph 2.

Cartridge (Acetylene Gas Lighting). A cylinder used for holding carbide in the generation of the gas.

Casing. See WINDOW CASING.

Cast Steel Bolsters, M. C. B. Specifications for. See BOLSTER SPECIFICATIONS.

Caster. Fig. 1633. A small wheel on a swivel attached to furniture and on which it is rolled on the floor.

Caster Holder (Dining Cars). A shelf or tray for holding bottles of condiments.

Casting. Any piece of metal which has been cast in a mold.

Catch. A device to prevent a gate, door or window from opening.

Catch Lever (Three-Stem Coupler). A crank lever passing vertically through the catch, by means of which it is caused to release the knuckle for uncoupling.

Catch Spring (Three-Stem Coupler). A coiled spring on the catch spring bolt operating the catch.

Cattle Car. More properly STOCK CAR.

Ceiling. 18, Figs. 351, 352. The inside or under surface of the roof or covering of a car. This term is sometimes used to mean SHEATHING. The ceiling of a passenger car is generally termed HEAD LINING. DEAFENING CEILING is boarding under the sills of a car, the space between it and the floor being either left empty or filled with shaving or some similar substance to deaden the noise of the wheels. See AGASOTE, HEAD LINING, LIGNOMUR.

Ceiling Furring. Strips or pieces fastened to the carlines overhead, to which the paneling or veneering of the ceiling is applied.

Ceiling Veneers. Thin boards with which the ceilings of passenger cars are covered. The term is also misapplied to the thin preparations of papier maché etc., in imitation of natural wood veneers. See VENEER.

Cell. An electro-chemical device for producing electrical energy, consisting of two metaloid elements immersed in a liquid electrolyte. When the two plates are connected by an exterior conductor a current of electricity is caused to flow from one element to the other through the liquid electrolyte and the exterior circuit. Such a device is called a voltaic or primary cell. A group of such cells connected is called a battery and a single cell is also commonly referred to as a battery. The parts of the elements are referred to as a plate or electrode. See STORAGE BATTERY.

Center Axle Guard. The axle guard for the center axle of a six-wheel truck. See AXLE GUARD.

Center Bearing. Figs. 1078-1085. The place in the center of a truck where the weight of the body rests. A body center plate attached to the car body here rests on a truck center plate attached to the truck. The general term center bearing is used to designate the whole arrangement and the functions which it performs, in distinction from SIDE BEARING. See also CENTER PLATE.

Center Bearing Arch Bar. 66 and 67, Fig. 1010. See CENTER BEARING BRIDGE.

Center Bearing Beam. See CENTER BEARING BRIDGE.

Center Bearing Bridge (Six-Wheel Trucks). 66 and 67, Fig. 1010. A structure formed by the top and bottom center bearing arch bars to support the center plate block or center bearing beam and transmit the weight of the car to the bolsters, on which its extremities rest.

Center Block Column. A column placed on top of the center plate block or bearing beam, and between it and the center bearing arch bar.

Center Buffer Spring. A spiral spring situated above the draft springs in some forms of passenger draft gear and intended for buffing purposes only.

Center Buffer Stem. See BUFFER STEM.

Center Compression Beam Brace. In wooden passenger equipment car framing, a brace for the compression beam in the center of the side truss.

Center Counterbrace. A counterbrace in the body of the car between the trucks, to stiffen a compression beam brace. See also COUNTERBRACE.

Center Cross Beam. A cross timber framed into the two intermediate sills of a coal or ore car, to which the center doors are hung.

Center Cross Beam Cap. A cap piece to cover the center cross beam.

Center Cross Tie Timber. A cross tie timber in the middle of a car, generally placed between the double drop doors of a gondola car.

Center Door Rail. See MIDDLE DOOR RAIL.

Center Draft Drawbar. A drawbar which is connected directly with the king bolt of a truck. It is a style specially designed for use on the very sharp curves (of 90 and 100 ft. radius) of elevated railroads and subways, and is confined to those lines. Sometimes termed radial draw gear.

Center Draft Tube (Argand Lamp). The hollow passage for air in the center of the burner.

Center Dump Car. Figs. 42-45, 63, 68, 326, 327, 329, 333, 334. A car which will discharge its entire load between the rails. See also CONVERTIBLE CAR.

Center Floor Timbers. The CENTER SILLS.

Center Frame. See TRUCK CENTER FRAME.

Center Girth. See DOOR CENTER GIRTH.

Center Pin or King Bolt. Figs. 364, 1077. A large bolt which passes through the center plates on the body bolster and truck bolster. The truck turns about the bolt, but the stress is taken by the center plates. It is, therefore, a mere pin and not a bolt in the usual sense. The name king bolt is derived from the name of the corresponding part for the front wheels of a wagon. Center pin, however, is the more common term.

Center Pin Floor Plate. An ornamental casting set

into the floor of a passenger equipment car to cover the head of the center pin.

Center Plate. 7, Figs. 287, 288; 6, Fig. 291; 14, Fig. 314; 5, Fig. 335; 7, Fig. 340; 26, Figs. 351, 352; 31, Fig. 364; Fig. 479; 11 and 12, Fig. 490; 63, Figs. 989, 991, 1010, 1078-1085. One of a pair of plates which fit one into the other and which support the car body on the trucks, allowing them to turn freely under the car. The center pin or king bolt passes through both, but does not really serve as a pivot. The body center plate or male center plate is attached to the under side of the body bolster or in cast steel bolsters is made an integral part of the casting. The female or truck center plate is attached to the top side of, or cast integral with, the truck bolster. When the car is tilted, as on a curve, part of the weight is carried on the SIDE BEARINGS. See ANTI-FRICTION, BALL BEARING and ROLLER CENTER PLATES.

Center Plate (M. C. B. Standard). Fig. 2856. In 1915 the center plate shown in the drawing was adopted as a standard.

Center Plate Block. 64, Fig. 1010. The member supporting the center plate of a six-wheel truck. It is in turn supported by the center bearing arch bars.

Center Plate Shim. Fig. 1076.

Center Rod (Postal Car). A device which fits in a socket at the top of the pedestals, and to which the ends of the two rods, which support the distributing trays, etc., near the center of the car, are fastened.

Center Sill. 4, Figs. 287, 288; 2, Fig. 291; 1, Figs. 314, 335, 340; 1, Figs. 351, 352, 364; Fig. 373. The central main longitudinal members of the underframe of a car which are usually close together in the center of the car. They form as it were the backbone of the underframe and transmit most of the buffing shocks from end to end of the car. In steel underframe cars the center sills are usually heavy I-beams, channels, deep built-up fish-belly girders or pressed steel fish-belly girders, often with reinforcing flange angles. See CENTER SILL WEB PLATE, CENTER SILL BOTTOM ANGLE, and CENTER SILL COVER PLATE.

(Hand Car.) The corresponding member in the floor framing of a hand car.

Center Sill Bottom Angle. 2, Fig. 404. The angle at the bottom of a center sill of the built-up type.

Center Sill Bottom Cover Plate. See CENTER SILL COVER PLATE.

Center Sill Cover Plate. 3, Fig. 291; 13, Fig. 335; 4, Fig. 404. A flat plate riveted across steel center sills, either above or below, to give additional strength.

Center Sill, Splicing of. See SILL, SPLICING OF.

Center Sill Stiffener. Fig. 480. A filling piece riveted between the center sills to act as a brace for holding them rigid.

Center Sill Top Angle. 3, Fig. 404. The angle at the top of a center sill of the built-up type.

Center Sill Top Cover Plate. See CENTER SILL COVER PLATE.

Center Sill Web Plate. 1, Fig. 404. The plate which forms the web of a center sill of the built-up type.

Center Sills (M. C. B. Recommended Practice). In 1914 by letter ballot, minimum design requirements for new cars were adopted for steel center sills. Area of center sills: 24 sq. in. minimum.

Ratio of stress to end load: 0.06 maximum.

Length of center or draft sill members between braces: 20 d, maximum ("d" is the depth of member, measured in the direction in which buckling might take place).

Center Sills, Spacing Between (M. C. B. Standard). In 1905, the spacing between steel center sills of 12⅞ inches was adopted as recommended practice. Advanced to standard in 1907.

Center Stay (of a Chandelier). The central support around which the lamps are grouped. In some cases it is the only method of attaching the chandelier to the ceiling, and in others there are several inclined roof braces or vertical lamp arms in addition.

Center Stop (Tip Car). A bracket or block attached to a draw timber to restrain the body from moving longitudinally.

Centering Devices. See DRAWBAR CENTERING DEVICE.

Centering Gage. A gage to fix the middle point of an axle.

Central Filling Piece (Steel Tired Wheels). The part surrounding the hub and connecting it with the tire. Also termed the skeleton. A wheel center is a hub and central filling piece combined.

Centrifugal Dirt Collector. Figs. 1386, 1459. A device connected in the branch pipe between the brake pipe and distributing valve, or triple valve, and so constructed that due to the combined action of centrifugal force and gravity, all dirt and foreign material is automatically eliminated from the air flowing through the collector chamber and by means of a plug may be removed without breaking any pipe connections whatever. When this device is used, the brake pipe air strainer may be omitted.

Chafing Plate. Fig. 1182. A metal plate to resist wear, used on truck transoms, etc.

Chain. "A series of links or rings connected, or fitted into one another, usually made of some kind of metal."—Webster. See BERTH CHAIN, BRAKE CHAIN, HAND BRAKE CHAIN, SAFETY CHAIN, etc.

Chain Holder (for Basin Plug). A stanchion provided with a screw thread and nut for passing through the marble slab. Also called a chain post, or chain stay.

Chain Post or **Stay.** See CHAIN HOLDER.

Chain, Specifications for. (M. C. B. Recommended Practice.)

In 1914, by letter ballot, specifications for chain for passenger and freight equipment cars were adopted as Recommended Practice. Revised 1915.

1. *Process.*— (a) The chain may be made of either iron or steel, and may be welded by either the electric or fire process.

(*b*) Iron chain shall be manufactured from a grade of wrought iron that will meet the requirements of the M. C. B. specifications for Refined Wrought Iron Bars.

(*c*) Steel chain shall be manufactured from steel which has been made by the open-hearth process, and which shall be ductile and of satisfactory welding quality.

(*d*) Chain 5/16 in. in diameter or less may have links twisted, if so specified on the order; all other sizes shall have straight links.

2. *Tensile Test.*—Samples from finished chain shall conform to the minimum requirements as to tensile properties given in Table No. 1, the elongation being determined in a length of from 12 to 18 in. to the nearest link.

3. *Proof Test.*—(*a*) All chain shall be proof-tested by subjecting it to the loads given in Table No. 1, and when so tested it shall stand these loads without showing any defects.

(*b*) The manufacturer shall furnish a certificate of proof-test to the purchaser or his representative.

4. *Test Specimen.*—Tension test specimens shall consist of not less than 2-ft. lengths cut from the finished chain.

5. *Number of Tests.*—One tension test shall be made to represent each 200 ft. or fraction thereof ordered.

Diam. bar.	Proof-test loads. Pounds.		Breaking loads. Pounds.		Elongation. Per Cent.		Maximum length. 100 links.	Normal weight. 100 feet.
In.	Steel.	Iron.	Steel.	Iron.	Steel.	Iron.	Ins.	Lbs.
1/4	1,650	1,500	3,300	3,000	12	10	102	75
5/16	2,650	2,400	5,300	4,800	12	10	114.7	110
3/8	3,700	3,400	7,500	6,800	12	10	125	165
7/16	5,100	4,700	10,200	9,400	12	10	137.5	205
1/2	6,700	6,100	13,400	12,200	12	10	150	265
9/16	8,500	7,800	17,000	15,600	12	10	168	325
5/8	10,500	9,600	21,000	19,200	12	10	176	425
11/16	12,500	11,600	25,000	23,200	12	10	195	520
3/4	15,100	13,800	30,200	27,600	12	10	213	610
13/16	17,600	15,800	35,200	31,690	12	10	225	725
7/8	20,600	18,800	41,200	37,600	12	10	238	810
15/16	23,500	21,200	47,000	42,400	12	10	250	925
1	26,900	24,500	53,800	49,000	12	10	263	1,025
1 1/16	30,400	27,600	60,800	55,200	12	10	295	1,225
1 1/8	34,100	31,000	68,200	62,000	12	10	325	1,350
1 1/4	42,100	38,300	84,200	76,600	12	10	353.5	1,650
1 3/8	.....	.....	.....	112,000	..	15	355	1,100
1 1/2	.....	.....	.....	134,400	..	15	390	2,450
1 5/8	.....	.....	.....	138,200	..	15	425	2,875
1 3/4	.....	.....	.....	165,000	..	15	475	3,200
1 7/8	.....	.....	.....	190,000	..	15	525	3,640
2	.....	.....	.....	216,000	..	15	575	4,200

6. *Length.*—The length of 100 links, inside to inside of end links, shall not exceed the values given in Table No. 1 by more than two, and shall be measured after proof-test has been made. In making this measurement a load not to exceed ten per cent of the proof load shall be applied so that the slack may be taken up.

7. *Weight.*—The weight of the chain shall not vary more than three per cent above and five per cent below the weight given in Table No. 1. Excess over the allowance permitted will not be paid for.

8. *Workmanship.*—(*a*) The chain shall be free from injurious defects and shall have a workmanlike finish. The diameter of the welds shall not be perceptibly less than the diameter of the bar, and unless otherwise specified shall not exceed the diameter of the bar by more than twenty-five per cent.

(*b*) Prior to inspection, the chain shall be free from paint or any other coating which would tend to conceal defects.

9. *Limiting Weights.*—Bolsters, including centerplate and side bearings, shall conform to the weights given in table. In case the bolsters have met all requirements except that of overweight, they may be accepted at the maximum allowable weight here specified.

Car Capacity, Lb.	Weight, Lb. Minimum.	Weight, Lb. Normal.	Weight, Lb. Minimum.
80,000	775	795	815
100,000	840	865	890
140,000	1,110	1,140	1,170

10. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contact of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacturer of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be conducted as not to interfere unnecessarily with the operation of the works.

11. *Rejection.*—Material which, subsequently to the above tests at the mills or elsewhere, and its acceptance, develops weakness or imperfections, or is found to have injurious defects, will be rejected and shall be replaced by the manufacturer at his own expense.

12. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Chair. The usual designation for the seats of parlor cars. Ordinary chairs are used in dining cars. See Reclining Chair, Revolving Chair.

Chair Arm Plate. A metal plate for the top of a chair arm. If for passenger car seats, it is called an arm cap.

Chair Car. Figs. 148, 149, 378-380. A day coach or passenger car equipped with reclining chairs, providing more comforts than a day coach for passengers travelling at night who do not desire to use a sleeping car. See Passenger Car.

Chandelier. A lamp or lamps having an elaborate form of suspension from a roof or ceiling.

Change-Over Switch (Electric Lighting). Fig. 2543.

Change-Over Valve (Empty and Load Brake). Fig. 1358.

Channel. A rolled steel commercial bar shaped like a trough or channel. It is commonly used in steel car construction.

Channel Section Bolster. A bolster whose cross section has the shape like that of a trough or channel.

Chapel Car. Figs. 180, 181. A car whose interior is arranged as a chapel.

Chaplet. A piece of iron used in a mold for casting, to hold a core in its place.

Charging Plug. An electric fitting or connection device to which wires leading to a yard charging plant or electric-light circuit are attached. The plug is made to fit the receptacle in such a manner that the positive wire from the charging plant will invariably be connected to the positive battery wire. By inserting the plug in the receptacle the battery on the car may be connected with and charged from the stationary charging plant. These devices are used principally in straight storage work where no generating plant is carried on the car.

Charging Receptacle. An electric fitting or connection device attached to the under side of the car body from which wires lead to the storage battery. There is generally one on each side of a car.

Check Chain or Safety Chain. 68, Figs. 991, 1010. A chain attached to a truck and the body of a car to prevent the former from swinging crosswise on the track in case of derailment. Such chains are usually attached either to two or to each of the four corners of a truck and to the sills of the cars.

At the eighth Annual M C. B. Convention, Cincinnati, 1874, it was

"Resolved, That truck and car body check chains are,

when properly applied, a valuable acquisition on passenger equipment, and your committee recommend their general use." In 1893 the use of truck and car body check chains, properly applied, was adopted as a Recommended Practice. In 1896 it was agreed that this recommendation referred to passenger equipment only.

A difficulty with check chains has been that the eyes by which they are attached to the body and truck were not strong enough to resist the strain, and that the chains themselves have been too long to come to a bearing soon enough to have the trucks controllable.

Check Chain Chafing Plate. A plate attached to a truck timber to resist the wear of a Check Chain.

Check Valve (Triple Valve). 15, Fig. 1360. The valve under the emergency valve which prevents the escape of brake cylinder pressure back into the train line when a hose bursts or the train parts. In an emergency application the emergency valve opens and allows the brake pipe pressure to enter the brake cylinder through the check valve which is raised off its seat.

Check Valve Case (Triple Valve). 13, Fig. 1360. See Check Valve.

Check Valve Case Gasket (Triple Valve). 14, Fig. 1360.

Check Valve Spring (Triple Valve). 12, Fig. 1360.

Cheek Casting. See Draft Casting.

Chill. A kind of crystallization produced when melted cast iron is cooled suddenly. It is usually accomplished by bringing the molten iron in contact with a cold metal (usually iron) mold. The hardened part of a cast iron car wheel is called the chill. The mold in which a chill is produced is sometimes called a chill, but the name chill mold has been given to this. See Wheels, Specifications for.

Chill Crack. An irregular crack developed in casting upon the chilled surface of the tread of car wheels. See Wheels, Specifications for

Chimney (Gas Lamps). See Mica Chimney.

Chipping (of Chilled Car Wheels). A scaling off of small portions of the chilled metal, due to imperfect or irregular crystallization. See Wheels, Specifications for.

Chock or **Chock Piece.** "In shipbuilding a wedge or triangular-shaped block or timber used to unite the head and heel of consecutive timbers."—Century. Also intended as a filling piece to give form or shape. Hence in a snow plow a timber which joins successive timbers, and fills out to give shape.

Chock Block. A triangular piece used on the bunk of a logging truck to hold the logs in place.

Chord (of a Truss). The long horizontal members at the top and bottom of a truss. The side sills and plates of a car body are top and bottom chords of the side trusses, but the terms are not used in car building. In Great Britain the chords are sometimes termed booms.

Cinder Deflector. See Dust Deflector.

Circuit Breaker. Figs. 2692, 2724, etc. A device for automatically opening the circuit from the trolley or third rail shoe to the controller when the current exceeds a predetermined amount.

Circulating Drum (Baker Heater). Fig. 2113. A cast iron vessel with hemispherical ends, on top or inside of the car, filled with water, and connected by two pipes with the coil in the stove and with the pipes which extend through the car. As the water in the coil becomes heated it ascends to the drum, and from there it descends through the other pipe to the radiating pipes in the car. After passing through them it is brought back by return pipes to the coil, when it is again heated. Thus a continuous circulation is kept up. It is also called the expansion drum.

Circulating Pipes (Car Heaters). A general name for the pipes which carry the steam or heated water through the car and return it again to the heater. The term radiating pipes is also used.

Circumference Measure (M. C. B. Standards). See Wheel Circumference Measure.

Clam Shell Bucket. Fig. 205. A form of digging or shovelling apparatus, operated by power, and taking its name from its similarity to a clam shell.

Clamp. A device for holding or binding two or more parts together. See Pipe Clamp, Hose Clamp.

(Carpentry.) "A frame with two tightening screws, by which two portions of an article are tightly compressed together, either while being formed or while their glue joint is drying."—Knight.

Clamp Lock (Steam Couplers). A Coupler Latch.

Clasp Brake. Figs. 999, 1002, 1003, 1006, 1009, 1016. 1329, etc. An application of brakes in which two brake shoes are used on each wheel, and opposite to each other, instead of one brake shoe per wheel as is the ordinary practice. The brake pressure per square inch of bearing service is thus greatly reduced. Used on heavy high speed passenger train cars.

Claw Jack. A jack having a step or projection at the bottom of the movable column, used when a bearing close to the ground is required. A foot lift jack.

Cleaning Air Brakes. See Air Brake, Cleaning and Testing of.

Clearance or **Clearance Limit.** British equivalent, loading gage. The limiting dimensions of height and width for cars in order that they may safely clear all bridges, tunnels, station platforms and other structures.

Clearance Car. A car with a light frame built out on all sides to the extreme width and height required for any car that is to pass over the road. It is run over the road first to ascertain if the car can with safety be sent over the road. The clearance car may also be used to ascertain what is the maximum cross-section of tunnels, bridges, etc., over a road so that cars can be built within the limits determined by the clearance car.

Clearance, Couplers, Side. See Automatic Car Couplers.

Cleat. A strip of wood or iron fastened across other material.

Clere-Story. See Deck.

Clevis. "A stirrup-shaped metallic strap used in connection with a pin to connect a draft chain or tree to a plow or other tool."—Knight. The term is applied to various kinds of irons resembling a plow clevis in shape, and also to bolts with forked ends.

Clinch Nail. A wrought iron forged nail, so named because it can be bent or clinched without breaking. Cut nails, the common and cheapest kind, although of wrought iron, will not clinch.

Clip. A U-shaped strap for attaching any body, more particularly a pipe, to the side of a partition. See Pipe Clip. More broadly a device permanently attached to one part, whose function it is to hold another part in place which can readily be slipped into position. See Release Spring Clip.

Close Return Bend. A short cast iron tube made of a U shape, for uniting the ends of two pipes. It differs from an open return bend in having the two branches in contact with each other.

Closet. A small room, usually for storage.

A retiring room for sanitary purposes, more commonly called a SALOON. See also DRY CLOSET and WATER CLOSET.

Closet Hopper. See HOPPER.

Club Car. Figs. 182, 245. See LOUNGING CAR.

Coach. Figs. 140-149, 226-229, 378-398. A term commonly used to designate passenger cars which are used for day travel. See CAR; PASSENGER CAR.

Coach Screw (British). American equivalent, lag screw, but coach screw is also used. A square-headed screw with a pointed end used to screw into wood.

Coal Car. A car for carrying coal; usually a hopper or gondola car, but box and stock cars are frequently used for this purpose. See also CAR.

Coat Hook. Fig. 2026, etc.

Cock. "A spout; an instrument to draw out or discharge liquor from a cask, vat or pipe."—Webster. See BIBB COCK, MAIN COCK, etc.

Coil Spring. See HELICAL SPRING.

Coke Car. Fig. 32, etc. A car of large cubic capacity for carrying coke. Modified forms of hopper cars with doors which discharge the load to one or both sides of the track are commonly used. Frequently a coke rack is applied to the sides of gondola cars. Box and stock cars are often used for carrying coke. See CAR, and COKE RACK.

Coke Quenching Car. Fig. 196. A car with an inclined floor, into which coke is discharged from the furnace and quenched with water.

Coke Rack. Fig. 291. A slatted frame or box applied above the sides and ends of gondola cars to increase the cubic capacity for the purpose of carrying coke or other freight in which the bulk is large relative to the weight.

Coke Rack Angle. 27 and 32, Fig. 291. A commercial angle used in forming the coke rack on a steel coke car. Commonly termed end and side coke rack angles, and further designated top, center, intermediate or bottom, as the case may be.

Coke Rack Stake Pocket. A metal socket fastened to the sides and ends of a gondola car to receive the stakes of a coke rack.

Cold Shot. Small globules of iron resembling ordinary gun shot, which are found in the chilled portion of cast iron wheels.

Collar. "A ring or round flange upon or against an object."—Knight.

(Of a Journal.) A rim or enlargement on the end of the car axle which takes the end thrust of the journal bearing.

Colonist Sleeping Car. See EMIGRANT SLEEPING CAR, SLEEPING CAR, and CAR, M. C. B., Class PE.

Color Coat (Painting). The coat or coats which follows the rough stuff or scraping filling coat in painting passenger car bodies. See FINISHING VARNISH and PAINTING.

Column (Diamond and Other Trucks). Figs. 1100-1101. Another name for a BOLSTER GUIDE BAR.

(Of Crane.) Another name for the mast, particularly when entirely supported from below.

Column Bolt. 109, Fig. 991. A bolt passing through the arch bars and holding the truck column or bolster guide bar in place and the truck frame together.

Column Bolt (M. C. B. Standard). See ARCH BARS, COLUMN and JOURNAL BOX BOLTS. (M. C. B. Standard.)

Combination Baggage Car. A baggage car having compartments for express or mail, or both, as well as for baggage. See COMBINATION CAR.

Combination Car or **Combined Car.** Figs. 139, 221-225. A passenger train car divided into two or more compartments for the accommodation of different classes of traffic. See CAR.

Combination Cock (Baker Heater). A cock with funnel attached, used at the top of the water tank for filling. When opened with the key it allows the inward passage of the water, and at the same time the outward passage of air through a separate channel, hence the name.

Combination Lamp. Fig. 2305, etc. A lamp arranged for two lighting systems, as gas and electricity.

Combination Valve (Steam Heating). Figs. 2050, 2092.

Combined Platform and Double Body Bolster. A passenger equipment car platform frame and double body bolster made in one piece. See DOUBLE BODY BOLSTER and BODY BOLSTER.

Combined Stop and Lock. Fig. 494. See DOOR STOP.

Combined Triple Valve, Reservoir and Brake Cylinder (Freight Air Brake). To lessen the complication and reduce the cost of freight brake gear these three parts, which are separate in passenger brake gear, are combined.

Commutator. See ARMATURE, BOLTED COMMUTATOR.

Commutation Pole Motor. Fig. 2675, etc. A railway motor in which four auxiliary coils and pole pieces, called commutating poles, are mounted between the four main field poles. The windings of these poles are connected in series with each other and with the armature. The commutation is improved and the poles perform their functions equally well regardless of the direction in which the motor is run.

Compartment. A subdivision of a passenger car. In British carriages it usually runs entirely across the car. In American parlor and sleeping cars, when used, it runs only partially across, leaving room for a passage or corridor at the side. Often called STATEROOM.

Compartment Sleeping Car. Figs. 178, 244. A sleeping car which is divided into staterooms all opening into a common corridor which runs the whole length of the car. See SLEEPING CAR.

Compensating Valve. A valve designed for use on high speed trains to regulate the brake cylinder pressure so that the maximum retarding power may be obtained without injury to the wheels.

In service application, with both plain and quick action triple valves, it acts as a safety valve, to relieve the cylinder of surplus pressure. In emergency applications part of the vented brake pipe air passes from the side cap of the triple into the spring box of the compensating valve and, exerting a pressure on the diaphragm in addition to the spring, prevents the valve from opening. After a few seconds the pressure of air in the spring box has become so reduced by back leakage through the small hole in the check valve that the brake cylinder pressure is able to force the piston down, permitting brake cylinder air to escape until the pressure becomes reduced to that at which the valve is adjusted, when the spring moves

the piston back and closes the exhaust. With this valve the maximum brake cylinder pressure in emergencies is gradually reduced to that at which the valve is adjusted.

Composite Car. Another name for COMBINATION CAR. A freight car with a combination steel and wood frame.

Composite Framing. A type of framing which combines iron and wood, in the sills, posts, plates, etc. The sills and plates of the body and deck consist of two pieces of wood with an iron or steel flitch plate between, the three pieces being bolted together as one.

Compound Carline. A carline having the main or central portion of wrought iron, with a piece of wood on each side. Commonly used for wooden cars with clere stories, and sometimes called profile carline, owing to their following the shape of the clere-story.

Compressed Air Jack. See PNEUMATIC JACK.

Compression Beam. A horizontal timber in the side framing of a wooden passenger-equipment car body, which acts as the compression member of a truss. The compression beam brace abuts it. The compression beam is sometimes made double, one piece above the other, with separate braces (main compression brace and center compression brace) acting upon each. See END COMPRESSION BEAM.

Compression Beam Brace. A timber used in connection with a compression beam to form a truss in the side framing of a wooden passenger-equipment car. It is sometimes stiffened by a center counter brace,. and sometimes two or more braces are used. It is then termed main compression brace.

Compression Faucet. A spring faucet with a flat disk on top. The valve is opened by pressing this disk and closed by a spring when the pressure is removed.

Compression Member. Any bar, beam, brace, etc., which is subjected to strains of compression, and forms part of a frame truss, beam, girder, etc. Struts, body braces, etc., are compression members. Similarly a tension member is used for tensile strains.

Concealing Water Closet. A form of closet covered with a small seat and sometimes placed in the corner of compartments or staterooms in private and sleeping cars.

Condensation Meter (Car Heating). A device for measuring the steam consumption of car heating systems.

Conductor (Refrigerator Car). The drip pipe from the ice pan.

Conductor's Car. A CABOOSE CAR.

Conductor's Lantern. One with an extra-sized bail attached to it by which it can be held on the arm, leaving the hands free.

Conductor's Switch. Fig. 1407. A device used in connection with electro-pneumatic air-signal equipments for traction roads, which, when the signal cord is pulled, energizes the signal magnet, opening the magnet valve and admitting air to the signal whistle.

Conductor's Valve. Figs. 1355, 1383, 1458. A valve for applying the train brakes and placed at some convenient point in each passenger car, usually in the saloon.

Conductor's Valve Chain and Hook. Fig. 2038.

Conductor's Valve Discharge Pipe. A pipe leading from the conductor's valve down through the floor of the car to carry off the escaping air.

Conductor's Valve Pipe. Connects the brake pipe with the conductor's valve.

Connecting Chain (Steam Shovel). A pitch chain, connecting the pitch gear on the two axles of a truck, used for making the car self-propelling.

Connecting Rod. A rod which connects two or more parts or objects.

(Hand Car.) The iron rod which connects the bell crank and the crank shaft.

Connection Angle. A piece of commercial angle or a bent plate riveted to two members of a steel frame to hold them rigidly together.

Connection Clip. See CONNECTION ANGLE.

Construction Car. A car used in building a new line of railroad or making repairs to roadbed and structures. The cars used as eating and sleeping cars for the men employed on construction work are frequently placed under this heading, as well as ballast cars, etc. See BALLAST CAR and CONTRACTOR'S CAR.

Contactor. Fig. 2730. A magnetic switch used to make or break a circuit in a motor control system. See AUXILIARY CONTACTOR and CONTROL SYSTEM.

Continuous Basket Rack. See BASKET RACK.

Continuous Brake. A system of brakes so arranged that by connecting the brake apparatus on the different cars forming a train it can be operated on all of them from the engine or from any of the cars. See AIR BRAKE, VACUUM BRAKE.

Continuous Carline. A carline, which passes directly from side to side of the car, across and under the clere-story or upper deck, in distinction from a profile carline, which is bent to follow the outline of the clere-story.

Continuous Draft Gear. A draft gear, having a continuous rod or rods extending throughout the length of the car from the drawbar at one end to the drawbar at the other end, whose office is to transmit the tractive stresses and relieve the draft timbers. See AMERICAN CONTINUOUS DRAFT AND BUFFING APPARATUS.

Continuous Truck Frame. An iron bar which is welded together in a rectangular shape so as to form the sides and ends of a truck frame.

Contour Line. See AUTOMATIC CAR COUPLER.

Contractor's Car. Fig. 60, etc. A car used by contractors in construction work; usually a dump car.

Control System. See MULTIPLE UNIT CONTROL, UNIT SWITCH SYSTEM.

Control Valve (Air Brake). Fig. 1368. A device which performs all the functions of the triple valve and, in addition, provides a maintained brake cylinder pressure; automatic emergency should the brake pipe pressure be depleted below a predetermined point; full emergency braking power at any time during or following a service application, and maximum braking power more quickly than by the use of the triple valve.

Controller (Electric Motor Car). Figs. 2682, 2729, etc. A device for regulating the speed and direction of rotation of the electric motors.

Convertible Car. Figs. 42-44, 93, 95-97, 333, 334, 348, 349. A car so built that it may be converted, without reconstruction, from one type to another, as stock to box or center dump gondola to side dump gondola. See also CAR, M. C. B. Class SD.

This term is also applied to a type of street cars which may be used either as open or closed cars.

Conveyor Car. A freight car equipped with motors for moving freight under special conditions, as on a coal wharf.

Cooking Utensils. Fig. 1721, etc. For use on dining, café-parlor, buffet cars, etc.

Cope. The upper portion of a mold or flash used in making metal castings.

Coping (British). A bar of iron secured to the top of the sides and ends of a gondola car (open wagon), and protecting them from local distortion.

Corner Angle Post. A corner post in the body framing of a car which consists of an angle bar, sometimes in combination with a wooden post.

Corner Brace. A diagonal member in the underframe between the end sill and transverse floor member or bolster. See End Sill Diagonal Brace.

Corner Brace or **Corner Plate** (Freight Car Bodies). 58, Figs. 287, 288; 30, Fig. 477. A wrought or cast iron angle plate or knee on the outside corner, to strengthen and protect the frame. There are usually three corner plates, upper, lower and middle. Very commonly a push pole pocket is combined with lower corner plate. Also used on the inside corners.

(Passenger Equipment Car End Framing.) An angle iron applied to the corner of the deck end plate to keep it from abrasion and strengthen it.

Corner Casting. Usually a Corner Plate or Push Pole Pocket.

Corner Handle. More commonly a Hand Hold or Grab Iron.

Corner Plate. See Corner Brace.

Corner Post. 22, Figs. 287, 288; 29, Fig. 291; 36, Fig. 364; 23, Fig. 404. The vertical member which forms the corner of the frame of a car body.

Corner Post Grab Iron. See Grab Irons.

Corner Post Knee Iron (Passenger Equipment Car End Framing.) A metal angle brace used to connect the foot of the corner post to the side sill.

(Vestibule.) An iron angle brace for the outside corner post of a vestibule resting upon the platform end sill.

Corner Post Pocket. The pocket for the corner post. See Post Pocket.

Corner Seat. A seat for the corner of a car, the back of which is not reversible.

Corner Seat End. A seat end bracket secured to the wall of a passenger car for supporting the outer end of a Corner Seat.

Cornice. The moldings where the ceiling or headlining joins the sides and ends of the car inside.

Cornice Sub-Fascia or **Panel.** A board or panel directly below a cornice.

Corridor (Sleeping and Compartment Cars). A passage running at one side of a car affording access to the compartments. All sleeping, dining and private cars have corridors to pass the staterooms, smoking compartments, etc.

Corrugated Metal Car Roof (Freight Cars). A roof consisting of iron, steel or zinc plates usually covered with boards, and resting on roof strips on top of the rafters and carlines.

Corticine. A form of floor covering much like Linoleum.

Cotter Pin. See Split Key.

Counter Bore. An enlargement, for a certain portion of its length, of a hole bored in any substance.

Counterbrace. In passenger equipment car framing, the timber framed into the top of the side sill near the needle beam and supporting the compression beam brace into which it is also framed.

Counterbrace Rod. An inclined rod which acts as a counterbrace.

Counterbrace Rod Plate Washers. Washers that rest upon the plate and receive the end of the counterbrace rod.

Coupler. 13, Fig. 291; 6, Fig. 340; Fig. 624, etc. The term applied to the modern drawbar. The coupler proper is the head of the drawbar, which is so constructed as to automatically connect with or couple to the drawbar head on another car. The drawbar and its head, together with its knuckle and locking devices, is commonly termed coupler. See Automatic Car Coupler.

Coupler or coupling is also commonly applied to the connector which is used on air brake and steam heat hose. See also Automatic Connector.

Coupler, Automatic. For M. C. B. Rules for Interchange of Traffic with regard to couplers see Interchange of Traffic.

Coupler Carrier. 22, Fig. 291; Fig. 481. See Drawbar Carry Iron.

Coupler Carry Iron. See Drawbar Carry Iron.

Coupler Centering Device. See Drawbar Centering Device.

Coupler, Electric. A device attached to the end of a car including insulated metallic contacts for the connection of electric circuits between cars, generally used for connection of trail car lighting, heating or signal circuits to the motor car. See Control System.

Coupler, Emergency. See Emergency Coupling Device.

Coupler Gage. See Automatic Car Coupler.

Coupler Horn. The projecting lug cast on the head of the coupler which bears on the face of the end sill or dead wood when the draft gear is closed solid. See Automatic Car Coupler.

Coupler Jumper. Fig. 2712. Two coupler plugs connected by an insulated flexible cable. See Control System.

Coupler Latch (Steam Coupler). A catch to lock the steam hose couplers together and prevent accidental parting in rounding sharp curves.

Coupler Knuckle. See Knuckle.

Coupler Knuckle Kicker. Figs. 651, 652. A knuckle opener.

Coupler Knuckle Lock (Automatic Couplers). Figs. 626-670. The block which drops into position when the knuckle closes and holds it in place, preventing uncoupling.

Coupler Knuckle Opener (Automatic Couplers). Fig. 649, etc. The device which throws the knuckle open when the lock is lifted so that a coupling can be made. With couplers not having a knuckle opener it is necessary to go in between the cars and pull the knuckle open by hand after the lock has been lifted.

Coupler Knuckle Pin. See Knuckle Pin.

Coupler Lock Lifter. (Automatic Coupler). Figs. 626-670. The part of the mechanism inside the coupler head in some types of M. C. B. couplers which is moved by the uncoupling rod and in moving lifts the knuckle lock so that the knuckle can open. Also designated as Coupler Lock Lift.

Coupler Lock Set (Automatic Couplers). Fig. 644. A feature of most M. C. B. couplers whereby the knuckle lock when lifted is held in a raised position until the knuckle is opened, when it allows the lock to drop back into position for automatically coupling when the cars are brought together.

Coupler Locking Pin Trigger. Figs. 648-650.

Coupler Plug. A movable coupler designed to engage and connect to a coupler socket. See CONTROL SYSTEM.

Coupler Release Rigging. See UNCOUPLING LEVER.

Coupler Rightener. Figs. 523-526. See DRAWBAR CENTERING DEVICE.

Coupler Socket. Fig. 2709. A fixed electric coupler. See CONTROL SYSTEM.

Coupler Yoke. Figs. 482, 694-713. The yoke or strap that surrounds the draft gear and is riveted or keyed to the end of the coupler shank or drawbar. See AUTOMATIC CAR COUPLERS (Miscellaneous M. C. B. Standards).

Couplet (of Springs). Two ELLIPTIC SPRINGS placed side by side, to act as one spring. Three springs united in this way form a triplet, four a quadruplet, five a quintuplet, six a sextuplet.

Coupling. That which couples or connects, as a hook, chain or bar.

Coupling Link. A wrought iron link or open bar by which freight cars are coupled together by coupling pins. Chain coupling links are used with draw hooks. In consequence of the danger to trainmen attending the use of coupling links, and legislation forbidding their use in Interstate traffic after January 1, 1898, automatic car couplers have almost entirely replaced them. See AUTOMATIC CAR COUPLER.

Coupling Pin. A round bar of iron with which a coupling link is connected to a drawbar. Now almost obsolete because of the use of automatic couplers.

Coupling Pin Chain. A small chain attached to the car by a suitable eye to prevent the coupling pin from being lost.

Cover. See JOURNAL BOX COVER, MANHOLE COVER, etc.

Cover Plate. In metal underframes for cars a plate which is riveted to the flanges of the center sills to give them additional vertical strength as a box girder. The plate riveted to the top flanges is called a top cover plate and one riveted to the bottom flanges a bottom cover plate. See CENTER SILL BOTTOM COVER PLATE and CENTER SILL TOP COVER PLATE.

Cover Strip (Refrigerator Car). Metal plates covering a gutter in the floor.

A strip of metal, or sometimes wood, to cover a joint in the roof sheets.

Crabs or **Tongs** (Pile Driver and Wreck Crane). See TONGS. Also called rail clips or rail clamps. A pair of loose bent iron bars fastened at the top with a ring and intended to firmly clamp to the under side of the rail head when an upward pull is applied to the ring. They are used to anchor a pile driver car, steam shovel or wreck crane to the rails and prevent them from overturning when a heavy load is being lifted.

Crane. See WRECKING CRANE.

Crane Post. The post of a crane, which corresponds to the mast of a derrick.

Crank. "A device for causing rotation of an axis, or for converting rotary into reciprocating motion, or vice versa."—Standard Dict.

Crank Shaft (Hand Cars). A short wrought iron shaft to which a crank of a hand car is attached, which is turned by suitable levers and is connected by gear wheels with one of the axles of the car.

Cricket Iron. A seat stand.

Cross Bar (Swing Link Hanger). The iron bar supporting the cross bar casting which carries the spring plank. Also called mandrel pin and lower swing hanger pin.

Cross Beam. A transverse floor member placed upon the sills to support the inclined floor of a coal or ore car.

Cross Bearer. 8, Figs. 287, 288; 8, Fig. 291; 11, Fig. 314; 6, Fig. 335; 5, Figs. 351, 352; 28, Fig. 364. A transverse member of the underframe, placed between the bolsters, acting as a tie between the various sills and helping to distribute the weight of the car. Cross bearers on steel cars are sometimes termed Needle Beams, but the term Cross Bearer is preferable. In steel car construction the term Cross Tie is commonly applied only to those members which tie the center and side sills together, the Cross Bearer usually having a filler between the center sills and thus extending across the car.

Cross Bearer or Cross Tie Cover Plate. Figs. 478, 480. The member which forms the top or bottom flange, to which the diaphragms are riveted in a built-up cross tie. The bottom cover plate is sometimes called Tie Plate.

Cross Bearer Center Filler. See CROSS BEARER DIAPHRAGM.

Cross Bearer Diaphragm or **Cross Tie Diaphragm.** 15, Fig. 404; Fig. 478. The web plate or filling piece, outside the center sills, to which the cover or tie plates are riveted in a built-up Cross Tie.

Cross Tie. See CROSS BEARER.

Cross Tie Timber. See CROSS BEARER.

Cross Tie Timber Truss Rod. An iron truss rod under the cross tie timber, serving to strengthen it. See NEEDLE BEAM TRUSS ROD.

Cross Tie Timber Truss Rod Bearing. A QUEEN POST for the cross tie timber truss rod of a built-up Needle Beam.

Cross Timber Hopper Ends. In a wooden hopper car, a transverse floor timber framed between the intermediate sills, to which the lower end of the inclined floor is spiked and to which the outer hopper doors are hung. The ends of the draft timbers are bolted to it, and the short center sills about it.

Crosshead (Air Brake Cylinder). A forked casting or forging attached to the end of a piston rod, to which the brake levers are connected.

Cup Holder or **Tumbler Holder.** A stand or rack for holding a drinking cup.

Cup Washer. A SOCKET WASHER.

Cupboard Bolt. See DOOR BOLT.

Cupboard Catch. An indefinite term for a light spring catch nearly or quite flush with the surface to which it is attached. It has a beveled bolt which snaps shut. See FLUSH BOLT.

Cupola. 22, Fig. 364. A small cabin built on the roof of a caboose to afford a means of lookout for the train crew and also to facilitate passage from the caboose to the top of the train. Cupolas are also commonly used on dynamometer cars.

Cupola Hand Rail. 19, Fig. 364. A rail attached to a cupola to prevent trainmen from falling when entering or leaving through the cupola windows.

Cupola Inside Step. 25, Fig. 364. A step attached to the inside of a caboose to enable trainmen to enter and leave the cupola.

Cupola Marker Lamp. See CUPOLA SIGNAL LAMP.

Cupola Signal Lamp. 21, Fig. 364. A signal lamp mounted on the cupola of a caboose.

Current Director (Car Heating). Fig. 2187. A device for controlling the flow of steam or hot water in the pipes, working on the principle of an injector.

Curtain. A piece of cloth or other material hung in front of or around any space or object, as a window or sleeping-car berth, and which may be contracted or spread at will. The term, however, is usually rectricted to loosely hung drapery, suspended on a curtain rod by curtain hooks or rings, in distinction from a shade, which is flat and rolls up. Curtains in cars are chiefly used for sleeping-car berths (Berth Curtains). Window curtains are used in dining, parlor and private cars. Except in the saloons, blinds have been abandoned, and window shades are in almost universal use on steam railroads. Blinds are still in general use in street cars. The protecting shield used over vestibule diaphragms is called a curtain.

Curtain Fixtures. Fig. 1922, etc.

Curtain Hook (Sleeping Berths). See Berth Curtain Hook.

Curtain Rod. A bar to carry a curtain hung upon rings and sliding freely along the rod.

Curtain Rod Bushing. A socket or bushing for the end of a curtain rod where it abuts a wall or partition.

Curtain Rod Folding Bracket (Sleeping Car). A bracket for a curtain rod in a sleeping car which may be folded into the upper berth in such a manner that it is out of sight when the upper berth is shut up. See Berth Curtain Rod Bracket.

Cushion. Cushions used in passenger car upholstery are of the box type, being built upon and connected with a wooden framework (cushion frame). See Car Seat.

Cushion Frame. A wooden frame to which the seat springs and upholstery of a car seat are attached.

Cuspidor. Figs. 2035, 2036. A vessel to receive discharges of spittle, and having a wide rim so that if it is upset its contents will not be spilled.

Cut-Out. A switch or fuse in a branch electric circuit or loop, used to disconnect the branch circuit from the main circuit.

Cut-Out Cock. Figs. 1346, 1384, 1450. See Brake Cut-Out Cock.

Cut-Out Valve (Car Heating). Used for controlling admission of steam to radiator pipes.

Cylinder. A chamber or vessel whose ends are circular, and with straight parallel sides, as the cylinder of a steam engine. See Brake Cylinder.

A name sometimes given to the fire pot of a stove or heater.

A type of lock is called a cylinder lock, Fig. 1655.

Cylinder Head. A metal cover for the end of a cylinder, held on by cylinder bolts or cylinder studs. The cylinder head through which the piston passes is commonly termed the back cylinder head, and the other the front cylinder head, corresponding to locomotive practice. Brake cylinder heads are called Pressure and Non-Pressure Heads.

Cylinder Lever. Figs. 477, 1307, etc. In passenger brake equipment, two levers which are connected by a rod attached near their centers. One end of one lever is attached to the crosshead of the brake cylinder, and the corresponding end of the other is attached to a bracket on the brake cylinder head at the opposite end of the cylinder. The other ends of the levers are connected with the floating levers by rods.

In freight brake equipment there is no second cylinder lever, the term applying only to the lever which receives the braking force direct from the push rod.

Cylinder Lever Bracket (Air Brakes). A T-shaped piece of iron bolted to the front cylinder head, to which one of the brake levers is attached.

Cylinder Lever Guide. A guide or support for the cylinder lever.

Cylinder Lever Support (Air Brakes). A wrought iron bar bolted to one of the center sills, on which the ends of the cylinder levers rest.

Cylinder Support. Fig. 478. A bracket attached to a brake cylinder for holding it in place on a car.

Cylindrical Gages. Gages made for measuring the size of cylinders and cylindrical holes, often called Whitworth gages. They consist of steel cylinders and rings hardened and ground very accurately to standard sizes. These fit into each other. The former is used for measuring the size of holes, and the latter for measuring the outside of cylindrical objects, and they are called internal and external cylindrical gages. They are generally used as standards alone, from which other tools and gages are made of the proper size.

D

Dairy Car. Fig. 115. A refrigerator car used for carrying butter, cheese, milk and other dairy products.

Damper. A valve in the stove pipe or in the bottom of a stove for regulating the draft.

Day Coach. See Passenger Car.

Dead Air Space (Insulation of Refrigerator Cars). Air spaces which have no communication with the atmospheric air outside, so there can be no free circulation or change of air as there is in a free air space.

Dead Block. See Dead Wood.

Dead Lever (of Brake Gear). Fig. 477. The one of a pair of truck brake levers to which the brake connecting rod is not attached. The upper end of the dead lever is confined within a dead lever guide, or brake lever stop, which is provided with pins to adjust the end of the brake lever, and consequently the slack in the brakes, as the brake shoes wear. The lever to which the power is first applied through the brake connecting rod is termed the live lever.

Dead Lever Guide. Fig. 479; 95, Figs. 991, 1010; Fig. 1310, etc. An iron bar or loop attached to a truck or car frame which holds the upper end of a fixed or dead brake lever. It usually has holes in it in which a fulcrum pin is inserted. By moving the pin from one hole to another the lever is adjusted so as to take up the wear of the brake shoes. Also called Brake Lever Stop.

Dead Lever Guide Lug. Fig. 481. A lug or bracket attached to a truck bolster to support the dead lever guide.

Dead Lock. A lock in which the bolt is thrown each way by the key, and not in one direction by a spring, as with a spring lock or night latch.

Dead Padlock. A padlock in which neither the lock, bolt, nor hasp has a spring, but the former is thrown each way by the key, and the hasp must be opened by the hand.

Dead Wood. 11, Fig. 335. A single wooden block or

stick of timber attached to the end sill of freight cars to protect persons between the cars from injury, by preventing the cars from coming together in case the drawbar or its attachment should give way. See BUFFER BLOCK.

Deadening or **Deafening.** The filling placed between the floor and the deafening ceiling of a passenger car to serve as a non-conductor of heat and noise. Mineral wool is sometimes used for deadening, but commonly shavings, when anything at all is used. An intermediate floor (between the sills) and deafening ceiling (under the sills) is used in refrigerator cars.

Deafening Ceiling. Boarding on the under side of the sills of a passenger car to exclude or deaden the noise of the car.

Deafening Floor. See DEAFENING CEILING.

Deck. A term applied to the roof of a car which has a clere-story. The deck or upper deck is properly the clere-story, but the entire roof is commonly called the deck and subdivided into lower deck or main roof, and upper deck.

Deck Beam. A beam in the form of an inverted T with a round knob on the upper end, used in some forms of steel car construction.

Deck Bottom Rail. See DECK SILL.

Deck Bridging. Bridging or blocking used in the upper deck or clere-story.

Deck Caboose Lamp. See CUPOLA SIGNAL LAMP.

Deck Carline. See UPPER DECK CARLINE.

Deck Collar (Heaters). A sheet metal ring to line the smoke pipe opening through the roof.

Deck Eaves Molding or **Upper Deck Eaves Molding.** A molding under the outside edge of the upper deck.

Deck End Panel. A narrow panel in the end of the upper deck.

Deck End Plate. A member that fulfills the same office for a clere-story that the body end plate does for the body. See END PLATE.

Deck End Sill. A horizontal timber connecting the ends of the deck sills, and forming the base for the end of the upper deck.

Deck Inside Cornice. A molding which fills the interior angle where the upper deck joins the deck side.

Deck Lamp. Figs. 2313, 2570, etc. A lamp which is fastened to the deck or ceiling of a car.

Deck Plate. A plate used in constructing the roof or deck of a steel passenger equipment car. A longitudinal member of the roof frame at the top of the deck posts and upon which the ends of the upper deck carlines rest. It has the same relation to the deck sill as the side plate has to the side sill.

Deck Post. An upright member which connects the deck plate with the deck sill.

Deck Roof. The roof of the upper deck or clere-story, itself sometimes called the deck or upper deck. See DECK.

Deck Sash. Figs. 1887, 1979, etc. A glazed sash in the sides of the upper deck. See SASH.

Deck Sash Catch. See DECK SASH LATCH.

Deck Sash Flush Catch. A deck sash latch mortised into the sash rail flush with the sash.

Deck Sash Latch. A spring bolt attached to a deck sash, which engages with a deck sash latch keeper or strike plate.

Deck Sash Opener. Fig. 1963, 1971, etc. A lever attached to a revolving rod by which a deck sash is opened and held in any desired position. A great variety of forms exist. The pull hook, a rod with a hook at one end, which is used for opening the deck sash, is also called a deck sash opener.

Deck Sash, Outer. A deck sash which carries the screen, and prevents the admission of dust and cinders.

Deck Sash Pivot. Fig. 1966, etc. Roughly a metal stud or spindle attached to a suitable flange by which it is fastened to a deck sash, and on which the latter turns. See DECK SASH RATCHET CATCH.

Deck Sash Pivot Plate. A plate attached to the window casing, with a hole or eye in which a deck sash pivot works. Sometimes they are provided with springs to prevent the sash from rattling.

Deck Sash Pull. A ring attached to a deck sash to open and close it.

Deck Sash Quadrant. A curved bar or plate of metal used as a guide or stop to control the movement of a deck sash. See DECK SASH RATCHET CATCH.

Deck Sash Ratchet Catch. Figs. 1903, 1939, 1965, 1978, etc. Usually combined with a deck sash pivot and stop. A ratchet makes it possible to hold the window open in any one of several positions.

Deck Sash Ratchet Plate. A part usually attached to the side of the car, but sometimes to the sash, carrying a ratchet in which the ratchet catch engages.

Deck Sash Spring Pivot. A DECK SASH PIVOT provided with a spring to make the sash removable.

Deck Screen Bottom Rail. A rail running the entire length of the clere-story, and closing the space between the bottom of the screen and the roof.

Deck Screen Post. An upright stick forming the side pieces of a frame to hold a wire screen put on outside of the deck windows to exclude dust and cinders.

Deck Side. The entire part, consisting of a plate, rail, posts and panels, or sashes, which forms the side which occupies the vertical space between the lower and upper deck.

Deck Side Ventilator. This term is used to designate the sash or valves and their attachments for opening and closing the aperture.

Deck Sill. A longitudinal member of the roof frame at the top of the lower deck or main roof carlines and forming the lower sill of the deck or clere-story.

Deck Sill Facing. The facing or finishing material applied to the inner side of the deck sill.

Deck Sill Sub-Facing. A thin board sometimes used below the Deck Sill Facing.

Deck Soffit Board. A board on the under side of the overhanging cornice of an upper deck.

Deck Top Rail. A DECK PLATE.

Deck Ventilator. See DECK SIDE VENTILATOR. The deck sash are frequently hung and operated as deck side ventilators.

Deck Window. A window in the upper deck or clere-story. More commonly a deck sash.

Deck Window Screen. An outside sash with a screen over it to exclude dust and cinders.

Defect Card. See AIR BRAKE DEFECT CARD.

Deflector. See DUST DEFLECTOR.

Deflector Springs (of Ventilators). Springs controlling the movement of the deflectors.

Dental Lavatory. Figs. 1746, 1769. A basin with the necessary faucet, tumbler holder, etc., used in connection with cleansing the teeth.

Derrick Car. A strong platform car which carries a derrick crane which is used for removing wrecked cars and engines, erecting bridges, or handling any heavy objects. Also called wrecking car.

Designation of Brake Rods and Levers. See FOUNDATION BRAKE GEAR.

Detective Wire (for Car Seals). A flat twisted wire or other equivalent device to prevent the seal being stripped from the wire without destroying one or both.

Diagonal Brace. 54, Figs. 287, 288; 9, Fig. 291; Fig. 474. See END SILL DIAGONAL BRACE.

Diagonal Floor Timber. A floor timber which is placed in a position diagonal to the sills.

Diameter Testing Gage (for Car Wheels). A gage for testing the diameter of wheels and axles. See WHEELS.

Diameter of Wheels. See WHEELS, DIAMETER OF.

Diamond Arch Bar Truck. Figs. 986, 989, 997. A car truck with iron side frames consisting of two or more ARCH BARS, and a pedestal tie bar. The spaces between the arch bars are diamond shaped, hence the name. The journal boxes are rigidly bolted to the side frames. The cross members of the truck, bolster, spring plank, etc., are either of wood or metal, or of both wood and metal combined, but the modern truck is almost always of metal throughout.

At the Master Car Builders' Convention (1884) it was voted that this form should be the type used in preparing designs for a standard freight car truck, to have a 5-ft. wheelbase, channel bar transoms, and either SWING or RIGID BOLSTER. For many years it was the type almost universally used, but latterly trucks with cast steel side frames have come into common use for freight service.

Diaphragm. Usually a thin wall or partition.

(Valves.) Some valves are regulated by diaphragms or diaphragm plates, to which are attached springs, nuts, stems, etc., whose names explain themselves. These diaphragms are commonly spring plates, which guide the rod and, assisted by spiral springs, cause the attached valves to seat or unseat at a fixed pressure.

(Of a Vestibule.) Figs. 536-548. A device usually of some combination of rubber and canvas, arranged in folds and connecting the vestibule face plate with the vestibule to exclude the dust and cinders, and at the same time to allow the face plate free movement to adjust itself to the motion of the cars.

Diaphragm Face Plate. See VESTIBULE FACE PLATE.

Dining Car. Figs. 150-162, 230-233, 243, 400-403. A car operated in passenger trains and equipped with kitchen and utensils, dining tables, etc., for serving meals to passengers. See CAR.

Dining Car Chair. Figs. 1681, 1683.

Dipper (Steam Shovel). Also called bucket or shovel. The heavy iron scoop or bucket which removes the earth or rock and transfers it to the cars.

Dipper Bail (Steam Shovel). The link fastened to the top of the dipper and to the dipper block.

Dipper Block (Steam Shovel). The block at the point of the boom around which the hoisting chain passes.

Dipper Teeth (Steam Shovel). Heavy iron cutters or teeth projecting from the dipper to break the earth.

Direct Steam Heating System. Figs. 2153, etc. A system of car heating in which the steam from the locomotive is carried directly to the radiators or heating pipes. The term is used to distinguish the system from those in which the steam is employed to heat the water which circulates in the radiators or heating pipes.

Dirt Collector. See CENTRIFUGAL DIRT COLLECTOR.

Discharge Pipe (Air Compressor). Also called reservoir pipe. A pipe by which the compressed air is conveyed from the air compressor to the main air reservoir.

Discharge Valve. (Of Car Signal Valve). The valve in the attachment called the car signal valve. The whole device is also sometimes so called.

(Of Air Compressor.) The valve through which the air as compressed passes to the main reservoir.

Distance Block. A short, thick piece of wood placed between two or more objects to keep them apart, or to preserve an interval of space between them, as floor timber distance block, truck bolster distance block, etc.

Distributing Table (Postal Car). Fig. 1862. A table upon which the mail bags are emptied of their contents, and from which they are distributed to the various boxes or pouches.

Distributing Table Hinge. Fig. 1862. A strap hinge for the table on which mail is sorted in postal cars.

Ditcher. A small steam shovel, usually mounted on a flat car, for digging the ditches in railroad cuts.

Dividing Attachment (Vacuum Brake). A device to regulate the application of the brakes to the locomotive or train, or both. See EJECTOR.

Division Arm (Twin Seats). The middle seat arm between the two seats.

Dog. A general term in mechanics for all devices which bite or take hold of or give motion to other parts.

(For Pawl of Winding Shaft.) A disk or button eccentrically pivoted in such a way as to hold the ratchet wheel pawl of a winding shaft in its place. The pawl itself of a ratchet gear is also sometimes termed the dog in other forms of ratchet gear where no dog to hold the pawl is necessary. A brake pawl-dog is similar.

Dome. A spherical roof or covering. A vertical cylinder attached to the top of the tank on tank cars and to the top of steam boilers. See TANK DOME.

Dome Head (Tank Car). The top of a TANK DOME.

Dome Lamp Shade. A LAMP SHADE of curved or spherical outline.

Door. A frame of boards or plates of metal for closing a doorway, as BOX CAR DOOR, DROP DOOR, PLATFORM TRAP DOOR, etc. See DOOR FRAME for names of parts.

Door Back Stop. See DOOR STOP.

Door Bolt or **Bar.** An iron bar, actuated by a handle, which slides into a bracket or eye and locks the door. Used chiefly on the swing doors of refrigerator cars.

Fig. 1804, etc. A metal bar attached to a slide and fastened to a door so as to hold it shut from the inside. They are either round, or barrel, or square. A square neck door bolt is one with an angle or shoulder in it. Flush door bolts are gained in so as to be flush with the surface. A cupboard catch is a form of door bolt having a beveled latch and actuated by a spring; but bolts so formed are commonly termed

latches. See also BARREL DOOR BOLT, FLUSH BOLT, SQUARE DOOR BOLT.

Door Bolt Bracket. An iron eye attached to the body of the car into which the door bolt or bar is forced, to hold the door in a closed position. Used chiefly on freight cars which are equipped with swing side doors.

Door Bolt Keeper. See KEEPER.

Door Bottom Rail. See DOOR FRAME.

Door, Box Car End, Seal Records of. (M. C. B. Recommended Practice.)

In 1913 the following recommendations were adopted:

End doors used for loading lumber in box cars are essential only on roads having long lumber loading in box cars as an essential feature of traffic.

End doors must be so constructed that when closed they lock automatically by means of a lock accessible from the inside of the car, thus avoiding the necessity of taking seal records.

Seal appliances now in use, and not accessible from the ground or from end ladders, should be revised so as to be accessible from the ground or end ladders, to promote the safety of employees.

Door Brace (Freight Car Doors). A diagonal piece of timber framed into the door frame to stiffen the door.

Door Bracket. Fig. 826. See SIDE DOOR BOTTOM GUIDE.

Door Bumper. Figs. 603, 619. A door stop.

Door Butt. A BUTT HINGE.

Door Button. "A small piece of wood or metal swiveled by a screw through the middle, and used as a fastening for a door or gate."—Knight.

Door Cap (Freight Car Doors). A horizontal board across the top of the door.

Door Case. The frame which incloses or surrounds the sides and top of a door. The separate parts are the door jambs or door posts, door sill and door lintel.

Door Case Top Rail. A timber parallel with the DOOR LINTEL.

Door Center Girth (Freight Car Doors). A horizontal board across the middle of the door. A middle door rail, except that it is not framed into the door, but simply nailed on.

Door Chain Bolt. A device which permits a door to be opened a short distance, yet not far enough to gain admission.

Door Check. Figs. 869, 871, 875, 876. A pneumatic or hydraulic dash pot and spring attached with suitable levers to the top of a swinging door and to the door lintel. The spring tends to close the door, and the dash pot checks its motion sufficiently to prevent the door slamming shut.

Door Closer. Figs. 869, 871. A DOOR CHECK.

Door, Door Jamb and All Other Inside Exposed Corners of Stock Cars, Rounding Corners (M. C. B. Recommended Practice). Fig. 2880A. In 1910 a Recommended Practice was adopted that doors, door jambs and all other inside exposed corners of stock cars be rounded to prevent injury to cattle.

Door Fastener. The common term for the device by which a car door is locked with the aid of a seal.

Door Fixtures, Box Car (M. C. B. Standard). Figs. 2896-2900. Side door fixtures. In 1897 a committee on this subject reported with details which were afterward adopted by letter ballot as Recommended Practice of the Association.

In 1910 an outside hung side door and a flush side door were adopted as Recommended Practice as representing the minimum requirements in door construction.

Also that the door hood coverings be omitted from new cars, and as much as possible in repairs to old cars.

In 1911 the location of center of hasp or sealing eye was made preferably 5 feet from top of rail and not more than 5 feet 9 inches from top of rail.

In 1912 the door hasp staple was increased from 5⅜ inches to 16 inches and provided with four bolt holes.

In 1912 the drawings and details were advanced to standard.

Door Fixtures, End (M. C. B. Recommended Practice). Fig. 2909.

In 1912 the box car side door fixtures were transferred to standard, the end door fixtures remaining as a recommended practice.

Door Frame. The structure in which the panels of a door are fitted. It is composed, as is also a window sash, of the stiles, or upright pieces at the sides; the mullions, or central upright pieces; the bottom rail; the lock or central rail, and the top rail. The DOOR CASE surrounds it.

Door Friction Roller. See SLIDING DOOR FRICTION ROLLER.

Door Guards (Baggage and Freight Car Sliding Doors). Strips of wood which inclose the space occupied by the door when open to keep the freight from interfering with its movement.

Door Guide. See SIDE DOOR BOTTOM GUIDE.

Door Handle. 61, Figs. 287, 288; Fig. 482. A handle, commonly of a D-shape, attached to a door as a means of opening and closing it.

Door Hanger. 60, Figs. 287, 288; Figs. 833, 870, 873. A device by which a sliding door is suspended at its top, and which slides on a track. Most modern freight car door hangers are fitted with rollers which run on a door track.

Door Hanger Sheave. See SHEAVE.

Door Hanger Roller. See DOOR HANGER.

Door Hasp. Figs. 482, 822, 824. A metal clasp attached to a door, by which it is fastened to a staple on the body of the car. A pin or a car seal is passed through the staple after the hasp is placed over it. Used chiefly on freight car doors. Generally made of malleable iron and the pin attached so that it cannot be lost. Padlocks are rarely used on freight cars.

Door Hasp Holder. Fig. 482. A metal strap, usually malleable iron, bolted to a freight car side door, and having a hook or eye to which the hasp is attached.

Door Hasp Staple. Fig. 1807. A ring or U-shaped staple over which the slotted part of the door hasp fits and through which the door pin is passed.

Door Head. A steel plate or combination of steel plates placed across the top of a door opening.

Door Hinge. See HINGE.

Door Holder. Figs. 602, 609, 877, 880, 881, 887. A device for holding a door open or shut. Also called door stop, as it is also intended to check the momentum of the door when swung open violently.

Door Holder Catch or **Door Holder Stop.** A metal bracket attached to the floor (floor stop) or side (parti-

tion stop) of a car, with which a door holder engages, to hold a door open.

Door Hook. Fig. 1813. A hook for holding a door open or shut.

Door Jamb. The side piece or post of a door case. Also called door post. Not to be confused with the stiles of the door itself. See DOOR POST.

Door Knob. Fig. 1814, etc. A ball attached to the end of the spindle of a door latch to take hold of in moving the latch or opening the door. The knob is often made in various peculiar forms.

Door Latch. An attachment to hold the door shut. See LATCH and LOCK. A door latch is often made in combination with a lock, having a separate bolt and key to secure or fasten the door from the outside.

Door Latch Bolt. See LATCH.

Door Latch Keeper. See KEEPER.

Door Latch Rose or **Escutcheon.** A plate fastened to a door as a guard or bearing for the latch spindle. A rose is frequently called a rosette. See ESCUTCHEON.

Door Latch Spindle. A small metal shaft to which the door handle or knob is attached, and by which the latch is turned.

Door Latch Spring. A spring which acts on the latch hook or bolt and causes it to engage with its keeper; usually made of a flat piece of steel.

Door Lintel. The horizontal part of a door casing above the door. See DOOR FRAME.

Door Lock. Figs. 796, 821, 832. See LOCK. A LATCH is usually combined with a passenger car door lock.

Door Lock Bolt. See LOCK.

Door Lock Keeper or **Nosing.** See KEEPER.

Door Mullian. 2, Fig. 847. A vertical bar of wood between the panels of a door. See DOOR FRAME, DOOR WINDOW MULLION.

Door Name Plate. A metal plate on the inside of a passenger car door with the name of the builder inscribed on it. The name is now more commonly painted on.

Door Notice Plate. See NOTICE PLATE.

Door Operating Gear. 17, Fig. 291; 9, Fig. 314; Figs. 786-794. The mechanism used to open and close the type of doors commonly known as drop doors, which are used on hopper, gondola and other types of drop-bottom cars.

Figs. 865-868. A power arrangement for controlling the opening and closing of sliding doors on suburban or street railway cars.

Door Panel. 10 and 11, Fig. 847. "A piece of board whose edges are inserted into the groove of a thicker surrounding frame of a door."—Webster. They are distinguished as lower, middle and upper. Any panel, but especially the lower, is sometimes cut up into two twin panels by a door mullion.

Door Parts. Fig. 864.

Door Pin (Freight Car Doors). A pin used to fasten a hasp to a staple.

Door Pin Chain. A metal chain by which a door pin is attached to a car.

Door Plate. A notice plate. See DOOR NAME PLATE.

Door Post or Door Jamb. 23, Figs. 287, 288; 37, Fig. 364; 24, Fig. 404; 1, Fig. 847. A vertical post which forms the side of a doorway.

Door Post Plate. A metal plate laid over the door post to protect it from damage.

Door Post Pocket. The pocket for the door post. See POST POCKET.

Door Protection Plate. A plate placed at the side of a doorway to act as a reinforcing member in case of shocks, as when trunks, etc., are thrown against the frame.

Door Pull. See DOOR HANDLE.

Door Rail. Fig. 847. A horizontal member or bar of the framing of a door. The upper one, 4, is called the top rail; the lower one, 5, the bottom rail; 6, the middle or lock rail; 7, the parting rail.

Door Rail Bracket (Car Doors). A bracket to carry a top door rail, serving as a guide for the door. See DOOR TRACK BRACKET.

Door Roller. Fig. 874. Also called door sheave. The term door roller is applied to a flat tread wheel pivoted in a bracket and attached to the bottom of a door to roll upon a flat surface rather than a narrow track.

Door Sash. 12 and 13, Fig. 847. A wooden frame containing one or more panes of glass, placed in a door. In some cases one of these sashes is made to slide, so that it can be opened for ventilation. They are distinguished as lower and upper door sash.

Door Sash Bolt. A metal pin attached to a sliding door sash to hold it in any desired position.

Door Sheave or Sliding Door Sheave. A small wheel on which a sliding door rolls. It is usually placed at the top of the door, and sometimes at the bottom also. It is carried in a door sheave holder. A grooved casting called a door shoe or door slide is sometimes used as a substitute on freight car doors, especially when the load does not rest upon the lower door track. See also DOOR ROLLER.

Door Shoe. See DOOR SHEAVE.

Door Sill. A cross piece attached to the floor on the under side of a door opening.

Door Slide. See DOOR SHEAVE.

Door, Sliding. See SLIDING DOOR.

Door Specifications for Outside Hung Side Doors for New Box Cars. (M. C. B. Recommended Practice.) Fig. M. C. B. 30.

In 1915 the following specifications for box car outside hung side doors for new cars were adopted as Recommended Practice:

1. Means must be provided for continuous weatherproofing and fireproofing around the top, bottom, front and back edges of door when closed.

2. Top of door must be continuously supported against outward pressure, and this support must also form the weatherproofing.

3. Closed door stop must be of metal, preferably continuous from top to bottom of door. If continuous door stop does not support the door against outward pressure, such support must be provided by not less than two brackets with lips, equivalent to brackets shown on the drawing, and located as shown thereon.

4. Metal open door stops are recommended, one or more in number, equivalent in strength to design shown on Revised Sheet M. C. B. 30, securely bolted to the belt rails or framing of the car with at least two ½-in. bolts or their equivalent. If wood open door stop is used, it should extend the entire height of the door and be reinforced by clip washers or through bolts to prevent splitting.

5. Bottom of door must be supported against outward pressure at not less than two points for any position of the door.

If individual bottom door guides, fastened to car body, are used, they must be at least four in number, one located adjacent to each door post, one in the middle of the doorway, and one between the back door post and the open door stop, approximately as shown on the drawing, and similar in design, with particular reference to height of lip, which should be not less than 1¾ in.

6. If door hangers are fastened to door with bolts, the design of door fastenings must be such that with hangers broken or removed the door can not be removed from the car, except by removal of either track, door guides, or door stops. When substantial hangers are riveted to steel doors, or to steel frames of wooden doors, with not less than four ⅜-in. rivets or their equivalent, this provision need not apply.

7. When hangers, or rollers are fastened directly to sheathing of wooden doors, bolts must be not less than ⅜ in. in diameter at least four in number for each hanger and spaced not less than 4 in. apart horizontally and 5 in. vertically, hangers preferably located so bolts will pass through two or more boards.

8. Door track may be located either above or below the door opening and the door supported so that under any service conditions there will be no binding of the door from vertical interference with door guides or track. The upper door track, if used, must be continuous in one piece, strong enough so that it will not sag, and securely fastened to car; proper flashing, if necessary, to be provided over door track.

If door is supported at bottom, means for keeping the supports in alignment must be provided.

9. For wooden doors, the door-hasp fastener must be at least 24 in. long, fastened with not less than five ⅜-in. bolts, with nuts on the inside of the door. The door-hasp fastener must be of such design that the hasp can not be removed without removing the bolts from the fastener. The door-hasp fastener must be secured to the steel frame of the door by at least one bolt or rivet.

For steel doors, the door-hasp fastener must be riveted to the door.

10. Proper clearance must be provided so that ⅜ in. bulging of the side of the car will not interfere with the free movement of the door. Door mechanism must be so designed that in a closed position the door is drawn reasonably tight against side of car. It should be possible for one man to open or close the door readily from the ground without tools.

11. All of the above recommendations apply particularly to cars with 6-ft. door openings and single outside hung side doors, and in all cases where a particular construction is described, or specific dimensions are given, their equivalent will be acceptable.

Door Spindle. The bar passing through the door which carries the door knobs.

Door Spring. An attachment to make doors self-closing.

Door Stile. 8, Fig. 847. One of the two upright pieces on the outer edges of a Door Frame.

Door Starter. Fig. 796. A device for helping to start a door to open.

Door Stop. A peg or block against which a passenger car door strikes when opened, often provided with a rubber cushion, especially for swinging doors. Door holders, which both stop the door and retain it, are often called door stops, as Figs. 602, 609, 877-881.

Freight Car Sliding Doors. 59, Figs. 287, 288; Figs. 482, 796, 825. A block of wood or an iron casting placed on the side of the car to limit the distance that the door can be moved. A Combined Stop and Lock is a door stop with an attachment for locking the door.

Door Threshold Plate. A plate on the threshold of the door.

Door Track. 34, Figs. 287, 288. A guide which supports a sliding door, and upon which it moves, or by which it is held in its place. They are either top door tracks or bottom door tracks. The former usually carry the weight of freight car doors, which are hung thereon by door hangers. The lower track serves only as a guide for the door shoes.

Door Track Bracket. A bracket for securing a side-door track to the car. See also Door Rail Bracket.

Door Track Support. Fig. 480. See Door Track Bracket.

Door Window Mullion. A middle upright bar in the door window frame. See Door Frame.

Doorway. The passage or opening formed by a door casing, which is closed by a door.

Dope. A mixture of waste and oil, placed in journal boxes to lubricate the journals.

Double Board Roof. The upper layer of grooved boards is sometimes laid with the grooves under, so as to form a kind of tube between the two layers. See Roof.

Double Body Bolster. Figs. 489, 492, 504-508, page 411. See Body Bolster.

Double Chair. Fig. 1682. A twin car seat.

Double Check Valve. (Air Brakes.) Fig. 1434.

Double Coil Draft Spring. See Draft Spring.

Double Coil Jet System (Car Heating). A system of car heating which combines the drum or jacket features with the jet or commingler system of injecting steam into the hot water circulation. The steam is first sent through the inner or seam coil of the double coil in the heater, and then through an annulus, into the circulating pipe. The jet is so directed as to aid the circulation in the pipes. It is claimed to be noiseless.

Double Coil Nest Spring. A spiral spring with another inside of it.

Double Deck (Stock Car). A second floor in a stock car half way between the ordinary floor and the roof, to increase the carrying capacity of the car for small live stock, such as pigs, etc. See Upper Floor, and Car.

(Automobile Car.) A similar arrangement fitted in an automobile car.

Double Door. A door made in two parts. These are sometimes fastened together by hinges, so as to fold back on each other, and sometimes each part is hinged to one of the door posts. Sliding doors are also sometimes made in two parts.

(Fruit Car.) Doors in pairs, one inside the other, as in refrigerator cars, etc., are also called double doors.

Double Lip Retaining Ring (Steel Tired Wheels). One of the common methods of attaching a steel tire to the body of the wheel.

Double Pipe Clip. An iron band made with two bends for holding two pipes (as heater pipes) in their place. See Clip.

Double Pressure Retaining Valve. See PRESSURE RETAINING VALVE.

Double Track Snow Plow. Fig. 216. A snow plow for use on railroads having two or more tracks, and so constructed that it throws the snow to one side only.

Double Transom Truck. A four-wheel passenger truck with two bolsters, designed to give the same easy-riding qualities as the six-wheel truck.

Double Washer. A washer that serves two bolts.

Double Web Bolster. A single bolster consisting of two beams. The term is not a desirable one, as it is likely to be confused with Double Body Bolster.

Dovetail. "A flaring tenon adapted to fit into a mortise having receding sides so as to prevent the withdrawal of the tenon in the directions to which it will be exposed to strain."—Knight.

Draft Arm. Figs. 679-687. See DRAFT SILL.

Draft Beam. Fig. 676. A substitute for draft timbers and stops, being cast in one piece and bolted on the inside of the center sills.

Draft Casting. 11, Figs. 287, 288; 5, Fig. 291; 15, Fig. 314. One of a set of castings riveted or bolted to the draft sills and transmitting to them the stresses received from the draft gear. The latter lies between the draft sills and the ends of its follower plates bear against shoulders on the castings.

Draft Door (Baker Heater). A door in the smoke flue base, automatically opened and closed by the fire regulator, by which the fire is regulated.

Draft Gear. Attached Draft Casting. 55, Figs. 287, 288; Fig. 513, etc.; Figs. 678, 709, 714, etc. A term used to designate the apparatus which connects the coupler or drawbar with the car sills. It receives and dissipates the shocks received by the coupler, thus tending to prevent their damaging the car. See FRICTION DRAFT GEAR, TANDEM SPRING DRAFT GEAR, TWIN SPRING DRAFT GEAR.

(Passenger Equipment Car). See THREE-STEM EQUIPMENT.

Draft Gear Carry Iron. A plate which extends underneath the draft sills and supports the draft gear.

Draft Gear Cheek Casting. See CHEEK CASTING.

Draft Gear Followers. See FOLLOWERS.

Draft Gear Tie Rod. A rod which connects an end sill or platform end sill with a body bolster or other cross timber to tie them together. The term is sometimes applied to the draft rods of continuous draft gear.

Draft Key. A key used with some forms of draft gear.

Draft Lug Angle. 44, Fig. 404. An angle riveted to the bottom of the center sill at the draft gear, to which the lower part of the draft casting is fastened.

Draft Plate. See DRAFT CASTING.

Draft Regulator. See FIRE REGULATOR.

Draft Rod (Continuous Draft Gear). A rod which unites two drawbars at opposite ends of a car, and relieves the draft timber attachments from tensile stress.

Draft Sill. 1, Fig. 291; Figs. 679-687. In wooden cars commonly designated as Draft Timber. The center sills which transmit the draft stresses from end to end of the car are sometimes termed the draft sills. When metal draft members are used the term draft sill is almost universally applied. See SILL SPLICING.

Draft Sill Tie Plate. Fig. 480. A plate riveted to the draft sills to help in holding them rigid.

Draft Spring. A spring attached to a coupler or drawbar to give elasticity. They are usually so arranged by means of follower plates at each end as to resist either tension or compression.

Draft Spring Pocket. A DRAWBAR SPRING POCKET.

Draft Spring Stop. A metal sleeve or thimble in the center of a spiral draft spring to resist excessive compression. Not to be confused with a drawbar stop.

Draft Spring Thimble. A projection riveted to the follower plates and fitting inside the draft spring to hold it in place.

Draft Timber. A pair of timbers, carrying the drawbar attachments, placed below the center sills, and usually extending from the platform end timber of passenger-equipment cars, or the end sill of freight cars, to the body bolster.

Draft Timber Bolt. A bolt used to secure a draft sill to a center sill.

Draft Timber Pocket. A casting attached to the body bolster or center sills of a car to receive the end of a draft timber.

Draft Timber Tie Bar. A transverse iron bar attached to the under sides of a pair of draft timbers to tie them together.

Drain Cock. See RESERVOIR DRAIN COCK.

Drain Cup or Drip Cup (Air Brake). A globular receptacle under a triple valve to collect water of condensation.

(Refrigerators and Ice Cars.) Fig. 361. A metal cup through which the drippings from the ice pass, but which is so arranged as to prevent the entrance of air to the car.

Drain Valve (Car Heating). A valve for draining off the water condensed in the steam pipes where an automatic trap is not used.

Draw Head. The head of an M. C. B. automatic coupler, exclusive of the knuckle, knuckle pin and lock.

Draw Spring. See DRAFT SPRING.

Draw Timbers. See DRAFT TIMBERS.

Drawbar. 9, Figs. 287, 288; 16, Fig. 314; 6, Fig. 340, Used synonymously with COUPLER. It has been used indiscriminately to designate both the old link and pin drawbar and the modern automatic car coupler. There has been in the past an effort to confine the name drawbar to the old link and pin type, but in the proceedings of the M. C. B. Association, in speaking of the height of drawbars, the term is applied to the M. C. B. standard automatic coupler. See AUTOMATIC CAR COUPLER.

Drawbar Carry Iron. 10, Figs. 287, 288; 22, Fig. 291; 28, Fig. 404; Figs. 481, 671-677. A U-shaped strap fastened to the under side of the end sill and supporting the outer end of the drawbar. Often contracted to carry iron or carrier iron. Also called stirrup.

Drawbar Centering Device. Figs. 688-693. A device for maintaining the drawbar normally in the center line of draft, but allowing it to move to either side when the car is rounding a curve and is coupled to another car.

Drawbar Safety Lug. See COUPLER HORN.

Drawbar Stirrup. See DRAWBAR CARRY IRON.

Drawbar Stop. See DRAFT CASTING.

Drawer Pull. A wooden or metal attachment on a drawer to take hold of in pulling it out.

Drawing Room. A small room or compartment in a drawing-room car. See STATEROOM.

Drawing Room Car. See PARLOR CAR. A term at one time applied to parlor cars, but now usually restricted to certain types of sleeping cars which have one or more separate compartments or drawing rooms containing a double-berth section and a sofa or lounge, in addition to which they are usually supplied with a private toilet. Such a car is termed a Drawing Room Sleeping Car.

Draw-Off Cock (Baker Heater). A cock for emptying the pipes.

Dressing Room. Another name for a saloon, particularly one provided with wash bowl and toilet facilities.

Drinking Cup Vendor. Fig. 1755.

Drinking Fountain. Fig. 1761, etc. See WATER COOLER.

Drip Coupling or **Basin Coupling** (Wash Basin). The connection of the waste pipe or drip pipe with the basin.

Drip Cup (Air Brake). A receptacle inserted in the brake pipe to receive water condensing therein. A drain cup.

Drip Pan (Refrigerator Car). Fig. 892. A dish or pan at one corner or end of the car for receiving the water from the melting ice, usually permitting it to escape by a trap.

Drip Tray. An enameled piece of iron placed directly under the seat of a closet, and over the bowl.

Drip Valve. Fig. 2136. See RESERVOIR DRAIN COCK.

Drip Valve, Automatic. Fig. 1381. Used in connection with an automatic connector.

Driving Chain (Steam Shovel). A pitch chain, used to make the steam shovel self-propelling, by engaging with the pitch gear attached to one of the axles.

Drop (of Lamp). The drop of a center lamp is its extreme length, measured from the ceiling to the lowest part of the lamp.

Drop Bottom. See DROP DOOR.

Drop Bottom Car. Figs. 42-47, 49-56, 59, 93, 314-321, 326-329, 331-334. A car with a level floor or bottom, equipped with a number of drop doors, for discharging the load. See also CAR and HOPPER BOTTOM GONDOLA CAR.

Drop Brake Shaft. Figs. 1521, 1523, 1524, 1543, 1544, etc. A brake shaft which is normally in a vertical position, but can be dropped to a horizontal position and still remain operative should conditions of lading require this to be done.

Drop Door. 8, Fig. 314. A door at the bottom of a drop bottom or hopper bottom car for unloading it quickly by allowing the load to fall through the opening. Drop doors are usually in pairs, and are supported by a chain wound upon a winding shaft or by a lever arrangement. Frequently a drop door beam extends across the car above the winding shaft to assist in supporting it and to stiffen the car.

Drop Door Beam. See DROP DOOR.

Drop Door Chain. A chain attached to a drop door, and usually connecting it with a winding shaft, for the purpose of controlling the door. Also sometimes termed hopper chain.

Drop Door Chain Ring. An iron ring to which are fastened the single chain passing around the door winding shaft and the two chains which are attached to eye bolts in each of the double drop doors.

Drop Door Eye Bolt. An iron bolt with an eye in the upper end which is fastened to a drop door near the edge away from the hinge and to which is secured the drop door chain.

Drop Door Gear. See DOOR OPERATING APPARATUS.

Drop Door Hinge. A hinge on which a drop door swings; usually made of flat bar iron, bent to form an eye, through which a hinge pin passes.

Drop End Door. Fig. 842. Used on gondola cars. The entire end is arranged to swing down at right angles to its normal position, for loading long material.

Drop End Gondola Car. Figs. 57, 58, 322, 323. A gondola car with the ends in the form of doors, which can be dropped when the car is used for shipping long material which extends over more than one car. See also CAR.

Drop Forging. One made by a die under a power hammer.

Drop Suspension (Electric Lighting.) A drop or bent frame is used, attached to the truck frame. As the belt or chain is adjusted by sliding the generator, this is of the sliding type suspension. See SUSPENSION.

Drop Table. A table hinged to the wall so as to drop against it out of the way when desired.

Drop Test Machine (M. C. B. Standard). Figs. 2881-2894. A machine for testing couplers, etc., by means of a heavy weight being dropped on them. In 1900 the drop-testing machine was modified and a further modification made in 1901. Further modification in 1903 Modified in 1911 and advanced to standard.

Drop Testing Machine. See above.

Dropper Bar. A special rolled steel bar.

Drum. A cylinder over which a belt or band passes.

"A chamber of a cylindrical form used in heaters, stoves and flues. It is hollow and thin, and generally forms a mere casing, but in some cases, as steam drums, is adapted to stand considerable pressure."—Knight. See STEAM DRUM.

(Hoisting Gear.) The main cylinder upon which the hoisting rope is coiled. The spur wheel is carried on the same shaft.

Drum Cover (Baker Heater). A sheet iron covering for the circulating drum on the outside of the car.

Drum Shaft (of a **Derrick** or **Crane**). The shaft on which the winding drum is carried.

Drum Support (Baker Heater). A bracket on the roof to hold the circulating drum.

Drum System of Car Heating. This method of heating employs a hot water circulation within the car, to which a Baker or other similar heater is attached. To provide a means for maintaining heat in the car when steam from the locomotive is used, a drum is employed to transfer the heat of the steam to the water of circulation. Simple forms of drums consist simply of a cylinder or pipe within another pipe of larger cross section, provision being made for the unequal expansion of the pipes, and outlet and inlet orifices being provided for the circulation of the steam and water.

Another type is the coil drum or coil jacket, which generally consists of a large sized pipe or casting capped at both ends. In this drum is placed a coil of copper pipe, which coil is made a part of the hot water circuit within the car. Steam from the loco-

motive is admitted to this drum around the copper coil, through which heat is imparted to the water of circulation. That part of the circuit above this drum becoming relatively lighter than the water of the circuit, a movement of the circulating medium is produced, creating a steady flow up through the coil. The amount of heat communicated to the circulating medium depends upon the surface of the coil and upon its conductive power to heat. A pressure of from 10 to 20 pounds of steam is carried in the drum.

Dry Closet. Fig. 1781, etc. A closet, so called in distinction from a water closet, which is not flushed with water.

Duck. A cotton fabric, lighter and finer than canvas, for use in car upholstery.

Dummy End (Passenger Equipment). Fig. 124, etc. A term applied to the end construction commonly used on baggage, express and postal cars, which have no external platform or vestibule.

Dummy Hose Coupling. Fig. 1393. A casting of the same shape as a hose coupling, into which the coupling may be hooked and prevent dirt and debris getting in the brake pipe, as well as to prevent the coupling being damaged when hanging down.

Dump Car. Figs. 60-69. A car from which the load is discharged either through doors or by tipping the car body. See also CAR, CENTER DUMP CAR and SIDE DUMP CAR.

Dumping Apparatus (Drop Bottom, Hopper Ballast Cars, etc.) Figs. 783-794.

Dumping Tray (Postal Car). Fig. 1862. A tray used in a postal car for handling mail.

Duplex Air Gage (Air Brake). A gage to register simultaneously on the same dial the main reservoir pressure and brake pipe pressure. For this purpose a red hand for the reservoir and black hand for brake pipe pressures are provided.

Dust Arrester (of Pintsch Gas Pressure Regulator). A cavity closed at each end by a perforated plate to prevent dust entering to clog the regulating valve.

Dust Deflector (Windows). Fig. 1953. A device for deflecting dust and cinders and preventing them from entering the car, particularly through the windows.

Dust Guard. Figs. 1022, 1023, 1051, 1065. A thin piece of wood, leather, felt, asbestos or other material inserted in the dust guard chamber at the back of a journal box, and fitting closely around the dust guard bearing of the axle. It is to exclude dust and prevent the escape of oil and waste. Sometimes called axle packing or box packing. See also DUST DEFLECTOR, JOURNAL BOX AND DETAILS.

Dust Guard (M. C. B. Standard). Fig. 2832. In 1909 standard dimensions for dust guards were adopted for the four standard journal boxes.

In 1913 dimensions for dust guards for 6 by 11 inch journal box were adopted as Recommended Practice. Advanced to Standard in 1914.

Dutchman. A block or wedge of wood driven into a crevice to hide the consequences of bad fitting in construction. A kind of shim. Also a piece of metal placed under the opening in a pipe clamp to prevent the cutting of the hose when the clamp is tightened.

Dynamo (Electric Lighting). A generator of electric current. See GENERATOR.

Dynamometer. A machine for measuring the drawbar pull of locomotives. See DYNAMOMETER CAR.

Dynamometer Car Figs. 199, 200, 241, 242, 414-417. A car equipped with apparatus for measuring and recording drawbar pull and such other data as may be desired in connection therewith. Used for the testing of locomotives.

E

Ear Bail (Lanterns). An attachment formed of wire connected with the wire guard, to which the bail is attached, instead of to the body of the lantern.

Eaves Molding (Freight Cars). A plain strip sometimes used outside the fascia.

(Passenger Equipment Cars.) An ornamental finish to the lower edge of the lower deck or main roof outside of and above the fascia. A similar deck eaves molding is used for the upper deck.

Eccentric Pivot Plate (for Seat Arms). A seat arm pivot plate, made eccentric only to get room for screw holes.

Egg Poacher. Fig. 1718. For use on parlor and buffet cars.

Egg-Shaped Stove. A stove resembling an egg in form. It is commonly known simply as a cast iron stove, and is very largely used for cabooses, etc., where appearance is not important.

Ejector. An appliance for operating a vacuum brake by exhausting or "ejecting" air. It consists essentially of a pipe placed in the center of a surrounding shell or casing, with an annular opening between the pipe and the casing. When the current of steam is admitted at the lower end and escapes at the upper end, the air in the casing is drawn out through the annular opening by the current of the escaping steam. The space is connected by a pipe with the appliances on the cars for operating the brakes. Suitable valves are also used in connection with the ejector to shut off and admit steam and air. A muffler is used to render noiseless the escaping steam. It consists simply of a box of small round balls, like shot, through which the steam must pass to escape. In the latest type a combination ejector is used having two ejector pipes, one a small one, which is kept in action continuously to maintain the vacuum in the brake pipe, and a large one for use in quickly releasing the brakes after a stop.

Elbow. A short L-shaped tube for uniting the ends of two pipes, generally at right angles to each other.

Electric Car. An ELECTRIC MOTOR CAR.

Electric Cell Filler. Fig. 2510. A device for supplying storage battery cells with water.

Electric Compressor Governor. See AIR COMPRESSOR GOVERNOR.

Electric Fan. Figs. 2276, 2277.

Electric Heater. Figs. 2162; 1, 2207, etc. Heaters used on electrically operated cars, where electric current is available for their operation. Usually placed under the seats. Heat is developed by passing current through resistance coils and is controlled by regulating switches. (Figs. 2167, 2175.)

Electric Lamps. Fig. 2518, etc.

Electric Lighting. Fig. 2427, etc.

Storage System. In this system each car is provided with a storage battery, which must be charged at terminals during the layover period.

Head-End System. The head-end system consists essentially of a steam-driven generator located in the baggage car or on the locomotive. Proper con-

trolling apparatus is provided and train lines are run from the generator through the entire length of the train, flexible connections being used between cars. It comprises the following apparatus: A generator, usually steam turbine-driven, placed in the baggage car or on the locomotive, and furnished with steam from the locomotive; the necessary indicating, regulating and controlling apparatus placed near the generator and in an accessible position; train line wires of the proper size on each car and running the entire length of the train, flexible connections being made between cars, in the vestibule; batteries, consisting of a suitable number of cells connected in series and placed in battery boxes attached to the under side of the cars; lamp regulators are sometimes installed in the cars to compensate for the line drop and to maintain constant voltage at the lamps.

Axle Generator System. The axle generator systems used in this country comprise the following principal parts: An axle-driven generator mounted on the car truck. (Abroad where rigid trucks are used the axle generator is frequently secured to the under side of the car body.) A suspension by which the axle generator is supported from the truck frame. A drive, connecting the armature shaft to the axle. A regulator for controlling the voltage and output of the generator at all train speeds. An automatic switch designed to open on reverse current for the purpose of preventing discharge of the battery through the generator. A regulator for controlling the voltage impressed on the lamp circuits. A battery of a suitable number of cells to supply current when generator current is not available.

For the successful operation of the system, the following requirements must be met: The polarity of the generator terminals must remain unchanged with a movement of the car in either direction. At all train speeds from the cutting-in speed of the generator to the maximum, the generator output and voltage must be maintained within the desired working limits. The generator must be automatically connected and disconnected from the battery circuit as the train speed rises above or falls below the critical speed. The lights may be burned at any time and the transfer of this load from the battery to the generator and vice versa must result in no appreciable change in the candle power of the lamps. The voltage impressed on the lamp circuit must be maintained within such limits as will give satisfactory illumination and reasonable life of lamps.

Electric Lighting. (M. C. B. Recommended Practice.) Figs. U to U-9.

In 1912 the following specifications were adopted for electric lighting of passenger equipment cars. Revised 1913.

In 1914 safety hangers for battery box trays were added, dynamo pulley fit for axle and electric light bulb G 18½ were changed. Revised 1915.

GENERAL.

1. That in electrically lighted cars the following voltages should be used:

60 volts (nominal) for straight storage, head-end and axle-dynamo systems.

30 volts (nominal) for straight storage and axle-dynamo systems.

2. That each electrically lighted car be provided with a notice giving the following information, and that this notice shall be posted in the switchboard locker:

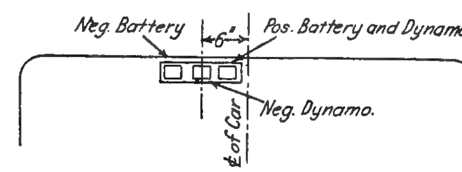
*System.
Type of generator.
Type of regulator.
Voltage of system.
Ampere hours capacity of battery at 8-hour rate.
Number of sets of battery in parallel.
Nominal charging rate ...... amps. ......max. amps.
Size of train line wires—B. & S.
Number of train line wires—(2 or 3).
Capacity of generator ...... amps.
Axle pulley ...... in. diam.
Generator pulley ...... in. diam.
Length of belt ...... ft. ...... in.
Wiring diagram (show location and capacity of fuses).

3. That the rules of fire underwriters shall cover all car wiring.

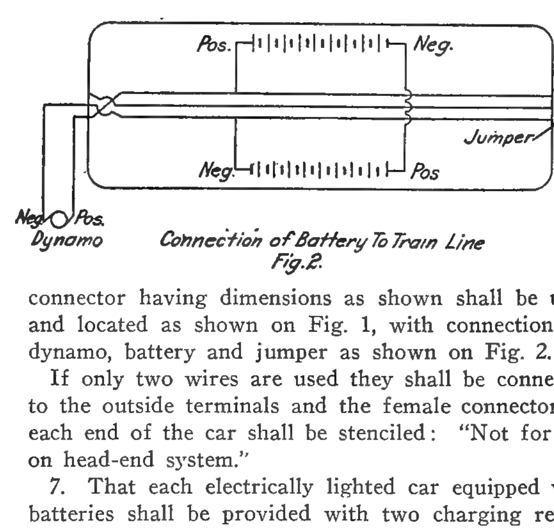
4. In wiring cars for electric lighting, all the wire shall be run in conduits, and the conduit shall be so installed that the wires can be pulled in and out of the conduit after the car is completed.

5. Standard lamps for car-lighting service should be in accordance with dimensions shown.

6. That where train-line connectors are used, a connector having dimensions as shown shall be used and located as shown on Fig. 1, with connections to dynamo, battery and jumper as shown on Fig. 2.



Location of Connector and Arrangement of Terminals When Facing Car.
Fig. 1.



Connection of Battery To Train Line
Fig. 2.

If only two wires are used they shall be connected to the outside terminals and the female connector on each end of the car shall be stenciled: "Not for use on head-end system."

7. That each electrically lighted car equipped with batteries shall be provided with two charging receptacles with swivel supports, as shown in detail on the drawings installed on each side of the car as shown, the outside annular ring to be the positive.

CONTROL AND PROTECTION OF PARTS.

8. That each electrically lighted car shall be provided with a switchboard upon which shall be mounted switches, fused switches or terminals. The switches, fuses or terminals to protect and completely disconnect the following parts:

(*a*) Train line.
(*b*) Battery.
(*c*) Axle-dynamo.
(*d*) Circuits for lamps, fans, etc.

The axle-dynamo terminals to control the positive

*State whether axle-dynamo, straight storage, and if used on head-end system.

and negative armatures and the positive field of the dynamo. Each of the above switches, fuses or terminals to be plainly marked, designating the part controlled, the positive terminal to be on the right side facing the board.

9. Where a main lamp switch is used, or where fuses controlling all lamps are used, they shall be so stenciled in plain letters.

10. The switchboard or regulator panels of electrically lighted cars shall be provided with fuses for the protection of the parts given below and with the type of terminal as specified.

(A) Train Line.—Terminals for reception of flat fuses shall be provided 2½ inches between centers; stud or screw to be ¼ inch diameter with 20 threads per inch.

(B) Battery.—Optional. Fuse terminals, if used, shall be same as for train line.

(D) Circuits.—For lamps, fans, etc., fuse shall be of the Edison screw-shell type for both positive and negative.

(E) Axle Generator.—Positive armature fuse terminal; terminals to have N. E. C. code standard 150 amperes knife-blade contact clips mounted with 4-inch clearance between clips.

(*a*) Axle Generator.—Negative armature fuse terminal optional. If used, terminal shall be same as positive.

(*b*) Axle Generator.—Positive field optional. If used, to have ferrule type clip mounted with 1-inch clear space between clips and to take N. E. C. code standard, 0 to 30 amperes.

Note.—Capacity of fuses, as designated above, to be such as to properly protect the parts in question.

11. That each electrically lighted car equipped with battery box or boxes shall have provided a fuse block, mounted in a suitable metal box.

17. Battery boxes shall have provided in each door a vent, substantially as shown on the drawing.

18. Battery boxes with two compartments, each 22⅝ in. long, or with one compartment 3 ft. 9¼ in., must be designed to safely carry a battery weight of 1,600 lb.

Battery boxes with four compartments each 22⅝ in. long, or two compartments each 3 ft. 9¼ in. long, must be designed to carry a battery weight of 3,200 lb.

19. In all battery-box designs, two angle irons or straps shall extend longitudinally under the battery box in such a location that in case of a defective battery-box floor the battery trays will be supported by the said angle iron or straps. The angle irons or straps shall be supported to the car body independently of the battery box proper, and shall be of sufficient strength in all parts to safely support the battery in accordance with the weight shown in paragraph 18 and the additional weight of the battery box proper, and the angle iron or straps and the supports for same shall be so installed that they can be readily inspected for corrosion.

Battery boxes shall have the following dimensions: Height in clear, 21½ in.; depth front to back, 2 ft. 1 in. Length of compartment to hold two standard double compartment trays, 22⅝ in. Length of compartment to hold four standard double compartment trays, 3 ft. 9¼ in.

AXLE DYNAMO.

20. A straight pulley seat should be provided for the axle pulley. If a bushing or sleeve be used it should preferably be secured to the axle, independent of the pulley. Bushing to have an external diameter of 7½ inches and to be 8½ inches long, turned straight. The pulley hub should have a uniform internal diameter of 7½ inches, the length of the hub to be 6½ inches, the face of the pulley to be 9 inches or wider if flangeless, and 8 inches if flanged. The generator pulley should be flanged and crowned and have a 7-in. face. The diameter of axle pulleys should preferably be 17 in. or 21 in.; the diameter of the generator pulley should preferably be 8 in. or 11 in.

21. When facing the end of the truck on which axle generator is mounted, the pulley or sprocket shall be on the right-hand side.

22. The electric connector between the dynamo leads and permanent wiring on the car should be made with non-reversing, self-locking receptacle and plug.

23. Axle-dynamo suspensions must be designed so that with full diameter wheels and truck, on straight, level track, any part of the dynamo or suspension must have a clearance not less than 6 inches above top of rail, and a clearance of at least 3½ inches between any part of the mechanism attached to the car body.

24. The dimensions of axles at the point of pulley fit shall be in accordance with the dimensions shown on the drawing at the positive and negative terminals of each set of batteries, and that the fuse block shall be in accordance with the detail as shown and installed on the car substantially as shown. Knife-blade fuses shall be provided with a capacity of between 101 and 200 amperes.

12. That where axle dynamos are used, negative, positive and dynamo field shall be fused as close as possible to the dynamo and prior to the said leads either entering the conduits or being secured to the bottom of the car. The above fuses to be used for emergency service only and to be at least one hundred per cent above the capacity of the fuses on the switchboards protecting the same leads.

13. All wires or terminals must be marked for identification.

BATTERIES.

14. That batteries as a set shall be connected up with a positive pole to the right, facing the car as shown in Fig. 2.

15. Where lead storage batteries are used they shall be preferably installed in double compartment tanks.

16. That where double compartment tanks are used, the connections and arrangements of battery terminals are to be as shown in Fig. 3.

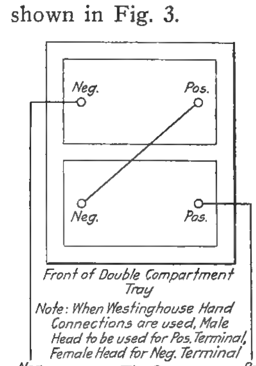


Fig. 3.
Connection and arrangement of Terminals in Double Compartment Tray.

25. In axle-dynamo suspension the metal carrying the weight of the dynamo must not be subjected to wear.

26. In axle-dynamo suspensions, if side arms are used, the end to be secured to the truck frame must extend under the transom and be bolted to the side frame near the transom, and if carried through or over end sill must be held securely to end sill by a hooked bolt not less than ¾ inch in diameter.

27. When possible, the belt should go over the end sill and under the brake beam, with belt clearance of at least an inch.

28. A typical design covering the general requirements in the above recommendations is shown on the drawings, and is recommended where applicable.

On all new and remodeled axle dynamos provided with ball or roller bearings, armature pulleys shall be in accordance with dimensions shown.

In all new or remodeled ball or roller bearing axle dynamos, the details of the pulley end of the armature shaft shall be in accordance with the dimensions shown.

On all sleeve bearing generators having armature shaft less than 1⅝ in. in diameter at the inside end of the pulley fit, it is recommended that a taper fit of ¾ in. in 12 in. be used, the inside dimension of the taper fit being 1½ in. with a length of 2½ in. measured on the axis of the shaft.

On all future and remodeled ball and roller bearing axle dynamos, the roller or ball bearing in annular ball bearing size used shall be that known as No. 412.

Electric Motor. Figs. 2675, 2677, 2703, etc. See Motor, Electric.

Electric Motor Car. Figs. 183-187. A car which is propelled by electric motors. See Motor Car and Car.

Electric Motor Car Equipment. Fig. 2672, etc. See Fig. 2676 for arrangement of apparatus.

Electric Shovel. A power shovel operated by electric power.

Electric Train Line Coupler (Electric Lighting). A device somewhat like a steam or air brake hose coupler which is used to connect the electric light circuits on adjoining cars.

Electro-Pneumatic Brake. Figs. 1359, 1398, 1399, etc. For long high speed electric trains, such as used in subway service. In addition to the functions performed by a quick action automatic air brake means are provided for applying and releasing the brakes on each car through the action of electro-pneumatic valves energized by current taken from contacts on the motorman's brake valve and continuous train wires. Brakes on long trains can be applied instantaneously and simultaneously with this device, eliminating any tendency to surging.

Electro-Pneumatic Car Discharge Valve. Fig. 1437. —A valve used with the train-signal equipment on cars employed interchangeably in electric road and steam-road service and requiring electro-pneumatic operation in electric road service and pneumatic operation in steam road service.

Electro-Pneumatic Compressor Switch. A device used in conjunction with the electric compressor governor in the governor synchronizing system for insuring uniform compressor labor. Its operation is controlled by the governor and its function is to automatically open or close the circuit to the motor-driven air compressor when the pressure in the main reservoir line falls below a predetermined minimum or rises to a predetermined maximum, respectively, which pressures are determined by the setting of the governor. See Air Compressor.

Electro-Pneumatic Signal System. Fig. 1404. An electrically operated train air-signal system, adapted to either single cars or trains which may or may not carry trailers, and providing means for signalling to the motorman from any part of the train and in as rapid succession as desired, the signals being sharp, distinct and coincident with the pulling of the signal cord. The system is so designed that, if desired, the whistle on each end of every car in the train may be sounded from a signal given from any part of the train. The equipment includes a conductor's signal switch, combined magnet and bracket, signal whistle, jumper and receptacle, cut-out cocks, fuses, snap switches, etc. For cars which operate in both steam road and electric road service, an electro-pneumatic car discharge valve is used, electric operation being used in electric road service and pneumatic operation in steam road service.

Electrode. A term sometimes used to designate the individual elements or plates of a storage battery.

Electrolier. A chandelier of electric lights.

Elevated Car. An electric motor car for use on elevated railways in large cities.

Ell. A short term for elbow.

Elliptic Spring. A spring of elliptical form made of two sets of parallel steel plates of constantly decreasing length. Such springs are generally used for bolster springs for passenger cars.

The set of elliptic springs is the total amount of bend or compression of which the spring is capable. Elliptic springs in service are termed double or duplicate, triplets or triplicate, quadruple, quintuple, sextuple, etc., according to the number of springs used side by side and connected by a single eye bolt, so as to constitute practically one spring.

Emergency Coupler Knuckle. Figs. 636 and 638. A knuckle which is designed for use in case of damage to the knuckle of automatic couplers.

Emergency Coupling Device. A short shank coupler which can be chained in place if the standard coupler is pulled out or broken.

Emergency Head Back-Up Connection. Fig. 1478. A device for application to an automatic connector in order that a back-up cock, brake or signal hose may be coupled to it.

Emergency Valve (Air Brake). 10, Fig. 1360; Fig. 1473. A valve used for making emergency applications of the brakes with the straight air system. See Triple Valve.

Emergency Valve Nut (Triple Valve). 28, Fig. 1360.

Emergency Valve Piston (Triple Valve). 8, Fig. 1360.

Emergency Valve Seat (Triple Valve). 9, Fig. 1360.

Emigrant Sleeping Car. A plainly finished sleeping car for the use of emigrants. See Sleeping Car.

Empire Deck. A form of roof used in passenger car construction in which both the lower deck and upper deck are curved. Double deck sash, usually half elliptic, are used and the upper deck is vaulted over each deck window. See Vaulted Deck Window.

Empty and Load Brake Equipment (Freight). Figs. 1351, 1358. This equipment not only operates to materially increase the total braking power controlling train units on grades, but gives a practically uniform braking power on car units—whether empty or loaded —in any service. In addition to the standard brake cylinder, auxiliary reservoir, and other details now used with the standard freight brake, this equipment

comprises: (1) An extra brake cylinder, called the "load" cylinder, with notched push rod and enclosed locking mechanism, which operates when the equipment is set in load position; (2) suitable connections, levers, etc., to form the connection and required multiplication of power from the "load" cylinder to the "empty" cylinder lever system; (3) a triple valve, slightly modified, to handle the extra volumes and cylinder; (4) a change-over valve, whereby the equipment may be placed in either the empty or load position, as desired; (5) additional reservoir capacity to furnish the air supply for the "load" brake.

End Axle Guard. The axle guard at the end of a six-wheel truck, to support the outer axle in case of breakage. See AXLE GUARD.

End Belt Rail. See BELT RAIL.

End Brace. 18, Figs. 287, 288; 21, Figs. 351, 352. See BRACE.

End Brace Pocket. See POST POCKET.

End Brace Rod. See BRACE ROD.

End Carline. A carline at the end of a car body. See CARLINE.

End Chute Plank. The planking of an inclined floor of a car which discharges its load longitudinally from the end toward the middle of a car.

End Compression Beam (Passenger Equipment Car Framing). A timber directly above the sills over the body bolster against which the compression beam brace and the end counterbrace abut. The compression beam proper is situated at the middle of the car, directly under the window sills. The end compression beam is sometimes omitted.

End Counterbrace (Passenger Equipment Car Framing). More commonly counterbrace. A brace in the side of a car body, between its ends and the body bolster. See COUNTERBRACE.

End Door. 38, Fig. 364; Figs. 806, 809, 820. A door in the end of a car.

In box cars this door, when used, is small and generally about half way up to the roof. It is used for loading and unloading long material, which cannot be handled through the side doors. See DOOR FIXTURES, END.

On some classes of automobile cars one end of the car is arranged in the form of a double swing door.

The term is used in connection with passenger cars to differentiate from the vestibule side door.

End Fascia. 42, Figs. 287, 288. A plain board on the end of a car covering the upper ends of the sheathing boards and extending to the roof line.

End Frame. Figs. 463, 474, 469, 471, etc. The frame which forms the end of a car body. It includes the posts, braces, belt rail and end plate. See BODY FRAMING and FRAME.

End Girth. See BELT RAIL.

End Girth Tie Rod. An end belt rail tie rod.

End Grab Iron. See GRAB IRON.

End Hook (Signal Cord). A hook sometimes used on the ends of passenger equipment cars, high up under the platform roof, for fastening the end of the signal cord.

End Panel. A panel at the end and on the outside of a passenger equipment car below the window.

End Piece (Wooden Truck Frame). 17, Figs. 991, 1010. A transverse timber or bar by which the ends of the two-wheel pieces of a truck frame are tied together. A crooked end piece is one cut away on top to clear the draft gear. The inside end piece is the one nearest the center of the car, in distinction from the outside end piece. They are frequently designated as the front and back end pieces.

End Piece Corner Plate (Passenger Equipment Trucks). 130, Figs. 991, 1010. A plate or casting used to connect the wheel and end pieces and stiffen the truck frame.

End Piece Plate. A plate used to stiffen the end piece of a wooden passenger equipment truck.

End Plank (Gondola Car). The planks in the end of the car body. They often form a door, which is hinged to the car floor so as to drop down upon it, and is called a drop end or drop end door.

End Plate. 26, Figs. 287, 288; 37, Fig. 404; Fig. 938. A member across the end and connecting the tops of the end posts of a car body and fastened at the ends to the two side plates. It is usually made of the proper form to serve as an end carline.

End Play (Of an Axle). The movement, or space left for movement, endwise.

(Of a Truck Bolster.) Usually called lateral motion. See SWING BOLSTER.

End Post. 21, Figs. 287, 288; 22, Figs. 351, 352; 37, Fig. 364; 24, 25, Fig. 404. The vertical members in the end body framing between the corner posts.

(Hopper Cars.) A vertical support for the overhang of the hopper floor, resting on the end sill. Ladder rounds are usually secured to the two end posts in the center.

End Post Pocket. A pocket for the end posts. See POST POCKET.

End Rafter. A term sometimes erroneously applied to an end carline.

End Rail. See WAINSCOT RAIL (Lower and Upper).

End Sheet. 19, Fig. 291; 5, Fig. 314. A plate used in closing in the end of a steel car.

End Sill. 2, Figs. 287, 288; 4, Fig. 291; 3, Fig. 214; 8, Fig. 335; 4, Fig. 340; 3, Figs. 351, 352; 42, 43 and 45, Fig. 404; Figs. 465, 470; Figs. 477, 479. The transverse member of the underframe of a car framed across the ends of all the longitudinal sills. In wooden underframe cars a heavy timber, approximately square in cross-section and in steel underframe cars a rolled or cast section, or a pressed plate. In passenger cars the end sill comes directly under the end door, the platform (which see), with its various parts, usually being a separate construction.

End Sill Angle. Figs. 477, 479. A commercial angle used on an end sill which is built up of several members.

End Sill Brackets (of Steel Frame Cars). Angle plates used to connect the longitudinal sills and the end sill. In bridge building such plates are termed brackets. When of triangular section they are termed gussets.

End Sill Diagonal Brace. 54, Figs. 287, 288; 9, Fig. 291; Fig. 479. A horizontal brace extending from the end sill diagonally back to or beyond the bolster.

End Sill Flitch Plates. The iron or steel plates sandwiched between the wood members of a composite end sill.

End Sill Plate. A plate extending the full length and width of a built-up end sill, and riveted to the other members.

An iron or steel plate bolted on the face of the

end sill of some passenger cars to give added strength.

End Sill and Plate Tie Rod. Tie rod joining the end sill with the end plate.

End Sill Stiffening Angle (Anti-Telescoping Device). An angle riveted or bolted to the end sill stiffening plate and to the end sill on the inside. The inner body truss rods pass through it, the end sill and the truss rod washer plate.

End Sill Tie Rod. An iron rod passing through the end sill and the bolster to tie the two together.

End Slope. The sloping floor from the end of a hopper car to the hopper door. See HOPPER SLOPE SHEET.

End Stiffener. 6, Fig. 314; Fig. 951. A reinforcing member extending across the end of a freight car to prevent it from bulging or breaking out due to shifting of the load or end shocks. An end tie band is a member of this kind, but with the ends bent and fastened to the side of the car, thus tying the end of the car securely.

End Stud See STUD.

End Tie Band. Fig. 951. See END STIFFENER.

End Timber. See BUFFER BEAM, END SILL, PLATFORM END SILL.

End Train Pipe Valve (Steam Heating). Figs. 2138, etc. A valve in the train steam pipe at the end of the car by which the entire car may be cut out. Usually operated by an extension handle extending up to the platform or out to the side of the car.

End Truss Plank. See TRUSS PLANK.

End Ventilator. An aperture for the admission or escape of air at the end of a car. See VENTILATOR.

End Window Panel. A panel at the end and on the outside of a passenger car alongside the window, in distinction from the end panel proper, which is below the window. See PANEL.

Equalizer. A short term for EQUALIZING BAR.

(Vestibule.) A bar in the hood of a platform which equalizes the pressure of the two upper face plate springs and keeps the opposing face plates in contact, so as to maintain frictional contact and exclude dust and smoke.

Equalizer Connecting Chain (Vestibule). Three links of a chain connecting the upper ends of the vertical equalizing levers with the end of the horizontal equalizing lever.

Equalizer Spring. 79, Figs. 991, 1010. A spring which rests on an equalizing bar and carries part of the weight of a car. Single or double coil spiral or helical springs are generally used for this purpose.

Equalizer Spring Block (Passenger Equipment Tracks). 76, Fig. 1010. A casting bolted to the wheel piece and resting on the equalizer spring cap.

Equalizer Spring Cap. 72, Figs. 991, 1010. A casting which fits over the top of the equalizer spring and transmits to it the weight received from the wheel piece.

Equalizer Spring Seat. 73, Figs. 991, 1010. A casting which rests on an equalizing bar and supports the spring.

Equalizing Bar (Passenger Equipment Trucks). 71, Figs. 991, 1010. Commonly abbreviated into equalizer. A wrought iron bar which bears on top of the journal boxes and extends longitudinally from one to the other. Equalizer springs rest on it between the two boxes. It is used to transfer part of the weight on one axle to the other, and thus equalize it on both; hence its name.

Equalizing Bar Pedestal (Four-Wheel Caboose Cars). A casting serving to give a fulcrum to the center of a lever, called an equalizing lever, which distributes the weight of the car evenly on the two axles.

Equalizing Bar Seat. The surface in top of a journal box on which an equalizer rests. See EQUALIZING BAR.

Equalizing Brake Lever. A floating brake lever is also called an equalizing lever. See BRAKE LEVER.

Equalizing Lever Set. Fig. 1440. An arrangement of cylinder levers and connections for double-truck cars, so designed as to insure proper equalization of braking force on both trucks with either the hand or air brake.

Escutcheon. A plate or guard for a keyhole of a lock.

Examination of Car Inspectors, Rules for (M. C. B. Recommended Practice).

In 1902 the following rules for examination of car inspectors were adopted as a Recommended Practice of the Association:

REQUIREMENTS.

One year at oiling cars.

Two years at car repairing.

Age limit for new men, thirty years.

Age limit for promoted men, forty years.

Vision, 20-20 in one eye and not less than 20-40 in the other, without glasses.

METHOD OF TESTING.—*Acuity of Vision.*—The test card should be hung in a good light and the party to be examined should, if possible, be seated with his back to the window. Each eye should be examined separately, using, for the purpose of excluding one eye, a folded handkerchief. The lowest line that can be read should be determined by exposing only one letter at a time through a hole cut in a strip of cardboard. In making out the report in each case, the visual acuity of each eye should be denoted by a fraction of which the numerator represents the number of feet at which the applicant is seated from the card, while the denominator represents the number of feet at which the lowest line which he can read should be read. Thus, if at 20 feet he reads the line marked 20 feet, his vision—20-20 or 1, which is the normal standard. If at the same distance he can only read the line marked 70 feet, his vision—20-70. If at 20 feet he reads the 15-foot line, the vision—20-15, or more than normal. If a room 20 feet long can not be used, a testing distance of 15 or 10 feet should be employed, in which case normal vision would be represented by 15-15 or 10-10 respectively, and lower grades of vision by such fractions as 15-20, 10-70, and so on.

Field of Vision.—Test should be made by having the applicant and examiner stand about three feet apart, each with one eye shut, looking each other steadily in the eye. The examiner should then bring his hand in from the edge of the field toward the center of the spacing between them, until the applicant sees it coming. This should be done from different directions, up, down and from each side. The applicant should see the hand coming about as soon as the examiner does. If not, this should be noted on the report.

Hearing.—Test should be made in a quiet room. First, the examiner should hold the watch opposite the ear to be examined not less than 48 inches distant, then gradually approach the ear until the applicant hears the tick, the stop being used to satisfy the examiner that the applicant is not deceiving. The distance

at which the applicant hears the watch should be noted in inches. The normal ear should hear the tick of the watch at 48 inches. Then the hearing power will be denoted by a fraction whose numerator represents the number of inches at which the watch is heard. Thus, if he hears the watch at 48 inches, his hearing —48-48, or normal. If he hears it at only 10 inches distant, his hearing—10-48, and so on.

Color.—The committee does not think it essential that inspectors should be rejected on account of imperfect color sense. It is, however, believed that inspectors should be tested as to their color sense so that they, as well as their employer, may know their condition in this respect.

Educational.—The applicant should be able to write a legible hand in English, and also to read manuscript matter as well as printed matter.

Car Knowledge.—The inspectors should be able to name each part of the cars in general use, in preference using M. C. B. dictionary terms.

M. C. B. Rules.—Inspectors must pass a satisfactory examination on M. C. B. Rules, answering 75 per cent of the questions submitted. These questions should be of about the following character:

1. What are the Master Car Builders' Rules?
2. What is the object of the M. C. B. Rules?
3. What is the underlying idea or principle of these rules?
4. When is a company, operating the cars of another company, responsible for defects of such cars?
5. When a company is thus responsible, what should it do?
6. What care should be given to foreign cars by the company hauling them?
7. What cars must be accepted in interchange?
8. What is a defect card and how is it used?
9. Under what conditions is a road obliged to accept a car which is carded for defects for which the owner is not responsible?
10. What are the defects of wheels and axles for which owners and delivering companies are responsible?
11. Describe the form and use of the M. C. B. wheel gage.
12. What are the rules which apply to the cleaning of triple valves and cylinders?
13. What does the limit of height of drawbars mean?
14. When a company is obliged to make improper repairs, what must it do to call attention to such repairs?
15. What does the term unfair usage mean?
16. What are the rules regarding splicing sills?
17. What is the purpose of the repair card?
18. How do these rules apply to switching roads?
19. Are switching roads allowed to render bills against owners direct for repairs of any other than those named in Section 23 of Rule 5?

Exhaust Muffler (Traction Air Brake). A device for subduing the sound of air discharging to the atmosphere during operation of the brakes.

Expanded Metal. A perforated metal screen which is made by slotting a sheet of iron or steel and then drawing it out so that the slots form diamond-shaped holes in the plate. It is largely used in composite concrete construction as a binder and for lockers and window guards.

Expander Ring (Air Brake Cylinder). Fig. 1504.

Express Car. Fig. 127. A car operated in passenger trains for carrying express freight. See CAR.

Extensible Trap Door. Fig. 556. A trap door with an extension device to prevent passengers stepping between a car and the station platform.

Extension Bracket. See RUNNING BOARD BRACKET.

Extension Reach (Logging Cars). The reach is a long bar connecting the two trucks. The extension reach is adjustable.

Extension Reach End (Logging Cars). A strap for the end of the extension reach.

External Cylinder Gage. A steel ring with a cylindrical hole, which is very accurately made of a precise size, and used as a standard of measurement for the diameters of solid cylindrical objects.

External Screw Gage. A steel ring with a very accurate screw thread in the inside for testing screw threads. See INTERNAL SCREW GAGE.

Extra Transom (Passenger Equipment Trucks). 20a, Figs. 991, 1010. An extra or auxiliary member placed alongside the transom to further strengthen the truck frame.

Extra Transom Tie Rod. 23a, Figs. 991, 1010.

Eye. "A small hole or aperture."—Webster. See EYE BOLT.

Eye Bolt. "A bolt having an eye or loop at one end for the reception of a ring, hook or rope, as may be required."—Knight.

Eye Bolt Link Hanger. A special form of SWING HANGER having a very short link attached to an eye bolt passing through the transoms.

Eyelet. A short metallic tube, the ends of which are flanged over against the object through which it passes. Used as a bushing or reinforcement for holes. In metallic eyelets of the usual form the two halves which when compressed together form the eyelet are known as grommets. See CARPET EYELETS.

(Window Shade.) A slot in the window shade leather to fit over the sash lift to hold the shade fast.

Eyelet Nail. A wire nail with turned knob for use with carpet eyelets.

F

Fabrikoid. An artificial leather made by coating a cloth fabric with a secret compound which gives it the texture and appearance of leather.

Face (of Rim of Car Wheel). The vertical surface of the outside of the rim.

Face Plate. (Steel Tired Wheels). The plates connecting the tire and hub. They are distinguished as front and back face plates.

See VESTIBULE FACE PLATE.

Face Plate Buffer. A buffer plate to which a vestibule face plate is attached. See VESTIBULE FACE PLATE.

Face Plate Buffing Stem (Vestibule). See FACE PLATE PISTON.

Face Plate Piston (Vestibule). A face plate buffing stem corresponding to the side buffer stem, beneath the platform floor. The end is contained in a face plate piston guide.

Fall (Hoisting Tackle). That part of the rope to which power is applied.

Fall and Tackle. Another name for BLOCK AND TACKLE.

Fascia. 42, 43, Figs. 287, 288; 11, Fig. 364. A plain board running the length or width of the car, directly under the roof. Is designated as side fascia and end fascia, depending on location. In passenger equipment

cars the eaves molding is placed on the upper edge of the fascia.

Fastener. That which fastens or secures one thing to another.

Faucet. Figs. 1730, etc. A synonymous term with COCK, which see for fuller definition. See PUSH BUTTON FAUCET, BIBB COCK, TELEGRAPH COCK.

Faucet Alcove. A water alcove.

Feed Door (Baker Heater). A door for closing the aperture, giving access to the fire pot or (in base burners) the magazine.

Feed Tube (Oil Lamp). The tube connecting the reservoir with the burner. The standard by which the entire lamp is supported passes through it.

Feed Valve. Fig. 1418. Also called slide valve feed valve.

(Traction Air Brake.) A valve which automatically maintains the pressure of air supplied through the brake valve to the automatic brake system. It may be attached either to the brake valve or placed in the piping between the main reservoir and the brake valve.

(Train Air Signal.) See REDUCING VALVE.

Felt Edge (Car Seats). A device for building up the edges of car seat cushions. It is simply a roll of felt stitched in such a manner as to fit over a cleat: and when tacked down it forms an even elastic face to the cushion.

Female Center Plate. The body and truck center plates are sometimes called male and female plates, respectively. See CENTER PLATE.

Female Gage. An external gage. See EXTERNAL CYLINDER GAGE.

Fender Board. A board at the end of passenger car steps to prevent mud and dirt from being thrown on them by the wheels. More commonly, string board. The splash board, if used, goes on the back side of the steps.

Feralun. A metal cast with one or more incorporated wear, heat and acid-resistant strata, exposed as one or several faces, or embodied at a desired depth. A stratum may be so exposed as to give a gritty surface of extreme durability and any desired degree of roughness for an anti-slip surface. See SAFETY TREAD.

Ferry Push Car. A very long platform car used for pushing or pulling other cars on or off a ferry boat when the latter is approached by an incline too steep for locomotives, so that the latter can push or pull the cars without running on the incline.

Field Coils. Coils of insulated copper wire or ribbon surrounding the iron poles of a motor field magnet. Standard motors have four poles. Current passing through these coils produces the magnetic flux in which the armature rotates.

Filler Block. A block fitted into the space between the tank head and the end sill of a tank car to prevent the tanks moving on the frame. See TANK HEAD BLOCK.

Filler Cover. The cover for the opening to the water tank supply on cars.

Fillet. A small light molding, more generally termed a bead. A rounded corner left on the inside of the angle where two surfaces join.

Filling Cock (Car Heating). A cock used for supplying water to the hot water circulation heating system. In some cases has a funnel attachment.

Filling Device (Car Heating). Figs. 2148, 2262, etc. Used in connection with hot water heating systems.

Filling Funnel (Baker Heater). A funnel attached to the combination cock for filling the circulating drum with brine.

Filling Piece. Any piece of timber or metal used to close a gap.

Filling Spider. See BODY BOLSTER FILLER.

Filling Valve (Acetylene Gas Storage System). Fig. 2300.

Filling Valve (Pintsch System). This valve is a soft metallic seated valve of peculiar construction. Is handled with key, and is a left-handed valve. One is placed on each side of a car, bolted to an iron bracket. The pipe connection (1¼ in.) is made to a connection piece which is slipped through the bracket from the outside and screwed to the pipe. The filling valve is then bolted back against this flange connection piece, a lead and rubber gasket forming the tight joint. The valve has a sheet iron cover secured to it by four screws.

Finger Guard (Brake Beams). A projecting rod or finger which prevents the brake beam from being excessively displaced laterally by bearing on the inside of the wheel. A wheel guard.

Finishing Varnish (Painting). An elastic (oily) varnish applied in two coats. See PAINTING.

Fire Extinguisher. Figs. 2073, 2074. Usually a small receptacle carried in a corner of passenger cars, and containing some chemical which will extinguish fire.

Fire Regulator and Pressure Indicator (Baker Heater). This device is attached to the hot water circulating pipes at a point a little above the coils, and is somewhat like the old ball and lever safety valve, the ball or weight in this case being the draft door. The fire regulator bowl consists of two concave plates bolted together, with a corrugated steel diaphragm and two copper duplicates, top and bottom, between (for preservation). On this set of diaphragms rests a piston connected with a lever, on one end of which hangs the counter draft damper in the base of the smoke flue. On the front end of this lever is the spiral adjusting spring, and the figures denoting the pressure within the heater. The "adjusting spring" is to be hooked into the hole at the figures denoting the pressure and consequent temperature desired.

First Class Car. The ordinary American day coach used by the great bulk of short trip passengers. So called to distinguish it, on the one hand, from those of an inferior grade, as emigrant and (rarely) second-class cars, and on the other hand from sleeping and parlor cars, in which an extra charge, in addition to the ordinary fare, is made. Second-class cars are used in Canada.

Fixed Brake Lever. More commonly, Dead Lever.

Flag Holder (for Corner Post of Passenger Car). Fig. 1883, etc. A cast or malleable iron receptacle for a signal flag staff.

Flag and Lamp Socket. See SIGNAL LAMP SOCKET.

Flange. A projecting rim for attaching a part to any surface by screws or bolts.

(Of a Car Wheel.) A projecting edge or rim on the periphery for keeping it on the rail. See WHEELS, and INTERCHANGE OF TRAFFIC.

Flange Brake Shoes. BRAKE SHOES so constructed that they bear on both the tread and flange of a wheel.

Flange Fittings (Pintsch System). Special fittings re-

quired for the Pintsch system are all flanged and made of brass, the flanges held together by screws. The joints are made tight by the use of special lead and rubber washers.

Flange for Steel and Steel-Tired Wheels. See WHEEL TREAD AND FLANGE FOR STEEL AND STEEL-TIRED WHEELS.

Flange Thickness Gages. See WHEEL FLANGE THICKNESS GAGES.

Flange and Wheel Tread, Form of. See WHEEL TREAD AND FLANGE, FORM OF.

Flanges, Wheel, Distance Between the Backs of. See WHEEL FLANGES, distance between backs of.

Flanger. Fig. 212. A form of plow, sometimes placed under a special car, called a flanger car, but usually under a snow plow, for clearing ice and snow from the inside of the rails to provide a clear passage for the wheel flanges. Flangers are also frequently attached to locomotives, either on or just behind the pilot.

Flashing (Plumbing). "A lap joint used in sheet metal roofing, where the edges of the sheets meet on a projecting ridge. A strip of lead leading the drip of a wall into a gutter."—Knight. Hence, extended to mean any strip of sheet metal of an L section used to make a water-tight joint.

Flat Car. Figs. 70-80, 335-339. A freight car having a floor laid over the sills, and without any housing or body above. See CAR and WELL CAR.

Flexible Car Roof. Figs. 940, 942, 943, etc. A roof designed to accommodate itself to the weaving or distortion of the car frame.

Flexible Joint. See FLEXIBLE METALLIC JOINT.

Flexible Metallic Joint. Figs. 2100, etc. A metallic joint so designed as to provide for flexibility. For a swing joint, see Fig. 2102.

Flexible Truck. A truck with a more or less flexible connection between bolster and side frame.

Flitch Plate. An iron or steel plate sandwiched between pieces of wood and bolted together to give the member which they comprise greater strength. Also called sandwich plates.

Floating Connecting Rod (Foundation Brake Gear). A rod which connects a cylinder lever with a floating lever.

Floating Lever. A lever, one end of which is fastened to the fulcrum bracket, the other end connected to the live truck lever, and the middle to the cylinder lever, to which latter is connected the push rod.

Floating Lever Bracket. A bracket bolted to the underframe of a car to carry the floating lever of the brake gear.

Floating Lever Hanger. A square bracket or hanger supporting the floating lever.

Floor. 14, Figs. 287, 288; 12, 13, Fig. 404. The boards, plates, or other material which cover the sills of a car. In passenger cars the floor consists of two, and sometimes three, courses of boards, called respectively the flooring, intermediate floor and deafening ceiling, the latter being on the under side of the sills. With the introduction of steel passenger cars has come the use of floors of concrete and other mixtures (see Figs. 1706-1713). An intermediate or upper floor, more commonly called the double deck, is used in stock cars for carrying sheep and hogs. See FLOOR NAILING STRIP, FLOOR SUPPORT.

Floor Beam. 56, Figs. 287, 288; 57, Fig. 335; 14, Fig. 404. A beam for supporting the nailing strips or floor stringers in a steel car, and also acting to a certain extent as a tie between the side and center sills.

Floor Chute. See HOPPER TUBE.

Floor Mat. Fig. 1708. A texture or structure of hemp, cocoa fiber, rattan, india rubber, wood or other material, laid on the floor of a car for passengers to clean their shoes on.

Floor Nailing Strip. 14, Fig. 335. A strip of wood placed between the sills, to which the floor boards are nailed. See NAILING STRIP.

Floor Nailing Strip Stiffener. A metal reinforcing strip on a floor railing strip.

Floor Pipe. See HOPPER TUBE.

Floor Plate. Fig. 574. See CENTER PIN FLOOR PLATE.

Floor, Refrigerator Cars, Height of. See REFRIGERATOR CARS, FLOORS and ICE TANKS.

Floor Stop (for Door Holder). A catch for a door holder attached to the floor, in distinction from a partition stop attached to the wall or partition. See DOOR HOLDER.

Floor Stringer. See STRINGER.

Floor Strip. The strips that make the grated floor of a street car.

Flooring Support. 14, Fig. 404. See FLOOR BEAM.

Flooring. Fig. 478. See SIDING, FLOORING, ROOFING and LINING.

Flush Bolt. A bolt attached to a slide which is let into a door, sash or window, so as to be flush with its surface. A spring flush bolt is commonly called a cupboard catch.

Flush Bolt Keeper. A plate which is attached to a door, sash or window frame, and has a suitable hole, in which a flush bolt engages.

Flush Door. (Box Cars). Figs. 818, 819. A door which is flush with the side of the car when closed.

Flush Handle. A handle for a lock or latch which is placed in a recess, as of a door, sash or berth, and which does not project beyond the surface of the object to which it is attached.

Flush Sash Lift. A metal sash lift with a recess which is let into a sash so as to be flush with its surface.

Folding Door. Fig. 800. A door made in two or more sections hinged together to close by folding up.

Folding Lavatory. Figs. 1760, etc. A wash stand for the staterooms of sleeping, private and business cars, which can be folded out of the way and out of sight.

Folding Platform Tail Gate. See TAIL GATE.

Folding Table Leg. See TABLE.

Folding Wash Stand. See FOLDING LAVATORY.

Follower Block. A special form of draft gear follower plate.

Follower Bolt. A piston follower bolt. See PISTON.

Follower, Draft Gear (M. C. B. Standard). Decided in 1905 that flat followers made of wrought iron or open-hearth steel 1⅝ in. thick for tandem spring gear and 2¼ inches thick for twin spring and friction gear be adopted as recommended practice. Advanced to Standard in 1907.

Follower Lug. See CHEEK CASTING.

Follower Plate. Plates which bear against each end of a draft spring and transmit the tension and compression on the drawbar to the draft springs and to the draft timbers.

Follower Plate Support. A support or guide placed across the center or draft sills for the draft gear followers.

Follower Stop. See CHEEK CASTING.

Foot Board (Freight Cars). See BRAKE STEP.

Foot Plate (Three Stem Coupler). A cast iron wearing plate on the upper side of the passenger platform end sill. In platforms with vestibules a sliding foot plate is attached to the buffer plate and works or slides back and forth in a foot plate housing.

Foot Plate Housing. See FOOT PLATE.

Foot Rail. A horizontal wooden bar underneath a car seat for the passengers who occupy the next seat to rest their feet on. A foot rest. See FOOT REST.

Foot Rest. A movable support for the feet of passengers, commonly two horizontal wooden bars underneath a car seat, and attached to two iron rockers, called foot rest carriers, pivoted in the center so that it can be adjusted to a comfortable position for the passengers occupying the next seat, or moved out of the way if desired. Another style is an adjustable foot rest sliding in a grooved channel. A portable stuffed carpet foot rest is usually termed an ottoman or hassock.

Forefoot Sheave (Steam Shovel). A fixed pulley located below the floor under the boom foot sheave about which the hoisting chain runs before being carried to the hoisting drum.

Foreign Car. Any car not belonging to the particular railway on which it is running. See INTERCHANGE OF TRAFFIC.

Foundation Brake Gear. The levers, rods, brake beams, etc., by which the piston rod of the brake cylinder is connected to the brake shoes in such a manner that when air pressure forces the piston out the brake shoes are forced against the wheels.

Foundation Brake Gear, High Speed, for Passenger Service (M. C. B. Recommended Practice). Figs. 2911, etc. In 1903 the schedules for high speed foundation brake gear, as shown on the drawings, were adopted as Recommended Practice. Modified in 1907. In 1912 the drawings were revised to permit the hand and power brake to work in harmony. In preparing these schedules the following fundamentals of design were adopted:

FUNDAMENTALS.

Braking power to be 90 per cent. of the light weight of the car.

Equalized pressure in brake cylinder, sixty pounds per square inch.

Maximum pressure in brake cylinder, eighty-five pounds per square inch.

Maximum stress in levers, 23,000 pounds per square inch.

Maximum stress in rods, except jaws, 15,000 pounds per square inch; no rod to be less than ⅞ inch in diameter.

Maximum stress in jaws, 10,000 pounds per square inch.

Maximum shear on pins, 10,000 pounds per square inch.

Diameter of pins to provide a bearing value not to exceed 23,000 pounds per square inch.

The reduction of stresses in rods, lever and jaws due to friction of the foundation brake, and the reduction of braking power due to the same cause and to the action of release springs should be neglected, because it is considered too difficult to determine their value even with a fair degree of accuracy.

SIX-WHEEL TRUCKS.

The committee submits schedule "A-1" herewith for cars weighing 80,000 to 100,000 pounds and having six-wheel trucks, and schedule "A" for cars weighing 100,000 to 137,000 pounds and having six-wheel trucks; the difference between these schedules is that a sixteen-inch brake cylinder is to be used for schedule "A" and a fourteen-inch brake cylinder is to be used for schedule "A-1," otherwise they are the same. The location of the fulcrum hole in the cylinder lever is made to vary by quarters of the inch to suit the weight of the cars, but only one fulcrum hole shall be drilled in each lever.

With schedule "A" there should be used a brake beam suitable for a load of 28,000 pounds, and with schedule "A-1" there should be used a brake beam suitable for a load of 22,000 pounds imposed at the middle of the beam.

FOUR-WHEEL TRUCKS.

Schedule "B-1," submitted herewith, is for cars weighing 50,000 to 70,000 pounds and having four-wheel trucks, and schedule "B" is for cars weighing from 70,000 to 90,000 pounds and having four-wheel trucks, the differences between the two being that a fourteen-inch brake cylinder is to be used with schedule "B" cars, weighing 70,000 to 90,000 pounds, and a twelve-inch brake cylinder is to be used with schedule "B-1," cars weighing 50,000 to 70,000 pounds; also that with schedule "B" there should be used a brake beam suitable for a load at the middle of 28,000 pounds, the same as for schedule "A," and with schedule "B-1" there should be used a brake beam suitable for a load at the middle of 22,000 pounds, the same as for schedule "A-1."

The proper braking power for the weight of car is obtained by the location of the fulcrum hole in the cylinder lever.

Schedule "C" was designed for cars weighing 50,000 pounds and less and equipped with four-wheel trucks. A ten-inch brake cylinder is to be used with this schedule and a brake beam suitable for a load at the middle of 15,200 pounds.

DESIGNATION OF RODS AND LEVERS.

On the drawings, the location of levers and rods is designated by letters; the first letter in the designation distinguishes between body and truck. The second letter distinguishes between the levers and the connections. The figure following the second letter is the distinctive number for the lever or connection; and following this figure is the schedule letter to which the lever or connection belongs. Thus B-C2-B means body connection number two (second from cylinder piston rod), of schedule "B"; also T-L2-B would mean truck lever number two for schedule "B."

STENCILING LIGHT WEIGHT OF CAR.

The committee recommends that the light weight of car be stenciled on each car. The cross frame tie, when exposed, furnishes a convenient place on which to show the weight, but when this place is not available some other means should be provided. In addition to this the length of the cylinder end of the cylinder lever should be shown so that no calculation would be necessary to determine the proper cylinder lever for the car.

MARKING LEVERS.

It may be found desirable by some railroad companies to mark each lever in a manner to indicate the schedule to which each belongs and the location of each in the brake rigging, and if this is done it is suggested that the marking be the same as indicated on the drawings.

TABLE I.

Schedule Designation.	Light Weights of Cars (Lbs.)	Type of Truck.	Size of Brake Cylinder.	Maximum Load at Middle of Brake Beam.
A.	100,000 to 137,000	6-wheel	16 inches	28,000 lbs.
A-1.	80,000 to 100,000	6-wheel	14 inches	22,000 lbs.
B.	70,000 to 90,000	4-wheel	14 inches	28,000 lbs.
B-1.	50,000 to 70,000	4-wheel	12 inches	22,000 lbs.
C.	50,000 and less.	4-wheel	10 inches	15,200 lbs.

Three have been brought together in Table 1 the distinctive data of each schedule so that by referring to the table there can be found quickly the correct schedule for any particular car.

Fount. The oil receptacle of a lamp.

Frame. A structure composed of a number of members designed and arranged to withstand the stresses set up in the particular part of a car for which it is intended. See UNDERFRAME, etc.

Free Air Space (Refrigerator Car Insulation). An air space which has free communication with the outside air so that the air can circulate through it.

Freight Car. Figs. 1-115, 259-362. A general term used to designate all kinds of cars which carry goods, merchandise, produce, mineral, etc., to distinguish them from those which carry passengers. See CAR.

Freight Car Lock. A LOCK for fastening the doors of freight cars.

Freight Equipment Car. See CAR and FREIGHT TRAIN CAR.

Freight Equipment Cars, Marking on. See MARKING ON FREIGHT EQUIPMENT CARS.

Freight Train Car. A car ordinarily operated in freight trains. See CAR.

Freight Truck. A freight car truck.

Fresnel Lens. A lens formed of concentric rings of glass or other transparent substances, one or both sides of which are bounded by spherical surfaces.

Friction Block. 27, Fig. 1010. A casting attached to the truck bolster as a guide and to prevent wear between the bolster and transom.

Friction Buffer. A BUFFER in which shocks are absorbed by friction.

Friction Draft Gear. Figs. 718, 719, 729, 733, etc. Any form of draft gear which makes use of friction for absorbing and dissipating the energy of buffing and tension shocks transmitted through the couplers.

Friction Draft Spring. A special spring, the design of which is such as to increase its capacity by friction between the coils. See SPRING DAMPENER.

Friction Plate. A plate to prevent wear, as a plate screwed to the wall to protect the wood work from chafing by the seat back arms when the seat back is tilted. See BOLSTER CHAFING PLATE.

Friction Roller. A wheel or pulley interposed between a sliding object and the surface on which it slides to diminish the friction.

Frieze. A kind of plush or cloth used in upholstering. Commonly used for covering car seats.

Frog Wing Gage. See GUARD RAIL and FROG WING GAGE.

Fruit Car. Fig. 112. A box car equipped with some means of ventilation, for carrying produce which does not require refrigeration. Used commonly for fruit. See VENTILATED BOX CAR.

Frying Pan. Fig. 1721. For use on parlor and buffet cars.

Fuel Instruction Car. Figs. 201, 238. A car equipped for instructing railway employees in the economical use of fuel.

Fulcrum. "In mechanics, that by which a lever is sustained, or the point about which it moves."—Webster. See BRAKE LEVER FULCRUM.

Fulcrum Hanger Bar. A support for the brake lever fulcrum of a six-wheel truck.

Funnel. "A vessel for conveying fluids into close vessels; a kind of inverted hollow cone with a pipe; a tunnel."—Webster. See FILLING FUNNEL.

Furniture Car. A large box car, particularly designed for carrying furniture or other light freight which is bulky. See CAR.

Furring. 23, Figs. 351, 352. Pieces of wood placed in a wall or between sills to which to nail sheathing or flooring. The term is also applied to angle blocks glued or nailed in the inside angles of wood work, where strength and stiffness are required. See BLOCKING and NAILING STRIP.

Furring Brace Blocks. Blocks of triangular cross section glued in the angles between the sheathing and furring to give it greater stiffness.

Fuse. A wire strip or bar of fusible metal or alloy placed in series with an electric circuit and designed to melt and open the circuit when the current exceeds a predetermined value. It performs a function similar to that of a circuit breaker.

Fuse Box. A support for fuses, containing contacts for readily attaching the same, and usually provided with magnetic blow-out.

Fusee. The cone or conical part of a watch or clock, round which is wound the chain or cord. It is a very ancient mechanical contrivance, and is made of a cone form in order to equalize the power of the spring, the leverage of the cord increasing as the resistance of the spring increases and vice versa. See BERTH SPRING FUSEE.

Also a term applied to a signaling device used, after being lighted, to drop from the rear of trains to warn following trains and prevent rear end collisions.

Fusee Carrying Case. Fig. 2078.

G

Gage. A tool or instrument used as a standard of measurement of pressure or size. See CYLINDRICAL GAGE, DUPLEX AIR GAGE, PRESSURE GAGE, STEAM GAGE, etc.

(Back-Up Air Brake.) Fig. 1385. An air gage to

guide the brakeman in setting the brakes with the back-up brake apparatus.

(Of Track.) The distance in the clear between the heads of the rails of a railway; 4 ft. 8½ in. is the standard gage; if greater than this by more than ½ in., a broad gage; if smaller, a narrow gage. Wide gage usually means a minor and irregular or exceptional enlargement of a given fixed gage, in distinction from tight gage, a corresponding contraction. See WHEELS and TRACK, etc.

Gage, Guard-Rail and Frog Wing. See GUARD-RAIL and FROG WING GAGE.

Gages, Journal Bearing and Wedge. See JOURNAL BEARING and WEDGE GAGES.

Gages, Limit, for Inspecting Second-Hand Wheels. See WHEELS, LIMIT GAGES FOR INSPECTION.

Gage for Measuring Thickness of Rim of Steel Wheels. See WHEELS, STEEL, GAGE FOR MEASURING THICKNESS OF RIM.

Gage, Plane, for Solid Steel Wheels. See WHEELS, SOLID STEEL, PLANE GAGE FOR.

Gages for Round Iron. See LIMIT GAGES FOR ROUND IRON.

Gage, Rotundity. See WHEELS, SOLID STEEL, ROTUNDITY GAGE FOR.

Gage, Wheel-Cheek. See WHEEL-CHEEK GAGE.

Gage, Wheel Defect. See WHEEL DEFECT GAGE.

Gages, Wheel Flange Thickness. See WHEEL FLANGE THICKNESS GAGES.

Gain. "In architecture, a beveling shoulder, a lapping of timbers, or the cut that is made for receiving a timber."—Webster. In car work the term generally means a notching of one piece of timber into another.

Galvanized Iron. Sheet iron covered with sal ammoniac, after first being cleaned in a bath of dilute acid and then coated with zinc by immersing it in a bath of the liquid metal. An amalgam of 11.5 zinc and 1 mercury is sometimes used. It is usually made in sheets about 2 feet wide by 6 to 9 feet long, and its thickness is measured by its number, wire gage (W. G.). See KALAMINED IRON.

Gas Arm. A GAS WAY TUBE.

Gas Boiler and Utensils. Figs. 1719, etc. A small cook stove heated by gas for use on parlor and sleeping cars in preparing light meals.

Gas Burner. "The jet piece of a gas lighting apparatus, at which the gas issues and combustion takes place." —Knight.

Gas Lamps. Figs. 2302-2423.

Gas Pipe. See PIPE.

Gas Plate. See Fig. 1860 and U. S. POSTAL CAR specification for standard gas plate for postal car use.

Gasket. A thin sheet of rubber, cloth or sheet metal put in a joint between two pieces of metal to prevent leakage.

Gasolene Motor Car and Gas-Electric Motor Car. See MOTOR CAR.

Gate. See PLATFORM GATE.

(Of a Casting Mold.) The opening through which the melted metal is poured.

Gauze. See WIRE GAUZE.

Gear. In mechanics the term is used to designate a combination of appliances for effecting some result, as valve gear. See BRAKE GEAR, DRAFT GEAR, etc.

Wheels are said to be in gear when they have cogs interlocking or intermeshed.

Gear Case (Electric Motor). A case enclosing the gear and pinion of a railway motor to exclude dirt and water.

Gear Wheel. A cogged or toothed wheel. A spur wheel.

General Service Car. A car suitable for carrying a variety of classes of freight. See also CAR, M. C. B. CLASSES X M and S D, CONVERTIBLE CAR.

Generator (Electric Lighting). Fig. 2428, etc. A machine for generating an electric current, driven by a belt, chain or gear from an axle or by an engine or steam turbine mounted in a baggage car or on a locomotive. See ELECTRIC LIGHTING, AXLE GENERATOR.

Generator Apartment. An apartment in a passenger equipment car in which the electric lighting generator is located.

Generator Coils (Electric Heaters). Wrought iron pipe coiled into a spiral shape and put into the fire pot of a heater, to heat the water they contain and create a circulation through the hot water pipes of the car. Among the different types is the expanding generator coil in which the diameter of the pipe increases as the heated water ascends in it.

Generator Regulator. Fig. 2441, etc. An automatic device for controlling the action or output of the axle driven generator. As it is desirable to arrange the generator to become operative or generate its full voltage at a low speed, provision must be made for taking care of the output of the generator when it runs at very high speed. Generator regulators are generally designed to control the field of the axle generator, weakening it at high speeds and strengthening it at low speeds. They are made in various ways, the three principal types being rheostatic type, contacting type and counter electro motive force type. The rheostatic type consists of a rheostat of some form in the shunt field circuit of the generator. The resistance of this rheostat is generally varied by means of some motive power device, such as a solenoid or small motor. The action of the motive power device is controlled by the electrical conditions that obtain in the system. The contacting type employs a fixed resistance in the field circuit of the generator, which is intermittently cut in and out, depending upon the conditions. In fact, such a regulator acts substantially like a rheostatic device and accomplishes the same purpose. The counter electro motive force type consists of a small motor-driven generator which generates counter electro motive force or back pressure in the field circuit of the main generator. The counter electro motive force is controlled in the same manner as the operating device of the rheostatic or contacting types of regulator and it accomplishes the same end. See ELECTRIC LIGHTING.

Gib and Key. A fastening to connect a bar and strap together by a slot common to both, in which a gib with a beveled back is first inserted and then driven fast by a taper key.

Gimlet Pointed Screw. A common wood screw, which has its screw cut to a point like a gimlet, so that it can force its own way into wood.

Girder. "The term girder is restricted to beams subject to transverse strain, and exerting a vertical pressure merely on their points of support."—Stoney. The term is almost synonymous with truss. Thus engineers speak of a "Howe truss," a "Pratt truss," a "Warren girder" and a "lattice girder." The distinction is that a truss consists of separate parts held together by pins, or even simply by pressure, which may be taken down and re-erected; whereas a girder is a

single solid structure, either all one solid piece (rolled girder), or of plates riveted together (plate girder), or of combined plates and riveted lattice work (lattice girder).

Girth. See Belt Rail.

Girth Tie Rod. A Belt Rail Tie Rod.

Gland. A stuffing box, as of a piston rod, valve rod, etc.

Glass Water Gage. A gage consisting essentially of a vertical glass tube connected at the top and bottom with a boiler so as to indicate the height of water therein.

Glideover Seat. Fig. 1685. See Walkover Seat.

Globe (of Pintsch Gas Lamp). Figs. 2128, etc.; 2386, etc. A globe of hemispherical form, admitting air only from the top. It is almost a universal type of car lamp globe in Europe.

A glass bowl.

Globe Holder. A device for holding a globe on a lamp. Usually it consists of a metal ring at the base of the globe, on which the latter rests, and to which it is fastened with springs, screws, or by the pressure of the globe chimney on top, when the latter is adjustable.

Glue Size. One pound of glue in a gallon of water. Double size has about twice this quantity of glue. Patent size is a kind of gelatine.

Gondola Car. Figs. 42-59, 314-334. A car with sides and ends, but without a top covering, for the transportation of freight in bulk. Gondola cars are sometimes distinguished as high side, low side, drop bottom and hopper bottom. The floor or bottom is level. See also Car, Hopper Bottom Gondola Car and Drop Bottom Car.

Governor (Air Brake). See Air Compressor Governor.

Grab Handle. Figs. 601, 616, 621, 622. A Grab Iron.

Grab Iron. 32, Figs. 287, 288; 23, Fig. 291; 9 and 10, Fig. 364. Also termed hand holds and grab handles. They are attached to freight cars for the use of trainmen in boarding the cars, and are often more definitely specified as roof, side or end grab irons. They are attached to the ends of passenger equipment cars, both for the use of trainmen and for passengers while boarding a train. See Safety Appliances. Similar parts on passenger cars are called Hand Rails.

Graduated Spring. A form of compound spring in which only a certain number of the individual spirals come into action with a light load, and the others only under a heavy load. Another method of accomplishing the same end, graduating the resistance of the spring to the load placed upon it, is the use of the keg-shaped or spool-shaped spring. Under a load the part of larger diameter closes first and that of smaller diameter is much stiffer. Graduated springs have been constructed by combining rubber and spiral springs, but they are now out of use. Graduated springs have been superseded by single and double nest coil springs of equal length, and few, if any, are being applied.

Graduating Nut (Triple Valve). 20, Fig. 1360.

Graduating Sleeve (Triple Valve). 21, Fig. 1360. See Graduating Spring.

Graduating Spring (Triple Valve). 22, Fig. 1360. A spiral spring which acts against a collar on the graduating stem to restrain the triple valve piston from moving beyond service position when a gradual brake pipe reduction is made, but which is compressed by the piston when a sudden brake pipe reduction is made.

Graduating Valve (Triple Valve). 7, Fig. 1360. A device attached to the piston stem by a pin and whose movements are controlled by the piston. Its office is to open and close the service port in the slide valve, feeding air from the auxiliary reservoir to the brake cylinder when a service application of the brakes is made.

(Car Heating.) Figs. 2181, etc. Used for regulating the steam supply.

Graduating Valve Spring (Triple Valve). 35, Fig. 1360.

Grain Door. Fig. 836. A close fitting movable door on the inside of a box car by which the lower part of the door opening is closed when the car is loaded with grain, to prevent the latter from leaking out. Such doors are usually made so that they can be thrown over on one side of the doorway or be suspended from the roof, and thus be out of the way when they are not used. Very few cars, however, are fitted with such doors, and ordinarily a temporary arrangement is used which is nailed in place. On the Frisco a burlap covering is used to insure the grain from leaking out at the joints.

Grain Door Rod. An iron rod attached to the door posts on the inside of a box car, to which a grain door is fastened or hinged. The door and rod are generally arranged so that the former can be moved to one side and out of the way when the car is not loaded with grain.

Grain Shoe. 24, Figs. 287, 288. A strip of wood or other material used to prevent leakage of grain from freight cars.

Grated Door. A door consisting of a wooden frame with iron or wooden bars, used on cars for carrying fruit, live stock, etc.

Grating. 16, Figs. 351, 352. A perforated or slatted covering for an opening. On the floor of refrigerator cars, to raise lading above the floor and prevent its coming in contact with water, etc.

Gravel Car. A car for carrying gravel; usually either a dump car or a flat car, the latter most used. See Ballast Car, Contractor's Car.

Gravity Relief Trap (Steam Coupler). Fig. 2158. An auxiliary trap, automatic in its action, which is closed by the escape of steam and held closed by the steam pressure. When the pressure is removed the weight of the valve stem tips the valve and allows the escape of the water of condensation. The pressure under which it closes is dependent on the weight of the valve stem.

Gravity Side Bearing. A side bearing which is returned to its normal position by gravity.

Grease Box. A Journal Box.

Grille (Interior Decoration). Fig. 2034. Fret work for decoration. Used in the place of panels, over doorways an' in bulkheads and sometimes employed as brackets.

Grommet. Fig. 1709. The separate parts of any metallic eyelet are known as grommets. The two grommets, when compressed together (with a setting die), form the eyelet.

Ground Glass. Glass the surface of which has been roughened by mechanical or chemical process so as to break up the light passing through it and destroy its transparency. Several processes exist; by the wheel, sand blast, rotating with pebbles, or by fluoric acid.

Group Spring. A spiral car spring formed of a number

of separate springs, single or nested united by a common pair of spring plates.

Guard. See DUST GUARD, etc.

(For Lanterns.) The exterior wire cover surrounding the globe and protecting it from accident.

Guard Lining Strips. Horizontal bars or strips placed in a car to keep freight from a door, ice box, ventilator, etc.

Guard Posts (Fruit Car). A row of posts standing inside of the ventilators and serving as a fender for the load packed within so as to prevent obstruction to the ventilators.

Guard-Rail and Frog Wing Gage (M. C. B. Standard). The guard-rail and frog wing gage was adopted as standard in 1894, to define the dimensions of track to which M. C. B. standard wheel and flange gages have been made to conform. Modified 1907. Modified 1909.

Gudgeon. The bearing portion of a shaft, particularly an upright wooden shaft. The crosshead or wrist pin of a steam engine is sometimes called a gudgeon pin.

Guide. See DEAD LEVER GUIDE, etc.

Guide Bar. See BOLSTER GUIDE BAR or COLUMN.

Guide Casting. A strip or plate of metal screwed to the wall or arm rest of a seat for the striker arms to rub against to save the wood. Also called FRICTION PLATE.

Guide Rail. A door track.

Gurring Piece (Snow Plow). Probably from gurr, a fort, hence a piece built out to protect or fortify a structure. In a snow plow, timbers bolted to the posts to build out and give shape to the sides.

Gusset Plate. 30, Fig. 291; 38 and 40, Fig. 404; Fig. 480. A flat plate used to fasten two parts of a metal underframe together by riveting through each member and the plate, or to stiffen a joint between two pieces which are fastened together by angle plates, in which case the gusset plate is riveted to the flanges of the adjoining pieces.

Guy. A rope used as a stay.

Guy Rings (of a Derrick or Crane). Rings attached to the head block at the top of the mast to which guy ropes may be attached.

H

Hair Felt (Refrigerator Car Insulation). A heavy nonconductor of heat made of hair, placed between the inner and outer linings to prevent absorption of heat.

Half Elliptic Spring. See ELLIPTIC SPRING.

Hammer (Pile Driver). The heavy weight by which piles are driven. It falls between the leaders and is provided with a hammer eye or clevis, to which the shears of the hoisting rope or hammer rope are attached Also called a TUP.

Hammock (Sleeping Car Berth). 5, Figs. 1600, 1601. A light hammock of twine hung lengthwise across a sleeping car berth to hold day wearing apparel.

Hand Brake. 44 and 51, Figs. 287, 288; Figs. 1514-1550. The name applied to the brake apparatus with which all cars are equipped, which permits of the brakes being applied by hand. When cars are being switched in yards they are frequently in motion when no locomotive is coupled to them and a hand brake is necessary so that the trainmen may control them. See BRAKE SHAFT, BRAKE CHAIN, etc., and SAFETY APPLIANCES.

Hand Brake Chain. Fig. 477. One of the hand brake connections. See BRAKE CHAIN, BRAKE SHAFT CHAIN.

Hand Brake Chain Carrier. A guide for the hand brake chain, riveted to the underframe.

Hand Brake Connections. Fig. 477. The rods and chains connecting the hand brake shaft with the brake levers.

Hand Brake Guide. Fig. 480. See BRAKE ROD GUIDE.

Hand Brake Pawl. Fig. 494. See BRAKE PAWL.

Hand Brake Rod Guide. Fig. 489. See LOWER BRAKE SHAFT BEARING.

Hand Brake Shaft. 45, Figs. 287, 288. See BRAKE SHAFT.

Hand Brake Wheel. 44, Figs. 287, 288; 15, Fig. 291; 8, Fig. 364; Fig. 481. A wheel attached to the upper end of the brake shaft, by which the latter is turned to apply the brakes by hand.

Hand Car. Figs. 2747, etc. A small and light car arranged with cranks or levers and gearing so that it can be propelled by hand by persons riding on the car. They are commonly used by section or track repair gangs.

Hand Car Truss Rod. A transverse or longitudinal rod by which the floor frame of a hand car is trussed.

Hand Hold. 32, Figs. 287, 288. (Interstate Commerce Commission and M. C. B. Standard). See SAFETY APPLIANCES, also GRAB IRON.

Hand Rail. Fig. 611. A bar or rail to be grasped with the hand as a help in boarding and alighting from cars, and also to prevent trainmen from being thrown from cars, due to their motion or sudden shocks.

Hand Rail Post (Tank Car). A support for the HAND RAIL.

Handle Latch Spring (Motorman's Air Brake Valve). A spring carrying a latch or dog to hold the handle in any desired position.

Hanger. "That by which a thing is suspended."—Webster.

"A means for supporting shafting of machinery."—Knight. See BERTH CURTAIN ROD HANGER, BRAKE BEAM ADJUSTING HANGER, etc.

Hanger Link. A SWING HANGER.

Hanging Boards or Meat Timbers (Refrigerator Car). Transverse bars, resting usually on bogus plates, to which the load of meat is suspended from hooks.

Hard Hair. A quality of curled hair which is very stiff or rigid.

Hash Browner. Fig. 1720. For use on dining and buffet cars.

Hasp. A bar which fits over a staple and is fastened thereon by passing the shackle of a padlock through the staple, or by a pin. The other end of the hasp is attached by a pin or another staple to the door. See DOOR HASP.

Hat Hook. Figs. 2026, etc. A metal hook on which to hang hats.

Hat Rack. A basket rack.

Hatch. 8, Figs. 351, 352. The opening and also its cover, through which ice is placed in refrigerator cars.

Head Block (Of a Derrick or Crane). The casting carried at the top of the mast to which the boom rods, tension rods, guy rings, etc., are attached. It usually revolves upon a head block pin. See also TANK HEAD BLOCK.

Head Board. 4, Figs. 1600, 1601. A light partition which separates one berth in a sleeping car from that next to it. It is stowed away by day in the pocket between the upper berth, when closed up, and the roof.

It is secured in place at the back and front by head board bolts entering at the back into a bushing, fixed to the stop of the stationary seat back; and along the upper inside edge by a head board coupling, entering into a head board coupling keeper. The head board bolt for the front corner of the head board is of peculiar construction, designed to avoid all interruption of a flush surface by day, while still giving a secure attachment.

Head Board Bolt. Fig. 1602 See HEAD BOARD.

Head Board Bolt Bushing. Fig. 1602. See HEAD BOARD.

Head Board Coupling. A metal hasp and keeper by which a head board is fastened to the side of the car.

Head Board Fastener. Fig. 1605.

Head Board Plates. Fig. 1606. Reinforcing plates for a wooden head board.

Head Board Pocket. A pocket formed at the bottom of the head board by pulling out the head rest of a sleeping car seat. It is used for holding wearing apparel while the lower berth is in use.

Head End System. A system of electrically lighting a complete railway train from a single generating plant, located either on the locomotive, tender or on one of the cars of the train. Head end generators may be steam or axle-driven. If located on the locomotive, they are driven by steam. If located on the tender or on one of the cars, they may be axle-driven or steam-driven. The head end generator is connected to the train line system of the train by a suitable set of connections, and current is supplied to each car through the taps to the train lines. In this system it is not essential to equip each car with a storage battery, although it is generally advisable, for when so equipped the train can be broken up and separated into its units without destroying the continuity of the light on any car. See ELECTRIC LIGHTING.

Head Lining. 20, Figs. 1600, 1601. A lining with which the ceilings of passenger cars are covered.

Head Lining Nail. A nail with a large button-shaped head especially made for fastening head linings to the ceilings of wooden passenger cars.

Head Rest. The padded upper part of a seat back, against which the passenger's head rests. Also called Head Roll.

Head Roll (of a Seat). See HEAD REST.

Headlight (Motor Cars). Fig. 2710.

Headstock (British). American equivalent, end sill.

Heat Guard. A sheet metal covering for the woodwork of a passenger car, to protect it from the heat of a stove.

Heater. See HEATING APPARATUS. Any apparatus for warming a car, room, or building by convection; that is, by conveying hot water, steam, or warmed air into or through the apartments. The term generally refers to any arrangements for warming apartments other than stoves, which heat by direct radiation. See CAR HEATER.

Heaters of various types are often applied to refrigerator cars during cold weather, when it is desired to transport perishable products. See HEATER CAR.

(For Lamps or Lanterns.) A metallic attachment passing around and above the flame or otherwise immediately adjacent to it, by which heat is conveyed to the oil in the reservoir below, to prevent freezing, or, in some cases to assist combustion by heating or volatilizing the oil.

Heater Box. Fig. 898. A box applied to refrigerator cars and containing the burners for heating during cold weather while transporting perishable products.

Heater Car. Figs. 111, 113, 883-912. A car, equipped with heating apparatus, for carrying fruits, vegetables, and other perishable products during cold weather. Refrigerator cars are frequently converted to heater cars by adding heating apparatus.

Heater Car Details. Figs. 883, etc.

Heater Coil. A GENERATOR COIL.

Heater Pipe Casing. A wooden or iron shelf over a heater pipe in a passenger car to prevent the feet of passengers from coming in contact with the hot pipes. The casing also forms a foot rest.

Heater Room. A small closet, cased with sheet metal interior heat guards, to contain the heater and prevent all direct radiation.

Heater Switch. See ELECTRIC HEATER.

Heating Apparatus (Passenger Train Cars). See Figs. 2153, etc. See DIRECT STEAM HEATING SYSTEM; DRUM SYSTEM OF CAR HEATING; PRESSURE AND VAPOR HEATING SYSTEM; HOT WATER CIRCULATION HEATING SYSTEM.

Helical Spring. A spring made of bar steel bent in the form of a helix. A coil or spiral spring.

High Back Seat. A class of seats with extra high back and frequently a head roll or head rest. See SEAT.

High Side Gondola Car. A gondola car with extra high sides and ends, for carrying coal or minerals.

High Speed Brake. Figs. 1352, 1355, 1369, etc. The principles involved in the high speed brake were demonstrated by a series of experiments known as the Westinghouse-Galton tests. These showed that a greater pressure not only could be safely applied to the wheels by the brake shoes at high speeds, but also that such considerably greater brake shoe pressure must be applied to the wheels at high speeds in order to then resist the motion of the train as effectively as it is resisted with a more moderate brake shoe pressure at low speeds. This was accomplished by the use of a higher brake pipe air pressure with the standard quick action apparatus, with only the addition of a high speed reducing valve attached directly to the brake cylinders. The purpose of this device was to limit the brake cylinder pressure obtainable during a service application of the brakes to what was considered safe and necessary, but when an emergency application of the brakes was made, to permit the brake cylinder pressure to rise to a considerably higher value than the maximum permitted in a service application, and then to cause a gradual reduction of brake cylinder pressure so as to proportion, as far as possible, the blow-down of brake cylinder pressure to the reduction in speed as the stopping point is approached.

High Speed Foundation Brake Gear. See FOUNDATION BRAKE GEAR (M. C. B. Recommended Practice).

High Window. A term sometimes applied to the small windows, located high in the side of a car, commonly used in saloons and dining car kitchens.

Hinge. Figs. 882, 2011-2025. A hook or joint on which a door, gate, etc., turns. It is provided with a tube-like knuckle through which the HINGE PIN passes. See DROP DOOR HINGE, SOFA HINGE, etc.

The common door hinge is usually a butt or butt hinge, the varieties of which are the acorn butt, a large ornamental hinge, the Blake butt and the hopper

butt, so called from its pointed form. The parliament hinge is a sort of T-shaped butt hinge to afford more room for screws. It is little used except for ornamental purposes. The strap hinge is a common form of rough hinge for heavy doors, but it is sometimes made very elaborate and ornamental. A T-hinge is a combination of the butt and strap hinge, one-half being of each form. Butt hinges are either fast joint, loose joint or loose pin. A double acting hinge is one which permits the door to swing either way.

Hinge Pin. The pin passing through the knuckle of a hinge and holding the two parts together.

Hog Chain (Shipbuilding). A chain in the nature of a tension rod passing from the stern of a vessel, and over posts nearer amidships; designed to prevent the vessel from dropping at the ends."—Knight.

Hence applied to a certain form of trusses in car construction. A hog chain is an inverted truss rod, and usually so called when applied in connection with and in similar form to a body truss rod, the object of a truss rod being to prevent a beam from sinking in the middle, and of a hog chain to prevent sinking at the ends when supported at the middle. Also called an overhang truss rod.

Hog Chain Queen Post. A strut over which a hog chain passes.

Hog Chain Rod (of a Passenger Equipment Car). More properly a continuous counterbrace rod or an overhang truss rod.

Hoisting Block (of a Derrick or Crane). The main block at the lower end of the hoisting chains carrying the sheave hook, or hoisting hook, to which the load is attached.

Hoisting Block Clevis. A clevis carried at the top of a hoisting block to which the fixed end of the hoisting chain is attached. In some cases it is attached to a clevis at the upper end of the boom. See CLEVIS.

Hoisting Chain (of a Derrick, Steam Shovel or Crane). The chain attached to the hoisting drum at one end and to the hoisting block or boom clevis at the other, by which the loads are raised.

Hoisting Chain Sheave. A pulley placed in some wrecking cars at the foot of the mast, when the hoisting gear is at some distance from it. The term is equally applicable to the mast sheave and boom sheave at the top of those parts of a derrick, but the latter are generally otherwise distinguished.

Hoisting Drum (Steam Shovel). The barrel about which is wound the chain cable attached to the dipper block.

Hoisting Engine (Steam Shovel.) The engine geared to the hoisting drum.

Hoisting Gear (Steam Shovel). The gear wheel on the hoisting drum.

Hoisting Hook. See HOISTING BLOCK.

Holder (Pintsch Gas). Fig. 2300. A tank, hung below a passenger equipment car, to hold a supply of gas for lighting.

Holder Valve (Pintsch System). Fig. 2300. A valve which controls the supply of gas from the holders to the pipes.

Hollow Piston Rod (Freight Brakes). A brake cylinder piston rod which is hollow to receive the PUSH ROD.

Hood. See PLATFORM HOOD, VENTILATOR HOOD.

(Heater.) More properly a ventilator or wind scoop. A horizontal tube or covering on the outside of a car, and on top of the cold air pipe, so as to give the latter a T-shape. The air is admitted to the pipe through the ends of the hood, which are covered with wire netting to exclude cinders. It has a valve which is moved by the current of air so as to admit it whichever way the car runs.

Hook Bolt. A bolt having a hook at one end.

Hoop (for Oil Lamps). A ferrule with an interior thread into which the burner screws.

Hopper. (Passenger Cars). Fig. 1789, etc. A closet hopper, water, or soil hopper.

(Freight Cars.) See HOPPER BOTTOM CAR.

Hopper Bottom Box Car. Figs. 783-785.

Hopper Bottom Gondola Car. Figs. 42-44, 50, 326, 327, 333, 334. A gondola car having a level floor or bottom and one or more hoppers equipped with drop doors for discharging the load. See also DROP BOTTOM CAR.

Hopper Car. Figs. 22-41, 291-313. A car with the floor sloping from the ends and sides to one or more hoppers, which will discharge its entire load by gravity through the hopper doors. See CAR.

Hopper Carry Iron. A HOPPER SUPPORTING STRAP.

Hopper Chain. See DROP CHAIN.

Hopper Deflector. See HOPPER VENTILATOR.

Hopper Door. 16, Fig. 291. A door at the bottom of the slope or hopper of a hopper car which when opened permits the load to discharge. See also DROP DOOR.

Hopper Door Locking Pawl. In a hopper door gear, the catch which when thrown into engagement with the toggle arms, prevents the arms from moving from the closed position and opening the hopper doors.

Hopper Door Operating Shaft, End for. (M. C. B. Standard). Fig. 2905. In 1913 a 2-inch square end for hopper door operating shaft was adopted as Recommended Practice. In 1914 advanced to Standard.

Hopper Door Toggle Arm (Hopper Cars). A link in drop door mechanism which is fastened to the door and forces it shut when the toggle link is forced down.

Hopper Door Toggle Link (Hopper Cars). The arm in drop door mechanism which forces down the toggle arms when the winding shaft is revolved and closes the doors.

Hopper Ore Car. See ORE CAR.

Hopper Plates. The metal sheets constituting the bottom of a hopper bottom car. Also termed inclined floor or hopper slope. The term hopper plate is generally confined to the metal lining plate used in wooden hopper cars. See HOPPER SLOPE SHEET.

Hopper Siding. The planking that forms the side of a box hopper.

Hopper Slope Sheet. 18, Fig. 291. A metal sheet used in the sloped floor of a hopper car.

Hopper Stayrods. Inclined rods passing through the center sill of a wooden car and to the hopper supporting strap at the hinged end of the doors to prevent the hopper from sagging in the middle.

Hopper Support (Hopper Cars). An angle riveted to the ridge of the hopper at the center and the top of the side sheet, forming a support for the hopper. It serves the same purpose as the HOPPER SUPPORTING STRAP in a wooden car.

Hopper Supporting Strap. A heavy U-shaped iron strap bent to the shape of the hopper of a wooden gondola car, and with the ends bolted to the side sills. Its office is to support the hopper, and it is usually applied at the end of the inclined floor, and in the middle of the hopper at which point the doors are hinged.

Hopper Tube. The tube or chute leading from the hopper of a closet.

Hopper Ventilator or **Hopper Deflector.** A device for exhausting air from the closet hopper to the outside of the car.

Horizontal Brake Shaft. See BRAKE SHAFT.

Horse Car. Figs. 101-107. A car, usually of the passenger equipment type, fitted with stalls, and water and feed facilities, for carrying horses. See CAR.

Horse Car Door. Specially designed to suit the conditions, and larger than standard side doors.

Hose. Flexible tubing for conveying water, air, or other fluids. For metal hose see Figs. 1925, 1927. See also AIR BRAKE and METAL HOSE.

Hose Bracket. See BRAKE HOSE BRACKET.

Hose Chain. A light chain to hold up the steam hose when uncoupled and prevent its dropping to the track.

Hose Clamp. Fig. 2077. A clamp to bind the hose to the hose nipple and coupling. Sometimes called a hose band.

Hose Couplings. See AIR BRAKE HOSE COUPLINGS.

Hose Nipple. Fig. 2077. See BRAKE HOSE NIPPLE.

Hose Protector. A device to protect the air brake, signal or steam heat hose from injury. See also ARMORED BRAKE HOSE.

Hospital Car. Fig. 237. A car fitted with hospital appliances for use in treating injuries caused by railroad accidents. Such cars are usually run to the scene of accidents with the wreck train.

Hot Water Circulation Heating System. Figs. 2156, etc. A system by which the car is heated by the circulation of hot water, the water being heated either by fire in a heater, or by steam from the locomotive, or by a combination of both.

Hot Water Heater. See BAKER HEATER.

Hot Water Pipes. Pipes running alongside of a car under the seats, which contain hot water, and by which the car is heated. Between the seats the pipes on the side of the car have a hot water pipe guard rail running over and above them.

House Car. An enclosed freight car.

House Cars, Placard Boards For. (M. C. B. Recommended Practice). See PLACARD BOARDS FOR HOUSE CARS.

Housing. A term frequently applied to any part of a device which encases some or all of the working parts.

Housing Box. A JOURNAL BOX.

Hub (of a Car Wheel). The central portion into which the axle is fitted.

Hub Bolts (Steel-Tired Wheels). Bolts fastening the face plates to the hub.

Hydraulic Jack. Figs. 2763, etc. A machine in which the power is exerted by means of the pressure of some liquid acting against a piston or plunger, for raising heavy weights, as a car.

I

I-Beam. A rolled steel commercial bar whose cross section has the form of the letter I.

I-Beam Type Bolster. A bolster whose cross section has the shape of the letter I.

I-Section Bolster. See I-BEAM TYPE BOLSTER.

Ice Bunker (Refrigerator Car). 9, Figs. 351, 352; Fig. 891, etc. The receptacle in which the ice is placed in a refrigerator car.

Ice Car. A car for transporting ice, usually constructed with insulation similar to a refrigerator car, but without ice tanks or ventilators.

Ice Pan (Refrigerator Cars). A receptacle for carrying ice in cars which do not have end ice bunkers.

Ice Tanks, Refrigerator Car. See RRFRIGERATOR CARS, FLOORS AND ICE TANKS.

Icing Door. A door in the roof of a refrigerator car through whose opening ice and salt are placed in the ice tanks.

Imperial Gallon. An Imperial gallon contains 277.274 cubic inches and an Imperial gallon of water weighs 10 lbs.

Inclined Floor Timbers (Hopper Car). The wooden sills to which the sloped floor of a hopper car is nailed.

Indicator (Car Heating). Used in connection with the regulation of the hot water circulation heating system.

Indirect Lighting. Figs. 2588, etc. A system of lighting in which the light is not thrown directly on an object but thrown up and reflected.

Injector (Car Heating). Used in connection with the regulation of the hot water circulation heating system.

Inlet Valve (Steam Heating). The valve controlling the inflow of steam to the heater pipes.

Inside Casing (Baker Heater). Sheet iron or steel plate bent and riveted into the shape of a frustum of a cone, which forms the top of the fire pot.

Inside Ceiling (Refrigerator Car). The inside layer of light boards in the roof of the car. More properly, CEILING.

Inside Corner Brace. 58, Figs. 287, 288. See CORNER BRACE PLATE.

Inside Cornice (Passenger Car Interiors). A molding filling the angle where the roof joins the side of the car.

Inside Cornice Fascia. A projecting board which forms a molding or ornament under the inside cornice.

Inside End Piece (Passenger Truck Frame). The end piece which is nearest to the center of the car. It is usually straight, while the outer one is cut away on top so as to make room for the draft rigging.

Inside Hung Brakes. Figs. 1335, etc. Brake attachments for trucks in which the brake shoes and beams are between the wheels. When attached on the outside they are OUTSIDE HUNG BRAKES.

Inside Lining Stud. A vertical strip or post extending from the side sill to the girth to serve as a nailing strip for the inside lining.

Inside Roof. A light board roof or ceiling under the main roof and separated from it by the purlins.

Inside Window Panel. A panel inside of a passenger car between the windows.

Inside Window Sill. A horizontal piece of wood or metal under the window on the inside.

Inside Window Stop. A wooden or metal strip attached to a window post on the inside of a window blind or an inner sash of a double window. It forms a groove in which the blind or window sash slides. Also called window casing. Sometimes the window molding forms a stop on the inside.

Inspection Car. Figs. 2734, etc. A car used for inspecting track and right-of-way. See HAND CAR, VELOCIPEDE CAR.

Instruction Car. A car used for the instruction of rail-

way employees in matters pertaining to their work. See AIR BRAKE INSTRUCTION CAR.

Insulating Paper (Refrigerator Cars). A heavy paper specially prepared to make it a poor conductor of heat, placed between the linings as part of the insulation of the car.

Insulation Methods and Apparatus for Testing. (M. C. B. Recommended Practice.)

In 1915 the following method of making insulation tests, together with a description of the testing machine, was adopted as Recommended Practice:

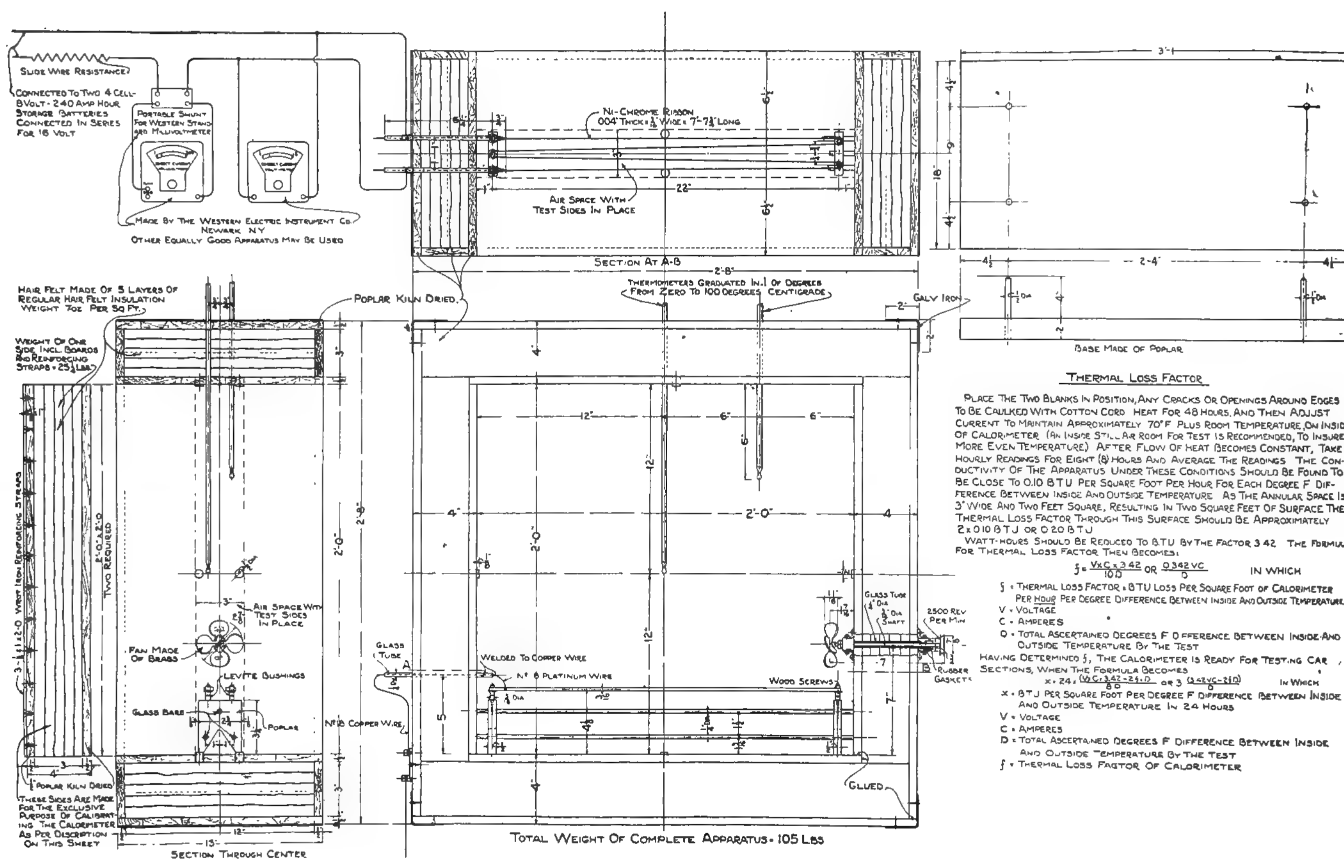
(*a*) The car shall be insulated throughout, including floors, sides, ends and roof (except pier panels), with material of such a nature that it can be securely fastened so as to withstand the vibration incident to railway service. The insulating material must be such that it will not support combustion, will not absorb moisture beyond its weight, and when wet, will not become corrosive.

(*e*) The thermal efficiency of the materials in side and end walls, in roof and in floor, must be such that a test duplicate section through walls, roof or floor (duplicate with the exception of framing members such as posts, braces, carlines or stringers which are to be omitted), will not transmit, when subjected to the test hereinafter described, more than the following amount of heat per square foot of surface in twenty-for 24 hours:

For side walls, end walls and roof..8 b. t. u.
For floor ....7 b. t. u.

The method of testing shall be as follows:

A calorimeter, as illustrated and described in Railway Mail Service drawing, Sheet 18, shall be used in all tests. It shall be carefully constructed and of the materials indicated and before used must be standardized for its thermal loss factor. The sections to



Apparatus for Insulation Tests.

(*b*) Side and end wall and roof insulating material shall be securely fastened. Where the nature of the material permits, it shall be cemented; and also mechanically clipped if necessary for proper support. Floor insulation shall extend the entire distance between side walls either in one full width or in sections fitted between floor supports and be secured in place.

(*c*) The construction of side and end walls and roof of car shall be such as to avoid or reduce to a minimum continuous metal connection from outside to the inside of the car.

(*d*) To insure maximum of insulating and sound-deadening efficiency, the construction at the junction of side and end walls and floor shall be such as to prevent the circulation of air through the side and end walls or through the floor or into the car.

be tested shall truly represent the materials as used and disposed in the car.

The heat must be supplied by direct electric current of constant voltage, measured by standardized instruments. The difference between inside and outside temperatures must be held as nearly 70 degrees Fahrenheit as possible. Readings of temperature and current shall not be recorded until forty-eight hours after heat is turned on and test begins, in order to insure throughout heat saturation of calorimeter and test sections. The duration of actual test shall be eight (8) hours, during which time temperature and electric readings shall be made and recorded each hour or more frequently, if considered necessary. The average of all readings thus recorded shall be taken as the final result.

Insulation (Refrigerator and Heater Cars). 11, Fig. 351, 352; Fig. 885, etc. A system of walls, and dead air-space used in the construction of the sides, ends, roof and floor to make them poor conductors of heat, thus facilitating the keeping of the contents of the car cool or warm, as may be desired.

(Passenger Train Cars.) The proper insulation of all-steel passenger cars is also an important matter. See Figs. 1580, etc.

Interchange of Traffic (M. C. B. Rules for).

The following code of rules governing the condition of, and repairs to, freight cars for the interchange of traffic is the result of the revision made in June, 1915, and takes effect October 1, 1915.

Where numbers are vacant the rules have been dropped from time to time, as the code has been revised.

Preface.—These rules make car owners responsible for, and therefore chargeable with, the repairs to their cars necessitated by ordinary wear and tear in fair service, so that defect cards will not be required for any defects thus arising.

Railroad companies handling cars are responsible for damage done to any car by unfair usage, derailment or accident, and for improper repairs made by them, and they must make proper repairs at their own expense, or issue defect card covering all such damage or improper repairs.

Inspection of freight cars for interchange and method of loading will be in accordance with this Code of Rules, the Specifications for Tank Cars, and the Loading Rules, issued by this Association.

CARE OF FOREIGN FREIGHT CARS.

Rule 1.—Each railway company must give to foreign cars, while on its line, the same care as to inspection, oiling, packing, adjusting brakes and repairs that it gives to its own cars.

INTERCHANGING FREIGHT CARS.

Rule 2.—Cars having defects for which delivering company is responsible must be properly carded when offered in interchange.

Empty cars offered in interchange must be accepted if in safe and serviceable condition, the receiving road to be the judge. Owners must receive their own cars, when offered home for repairs, at any point on their lines, subject to the provisions of these rules.

M. C. B. ASSOCIATION—AUTHORITY FOR TRANSFER OR ADJUSTMENT OF LADING.

(NAME OF ROAD)

Date__________

Lading __________

Transferred or Lading Adjusted. Account of__________

Issued to__________ R. R.__________

Car No.__________ Initial__________

__________ Inspector at__________

NOTE.—To be printed in black on white paper in duplicate form, filled out with ink or black indelible pencil. Original to accompany bill and duplicate retained for record.

Send bill and this check card to

SEE RULE 2.

Loaded cars offered in interchange must be accepted, with the following exceptions:

(*a*) Cars (whether loaded or empty) having defects in violation of the Safety Appliance Acts, must not be offered in interchange.

(*b*) Cars loaded with explosives must be handled in accordance with the regulations of the Interstate Commerce Commission.

Cars containing inflammable liquid which is leaking must be repaired or transferred without any unnecessary movement or at nearest available point.

(*c*) Cars improperly loaded (not complying with the Loading Rules) when transfer or rearrangement of lading is necessary.

(*d*) Lading of open cars when dimensions of lading are in excess of published clearances of roads over which the shipment is destined.

(*e*) When cars can not pass approved third rail clearances of American Railway Association.

(*f*) The following defects must be repaired while car is under load:

1. Defective wheels and axles under all cars.
2. All other truck defects on home cars.

............................**RAILROAD.**

BAD ORDER TRANSFER.

Send to..................R. R. Transfer track and

Send to owner or..........R. R. when empty for repairs

Account of following defects......................

....

Car No................Initial ....

Date................191...

Signed ....

Car Inspector.

3½ by 8 inches.

To be printed in green.

SEE RULE 2.

3. All other truck defects on foreign cars, except metal bolsters, metal truck sides and metal spring planks; also excepting non-M. C. B. standard journal boxes and contained parts in cases where the M. C. B. standard is not a proper substitute.
4. Defective outside wooden end sills on all cars.
5. Defective body center-plate or body center-plate bolts on all cars, except where such center-plate is cast integral with bolster on foreign cars.
6. Renewal of roof boards of outside wooden roofs, and of inside metal roofs, where such renewal does not exceed 25 per cent of the roof boards, and where

.............................**RAILROAD.**

BAD ORDER.

Return when empty to owner or............R. R.

For Repairs....................................

....

Car No..................Initial.................

Date.....................191..

....

Per.........................

DO NOT RELOAD THIS CAR.

To be printed in black.

SEE RULE 2.

purlines, rafters, ridge pole, side and end plates are in good condition, on all cars.

7. Side doors, where lading is properly loaded as required by the Loading Rules, on all cars.
8. Missing or defective side doors where requiring

no protection; end doors, roof doors and hatch covers, on all cars.

A. R. A. Car Service Rule 15 to apply when transfer or rearrangement of lading is necessary.

The car transfer check authorizing transfer or rearrangement of lading to be of the form shown.

When load is transferred by the receiving line, the car, when empty, may be returned to the delivering line, properly side-carded on both sides of car with a bad order transfer, return when empty card, showing the defects for which the car was transferred, in which case it must be accepted.

RETURN CARD.

........................Car No........................
from..Ry.
to..Ry.
for the following defects..............................
....
....
....
....
....

....
....................191..   *Inspector*

3½ by 8 inches.
To be printed in red.)
SEE RULE 2.

When load is not transferred car may be returned, when empty, to the delivering line, properly side-carded on both sides of car with a bad order return when empty card, showing the defects for which the car is returned, in which case it must be accepted.

In rejecting cars account having defects in violation of the Safety Appliance Acts—per Section (*a*)—or on account of being improperly loaded—per Section (*b*) and (*c*)—or on account of being unable to pass approved third rail clearances of the American Railway Association—per Section (*e*)—also in rejecting defective empty foreign cars, all of the defects objected to must be designated with ink or black indelible pencil on return cards of the form shown and placed on both sides of car.

Rule 3.—(*a*) Cars will not be accepted in interchange unless equipped with air brakes having 1¼ in. air brake pipe and angle cocks; also quick action triple valve, pressure retaining valve and an efficient hand brake.

(*b*) Cars will not be accepted in interchange equipped with stem or spindle coupler attachments.

(*c*) Cars built after October 1, 1914, will not be accepted in interchange unless equipped with either the No. 1 or the No. 2 M. C. B. Standard brake beams and so marked plainly on strut by stamping or casting on.

(*d*) Cars built after October 1, 1915, with axles other than M. C. B. Standard, will not be accepted in interchange.

Cars built prior to October 1, 1915, will not be accepted in interchange after October 1, 1917, unless equipped with M. C. B. Standard axles.

After October 1, 1916, M. C. B. Standard axles must be used in repairing foreign cars.

Cars built after October 1, 1916, with journal bearings other than M. C. B. Standard, will not be accepted in interchange.

(*e*) After January 1, 1916, tank cars (empty or loaded) will not be accepted in interchange unless the safety valves are stenciled to show adjusted, etc., within the time limit required by paragraphs 6 and 7 of the M. C. B. Specifications for Tank Cars.

(*f*) After October 1, 1916, no car carrying products which require for their refrigeration the use of salt with ice and which are equipped with brine tanks will be accepted in interchange unless provided with suitable device for retaining the brine between icing stations.

(*g*) After July 1, 1916, cars will not be accepted in interchange unless stenciled showing month and year originally built. Cars built prior to 1895 may be stenciled "Built prior to 1895."

(*h*) After October 1, 1916, cars will not be accepted in interchange unless equipped with all-metal brake beams.

(*i*) After October 1, 1916, cars will not be accepted in interchange equipped with continuous draft rods.

(*j*) After October 1, 1917, no car will be accepted in interchange unless the body is stenciled light weight and capacity in pounds as provided for in Rule 86.

(*k*) After October 1, 1916, all cars of less than 60,000 lb. capacity, having wooden or metal draft arms which do not extend beyond the body bolster, will not be accepted in interchange.

(*l*) If the car has air-signal or train-line steam pipes, the hose, pipes and couplings are at owner's risk, unless the car is stenciled that it is so equipped.

(*m*) When two or more cars chained together are delivered at an interchange point, the receiving road shall deliver to the delivering road at the time an equivalent number of switch chains of the same size as the chains so used on the cars delivered, or, in lieu thereof, furnish a defect card for such chains.

(*n*) After October 1, 1916, refrigerator cars not equipped with door hooks and fasteners to secure the doors in an open position will not be accepted in interchange.

USE OF DEFECT, BILLING REPAIR AND JOINT EVIDENCE CARDS.
USE OF DEFECT CARD, RULES 4-6

Rule 4.—If a car has defects for which the owners are not responsible, the receiving line shall require that a defect card be securely attached to the car, as per Rule 14.

NOTE—Fill in defects on both sides with ink or black indelible pencil. Attach this card to car as per Rule 14.

M. C. B. DEFECT CARD.
(*Name of Road.*)

Date................
Car specified below will be received at any point on this company's line with the following defects:
....
....
....

Car No..........Initials............
Inspector at..............

Send bill on this card to..........

3½ by 8 inches.
SEE RULE 5.

Defect cards shall not be required for any damage that is so slight that no repairs are necessary.

At outlying points where joint inspection is not in effect, the matter will be left to the judgment of the receiving line. At the larger points where chief in-

interchange inspectors are employed, the decision will be made by the chief interchange inspector as a representative of the car owner and the receiving line.

Defect cards shall not be required for missing material in fair usage from cars offered in interchange. Neither shall they be required of the delivering company for improper repairs that were not made by it, with the exception of the cases provided for in Rules 56, 57 and 70.

Rule 5.—Defect cards must be of the form shown on page 222. They must be of cardboard, printed in red ink on both sides, and must be filled in on both sides with ink or black indelible pencil. The cards must plainly specify in full each item for which charges are authorized, indicating the location of defects, as provided for in Rule 14.

Rule 6.—Any road making partial repairs of defects on a car which are covered by defect card will have the defects repaired crossed off the original card with

M. C. B. ASSOCIATION—BILLING REPAIR CARD
(NAME OF RAILROAD)

End	Repairs Made		Iron Cast	Iron Wrot.	Iron Mall.	Chain	Lumber	Springs	Cast Steel	Why Made

Date________19__Repaired at________Inspector________Labor Hours______
Car No.________Initial or Name________Kind______

TO BE ATTACHED TO BILL.

Billing repair card must not have carbonized back.
3½ by 8 inches.

SEE RULE 8.

ink or indelible pencil and card replaced on car. A copy of the card accompanying the bill with the defects which were not repaired crossed off will be sufficient authority to bill.

USE OF BILLING REPAIR CARD, RULES 7-11.

Rule 7.—When repairs of any kind are made to foreign cars a billing repair card must be made out. This card must specify fully the repairs made, the reason for same, the date and place where made and name of road making repairs; also show location of parts repaired or renewed, as per Rule 14.

If no bill is to be rendered, the billing repair card must be attached to the monthly bill, with the words

M. C. B. ASSOCIATION—RECORD REPAIR CARD
(NAME OF RAILROAD)

End	Repairs Made		Iron Cast	Iron Wrot.	Iron Mall.	Chain	Lumber	Springs	Cast Steel	Why Made

Date________19__Repaired at________Inspector________Labor Hours______
Car No.________Initial or Name________Kind______

TO BE RETAINED BY PARTY MAKING REPAIRS

Record repair card may have carbonized back.
3½ by 8 inches.

SEE RULE 8.

"no bill" written across the face of the card, in which case the cards must be entered in the billing statement in the first four columns, with the notation "no bill" in the fifth column for reference.

Rule 8.—The billing repair card shall be made in duplicate, the original to be known as the billing repair card and the duplicate to be known as the record repair card, and to be of the forms shown, all items of repairs to be in handwriting.

M. C. B. ASSOCIATION—BILLING REPAIR CARD—(Wheels and Axles)
(NAME OF RAILROAD)

Wheels and Axle Removed: Maker	Ry Co.'s Initials on Wheel	Wheel No. Date Cast	Service Metal Before Turning	Service Metal After Turning	Cause of Removal	Wheels and Axle Applied: Maker	Ry.-Co's Initials on Wheel	Wheel No. Date Cast	Service Metal	New or Sec Hand	Net Charge
Axle						Axle					
Location	Size and Kind of Wheels Removed and Applied				Size of Journals Removed and Applied				Labor		
									Total		

Date . . . . . . 191 . . . Repaired at . . . . . . Inspector . . . . . .
Car No . . . . . . Initial or Name . . . . . . Kind . . . . . .

To Be Attached To Bill

SEE RULE 8.

Note.—Use of present forms, if not conforming to recommended forms shown, may be continued until stock is exhausted.

Rule 9.—The following information must be specified on billing repair cards:

M. C. B. couplers, or parts thereof, R. and R.	New or secondhand. Size of shank. (Where 12¼-in. head coupler is applied or removed it must be so stated.) Yoke or key attachment.
Wheels and axles, R. and R.	Cast-iron, cast-steel, wrought-steel or steel-tired wheels. New or secondhand. Cause of removal (see Rule 10).
Journal bearings.	Solid, filled or other kind, R. and R. Length of journal. Box number (see Rule 14).
Metal brake beams, or parts thereof, R. and R.	Make or name of beam. If M. C. B. Standard brake beam is applied, state whether No. 1 or No. 2 in addition to name of beam. New or secondhand. Complete, or part or parts. Cause of removal. Part or parts scrapped.
Brake shoes, applied.	Cast or reinforced back.
Triple valve, R. and R.	Make and type. (Need not be shown when cleaned only.)

When triple valve, cylinder or centrifugal dirt collector is cleaned, the initial of road and date of last previous cleaning must be shown.

M. C. B. ASSOCIATION—RECORD REPAIR CARD—(Wheels and Axles)
(NAME OF RAILROAD)

Wheels and Axle Removed: Maker	Ry Co.'s Initials on Wheel	Wheel No. Date Cast	Service Metal Before Turning	Service Metal After Turning	Cause of Removal	Wheels and Axle Applied: Maker	Ry Co.'s Initials on Wheel	Wheel No. Date Cast	Service Metal	New or Sec Hand	Net Charge
Axle						Axle					
Location	Size and Kind of Wheels Removed and Applied				Size of Journals Removed and Applied				Labor		
									Total		

Date . . . . . . 191 Repaired at . . . . . . Inspector . . . . . .
Car No . . . . . . Initial or Name . . . . . . Kind . . . . . .

To be retained by parties making repairs

SEE RULE 8.

If necessary to remove load to make repairs, as specified in Rule 107, it must be plainly stated.

Rule 10.—In noting the cause of removal of wheels and axles, the terms used in Rules 68 to 86, inclusive, shall be used.

In all cases of wrought-steel wheels, the actual thickness of tread must be shown before and after turning off, measured from base line of tread to the condemning limit of tread, which is ¼ in. above the witness groove; also show actual thickness of tread on other wheels applied. This information must be reported to car owners regardless of whether or not repairs are chargeable to owners.

Rule 11.—Journal bearings having a babbitt lining ⅜ in. thick or thicker, shall be charged as filled journal bearings, and not as solid journal bearings.

USE OF JOINT EVIDENCE CARD, RULES 12-13.

Rule 12.—The evidence of a joint inspector, or the joint evidence of two inspectors, one representing the owner of the car and the other representing a railroad company, that the repairs are not proper, shall be final; the evidence to be signed only after an actual inspection has been made.

THE .... RAILWAY CO.

REPORT OF IMPROPER REPAIRS TO.............CARS.

Station.................................191..

Car No .... *Initial*.... *Received from* .... *Ry.* *At*.............*Date*........ 191 .

Description of wrong Repairs	*How Repairs should be made* ....
....	....
....	....
....	....
....	....
....	....
....	....
....	....

Show how Carded on other Side
We Certify Above to be Correct. { .... *Inspector for* .... *Ry.*
.... *Inspector for* .... *Ry.*

SEE RULE 12
Size, 3½ by 8 inches.

FORM OF JOINT EVIDENCE CARD.

SEE BELOW FOR OTHER SIDE.

A joint evidence card shall be used for this purpose, which shall describe and show location of parts repaired or renewed, as per Rule 14. This card shall be of the form shown.

If repairs are not corrected at time of the inspection, the joint evidence card shall be attached to the car, as per Rule 14.

THE......................................RAILWAY CO.

COPY OF M. C. B. DEFECT CARD. *Issued by*.................. *Ry.* *At*..............*Date*.........191..

Inspector...................... *Reading as follows* ....

....

....

....

....

COPY OF M. C. B. BILLING REPAIR CARD. *Issued* ....*Ry.* *At*.........*Date*...........191..

Inspector......................*Reading as follows* ....

....

....

....

....

DISPOSITION OF CAR *Carded to*............ ....*Shop*; *Repaired,* *forward without repairs*

REVERSE SIDE OF JOINT EVIDENCE CARD—SEE RULE 12.

The joint evidence may be obtained at any point on the home line at which the improper repairs are found, but preferably at the point where the car is received, and only after an actual inspection is made.

Rule 13.—The joint evidence card showing copy of billing repair card, covering wrong repairs, when wrong repairs have been corrected, shall be sent to the company issuing such billing repair card, and it shall issue M. C. B. defect card.

Rule 14.—The end of car toward which the cylinder push rod travels shall be known as B end and the opposite end shall be known as A end.

Facing the B end of car, in their order on the right side of car, the journal boxes and contained parts shall be known as R1, R2, R3 and R4, and similarly those on the left side of car shall be known as L1, L2, L3 and L4.

Defect cards and joint evidence cards must be securely attached to the car with at least four tacks, preferably on the outside face of intermediate sill between cross tie chambers on wooden cars, and on steel cars to cardboard located either on cross tie under car or on inside of side sill at the end of car.

Rule 15.—Duplicate defect, billing repair of joint evidence cards must be furnished promptly, on request, for lost or illegible cards.

GENERAL INSTRUCTIONS.

Rule 16.—Any car having defects which render it unsafe to run, unsafe to trainmen, or to any lading suitable to the car, may be repaired.

Repairs to foreign cars shall be promptly made, and the work shall conform in detail to the original construction, and with the quality of material originally used, except as provided for in Rules 17 and 18.

Rule 17.—In repairing foreign cars: (*a*) Defective non-M. C. B. Standards may be replaced with M. C. B. Standards (which must comply with M. C. B. specifications), provided such substitution does not impair the strength of car. Any increased cost resulting from and any expense of alteration necessary for the application of such M. C. B. Standards shall be charged to the party responsible for the repairs. Scrap credits are to be allowed for undamaged parts thus removed.

(*b*) Malleable iron, wrought iron or steel M. C. B. Standards may be substituted for each other or for gray iron M. C. B. Standards. Gray iron M. C. B. Standards applied in lieu of malleable iron, wrought iron or steel M. C. B. Standards shall be considered as wrong repairs.

(*c*) In replacing M. C. B. Standard couplers or M. C. B. Temporary Standard couplers, the dimensions of shank and butt of M. C. B. couplers standard to the car must be maintained.

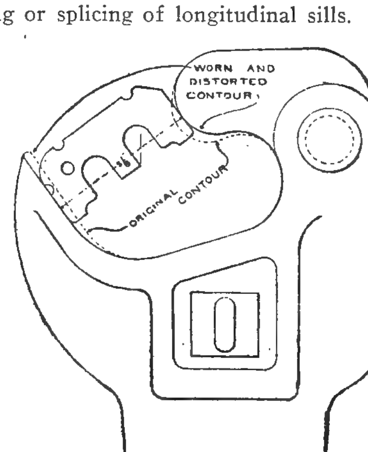
(*d*) If the car owner elects, on account of improper repairs, to remove M. C. B. Standard or M. C. B. Temporary Standard coupler in good condition, second-hand credit should be allowed, and charge be confined to second-hand coupler applied.

(*e*) When necessary to renew brake beam, any metal brake beam meeting M. C. B. specifications may be used, provided that the beam applied is at least as strong as the beam standard to the car.

(*f*) Billing repair card should specify kind of material applied and removed, and bill rendered in accordance therewith.

(*g*) Cast-iron brake shoes may be replaced with brake shoes having reinforced back and the increased cost charged to party responsible for the repairs.

(*h*) White pine, yellow pine, fir or cypress, may be used when repairing siding, when of equal grade or quality to the material standard to the car. Fir, oak or southern pine may be substituted for each other in renewing or splicing of longitudinal sills.



(*i*) Brake shafts, sill steps, uncoupling levers and grab irons must not be welded.

Rule 18.—Couplers that exceed the distance of 5⅛

in. between point of knuckle and guard arm, measured perpendicularly to guard arm, must have the defective part or parts renewed to bring coupler within gage, in which case owners are responsible.

When M. C. B. couplers of another make are applied to a car, the uncoupling arrangement shall be made operative at the expense of the company making the repairs.

Rule 19.—In making repairs to foreign cars, the following materials must not be used:

Cast-iron brake wheels.

Malleable iron couplers.

Open knuckles.

Malleable or steel-backed journal bearings.

Rule 20.—Any company finding cars not within the limits of standard height for couplers, must make repairs and charge to owners. When construction of car and trucks precludes the common methods of adjusting coupler heights, the application of metal shims between journal boxes and arch bars will be permissible.

Cars must be maintained within the limits of standard height for couplers, measured from the top of the rails to the center line of coupler head. As far as possible, cars should be adjusted when empty.

Empty cars measuring 32½ in. or less shall be adjusted to 34½ in., or as near as practicable thereto, but not exceeding 34½ in. Loaded cars measuring 31½ in. or less shall be adjusted to 33½ in., or as near as practicable thereto, but not exceeding 33½ in. When bill is to be rendered, the height of car before and after altering must be shown on billing repair cards.

Rule 21.—Bills may be rendered against car owners:

(*a*) For the cost of applying temporary running boards and hand rails to cars originally equipped with roofs or running boards, to make such cars safe for trainmen, when owners are responsible for the defective condition of the roof; also for the cost of applying temporary hand railings to, or boarding over the opening on, empty well-hole cars.

(*b*) For applying temporary transverse tie rods cars with sides spread or bulged beyond the clearance limits of the handling line.

Rule 22.—Draft timbers must not be spliced. Longitudinal sills may be spliced at both ends, except that

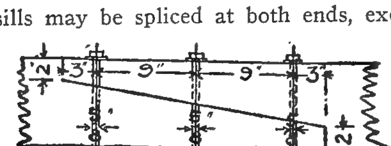


FIG. 8.

not more than two adjacent sills may be spliced at same end of car. The splicing of any sill between cross-tie timbers will not be allowed.

The splice may be located either side of body bolster, but the nearest point of any splice must not be within

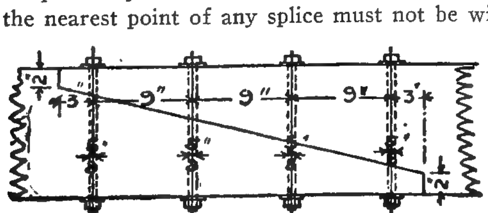


FIG. 9.

12 in. of the same, excepting center sills, which must be spliced between body bolster and cross-tie timber, but not within 24 in. of body bolster.

In splicing longitudinal sills other than center sills, if same are less than 12 in. in depth, the plan shown in either Fig. 8 or 9C shall be followed. If the sills are 12 in. or more in depth, the plan shown in either Fig. 9 or 9C shall be followed. In splicing

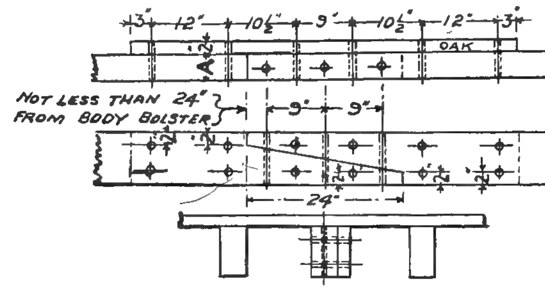


FIG. 9A.

THE SIZE OF HORIZONTAL OR CROSS BOLTS TO BE 5/8 INCH.

center sills the plan shown in Fig. 9B shall be followed.

The size of horizontal or cross bolts should be ⅝ in.

Sills of foreign cars shall be spliced as above provided.

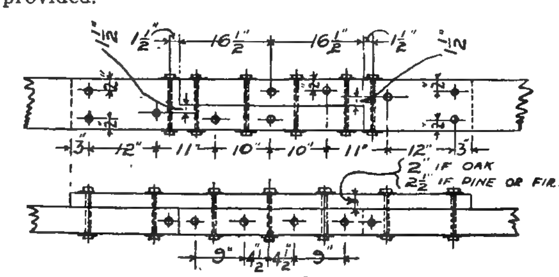


FIG. 9B.

ALL BOLTS 5/8" DIAM.

Cars delivered in interchange with center sills spliced in accordance with Fig. 9A will be accepted.

Steel sills may be spliced in accordance with Figs. A, B, C and D. Adjacent sills may be spliced.

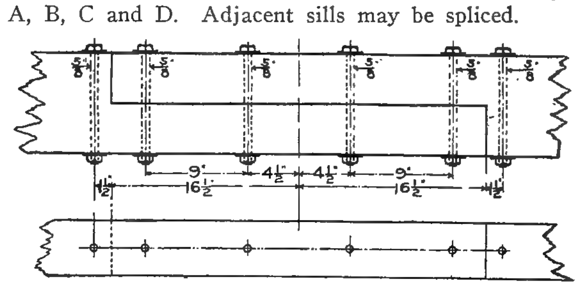


FIG. 9. C.

The splice for center sills, except as otherwise herein stated, to be located not less than 7 in. from either side of the body bolster, consisting of butt joints. The butt joints to be reinforced by plates on both

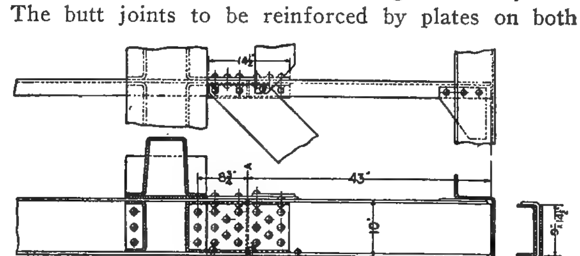


FIG A SECTION A-A

sides to be not less than twice the length of the protruding end, but not exceeding 24 in., and not less than thickness of web plate, with the one on the flange side of channel to include flanges, while the outside plate should only cover the web. The rivets to be spaced as shown on Figs. A and B.

Fig. A shows the method of splicing center sills in front of body bolster.

Fig. B shows the method of splicing center sills back of body bolster.

Fig. C shows method of splicing in cases where cars are damaged to such as extent that the center sills

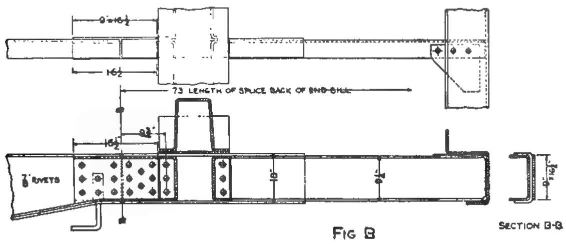


Fig B

have to be cut off less than 8 in. from the front side of the body bolster. This method is not recommended for sills with protruding ends less than 3 in. The outside plate in this splice may be made of pressed

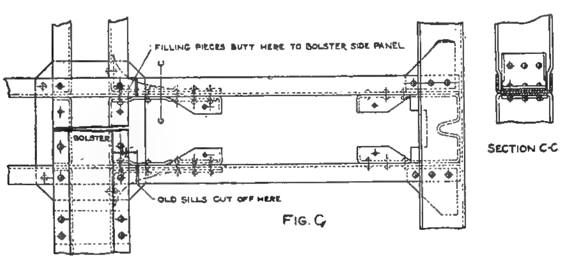


Fig. C

steel or a steel casting. The rivets should be spaced as shown on sketch.

Fig. D shows the method of splicing side sills. This

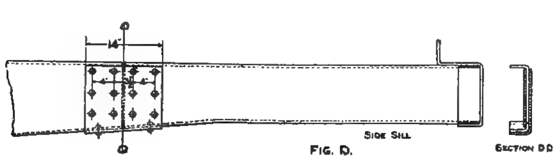


Fig. D.

splice may be located on either side of the body bolster. The rivets should be spaced as shown on sketch.

Rule 23.—In making repairs for which owners are responsible, wheels other than 33 in. may be replaced with 33 in. wheels, if practicable. If changes are necessary in order to bring the car to the proper height, the cost of so doing shall also be chargeable to the car owner.

Rule 24.—Wheels on the same axle must be of the same circumference.

In no case should two wheels be mounted on the same axle when the thickness of the two flanges together will exceed the thickness of one normal and one maximum flange, or 2 17/32 in.

Rule 25.—New wheels must not be mated with second-hand wheels.

Rule 26.—Prick punching or shimming the wheel fit must not be allowed.

Rule 27.—The wheel seats of foreign axles must not be reduced more than 1/16 in. to fit the wheels, and in no case must they be reduced below the limits given in Rule 86.

Rule 29.—When second-hand axles are applied the journals must not exceed ⅜ in. over the standard length and the collar must be not less than 5/16 in. thick. The diameter of the wheel seats or centers must not be less than, and the diameter of the journals must be at least ⅛ in. greater than the limiting diameters given in Rule 86.

Rule 30.—(*a*) All freight cars shall be lightweighted as follows, and shall be marked in accordance with M. C. B. rules with the following marks:

(1) The light weight, which shall be the multiple of 100 lb. nearest the scale weight, except that when the scale weight indicates an even 50 lb., the lower multiple shall be used.

(2) Capacity in pounds. Cubical capacity, except for flat and tank cars.

(3) Station symbol.

(4) Date of weighing, month and year.

(*b*) Each new car must be weighed separately and marked at the carworks, under the supervision of the owner's inspection. The accuracy of the scales used must be certified to by a railroad-scale inspector appointed by the car owner.

These provisions to be incorporated in the contract covering the purchase of the equipment.

(*c*) Wooden and steel underframe cars should be reweighed and remarked at least once every twelve months during the first two years the car is in service, and thereafter once every twenty-four months. All-steel cars should be reweighed and remarked at least once every thirty-six months.

(*d*) When a car is materially changed by repairs, alterations or repainting, it should be reweighed and remarked. (See paragraph (*f*) (8).)

(*e*) Any car without marking or which has not been reweighed and remarked within the prescribed period should be immediately reweighed and marked. If the car is reweighed at any time and is found to have a variation of 300 lb. or more between the marked and actual weight, it should be immediately remarked.

(*f*) (1) When empty cars are received in yards for inspection for defects or while empty cars are on shop tracks for repairs, there should be selected the cars whose condition and whose date of last weighing, etc., indicates that they should be reweighed and remarked. The number of cars selected will be regulated in accordance with facilities and traffic conditions.

(2) The initials and numbers of cars selected, also old light-weight marks, shall be reported to the weighmaster on the prescribed blank.

(3) Cars should then be cleaned and swept out under the supervision of the yardmaster or some one especially designated.

Cars should be dry and free from snow, ice, false floors, removable stakes, posts, or anything else affecting the weight.

(4) Missing parts, such as side or end doors, or parts peculiar to certain types of cars, should be replaced and included in the marked weight.

(5) Temporary double decks in stock cars should be removed before cars are weighed.

(6) The old light-weight stencil marks should be entirely painted out with quick-drying paint.

(7) Before cars are weighed, the accuracy of the scale must be regularly certified by the scale department, scale must be properly balanced and free from interference, and the weighmaster must know that cars are clean.

(8) Cars should not be light-weighed during rain, snow, sleet or heavy winds; except that when cars have been materially changed by repairs, alterations or repainting they must be weighed, even if it is necessary to do so under unfavorable weather conditions.

(9) Cars should be light-weighed at rest, uncoupled and free at both ends.

(10) The weights of the cars so obtained should be

furnished immediately on the prescribed blank to the car marker, who will mark the cars as provided in paragraph (*a*). When desired, any portion of the marks which will not be changed may be marked on the car before reweighing.

Complete reports of such reweighing and remarking should be forwarded on prescribed form to the designated transportation and mechanical offices and a copy retained by the weighmaster.

(*g*) When a car is remarked, the car owner should be notified of the old and the new weights, with place and date. The proper officer to whom these reports should be made will be designated in The Official Railway Equipment Register.

(*h*) Whenever a weighmaster at a point not equipped for marking freight cars, as provided in paragraph (*e*), ascertains, as per paragraph (*f*), the light weight of a car which is not marked in accordance with this rule, he shall attach to the car the prescribed Light Weight Card with the light weight and send two copies of the card to the designated officer of the railroad on which the scale is located, one copy to be sent to the owner of the car. The presence of the Light Weight Card on the car shall be authority for remarking the car at the first available station.

Rule 3—The re-light-weighing of cars, as provided above, to be charged to car owners, except when the weight of the car is changed on account of repairs due to unfair usage; when such repairs are made on authority of defect card, charge for re-light-weighing may be included on same authority.

PARTS OF CARS WHICH JUSTIFY REPAIRS IF OWNERS ARE RESPONSIBLE, OR REPAIRS OR CARDING IF DELIVERING COMPANY IS RESPONSIBLE.

BODIES.

DEILVERING COMPANY RESPONSIBLE, RULES 32-36.

Rule 32.—Damage to the body of the car due to unfair usage, derailment or accident. Defect cards shall not be required for any damage so slight that no repairs are necessary, the receiving line to be the judge.

Rule 33.—Repairing or replacing ladders, handholds, sill steps or brake shafts, whether or not in connection with other repairs.

Rule 36.—Temporary advertisements tacked, glued, pasted or varnished on cars.

The size and character of cards which may be used on freight cars may be divided into four classes, viz.:

1. Routing Cards: Cards bearing information required by the railroads, such as initial and number of cars, consignee, consignor, destination, contents, point of shipment, route, etc. These cards may be issued by consignor. (See illustrations for copy of card in reduced form.)

2. Special Cards: Required by the Regulations for the Transportation of Explosives and other Dangerous Articles by Freight and Express, formulated by the Interstate Commerce Commission. They shall be used, be of the text and size described, and be attached to cars as prescribed by said regulations.

3. Symbol (for example, fast freight line, manifest freight, etc.) and various M. C. B. cards: Cards prescribed by individual roads for special purposes. Their size, use, text and method of application will be prescribed by each individual road to suit its requirements. These cards may only be issued by railroads and may include same information as routing cards except name of consignor.

4. Special Cards: Cards required by United States Customs Regulations or by State authorities, such, for example, as quarantine regulations, and must be used as prescribed by the United States Customs Regulations; also routing cards used by the United States Army for shipment of Quartermaster's supplies.

(Name of Consignor, etc.)
(Name of Consignor, etc., in letters not more than one-half inch in any dimension.)

....

Initial and No............. Contents..........

Point of Shipment..........................R. R.

Consignee and Destination.....................

Via.......................................

Date.......................

Vertical dimensions, max. 5 inches.
Horizontal " " 8 "
To be permitted on all loaded cars.
No picture or trade-mark to be permitted.
Space for railroad information to occupy lower three-fifths of card. Printing on upper two-fifths to be limited to letters not exceeding one-half inch in any dimension.
All printing to be in black ink.
SEE RULE 36.

ROUTING CARD.

COMBINATIONS OF DAMAGES TO CARS WITH WOODEN UNDERFRAMES OR COMPOSITE WOOD AND METAL UNDERFRAMES WHICH DENOTE UNFAIR USAGE, IF EXISTING AT THE SAME END OF CAR AND REQUIRING REPAIRS OR RENEWALS.

(RULES 41 AND 42.)

DELIVERING COMPANY RESPONSIBLE, RULES 41-42.

Rule 41.—Damaged longitudinal sills, if necessitating replacement or splicing of more than two sills.

Rule 42.—Damaged corner and end posts, if neces-

UNITED STATES ARMY.
Q. M. SUPPLIES.

Initial and No..............Contents...........

Point Shipment.............. Via..........R. R.

Consignee................ Destination..........

Via.......................................

Date Shipment ....Consignor.

Size 5 inches vertical dimension.
" 8 " horizontal "

ROUTING CARD FOR QUARTERMASTER'S SUPPLIES
SEE RULE 36.

NOTE.—In the case of three longitudinal sills requiring renewal or splicing at the same end of the car, if the repairs to any or all of such sills are due to decay, elongated bolt holes, or split on account of elongated bolt holes, or broken on account of decay, joint inspection statement, made as per Rule 120, shall accompany the billing repair card which together will be authority for bill against the owner.

In the case of four or more longitudinal sills requiring renewal or splicing, if the repairs of each of such sills are due to decay or elongated bolt holes, the car shall be held and joint inspection statement forwarded to owner, who shall promptly authorize repairs at his expense, or destruction of car. In this case, any sill decayed and cracked, or decayed and broken, must be considered as a broken sill.

sitating the renewal of more than three posts. This will include damage to upper structure of cars with metal underframes.

ALL-STEEL UNDERFRAME OR ALL-STEEL CARS.

RULES 43-52.

Rule 43.—Any damage to the underframe of all-steel or steel-underframe cars, unless such damage occurred in wreck, derailment, cornering or sideswiping, and except unconcealed fire damage.

Rule 48.—Failure or loss under fair usage of any part of the body of the car; inside parts or concealed parts at owner's risk.

Rule 49.—Steel cars not equipped with cardboards for joint evidence and defect cards.

Rule 52.—Running boards in bad order or insecurely fastened.

In making repairs to safety appliance details, nails or lag screws must not be used where screws, bolts or rivets are required by law.

Hand holds or grab irons must be of wrought iron or steel.

The use of drive screws is not permissible.

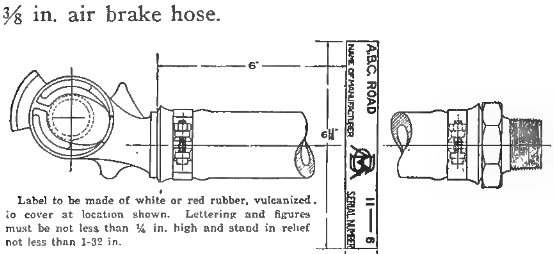
BRAKES.

Rule 54.—Car owners are not responsible for damage to any part of the brake apparatus caused by unfair usage, derailment or accident that requires repairs or renewal.

DELIVERING COMPANY RESPONSIBLE, RULES 56-58.

Rule 56.—Cars intended to be equipped with metal brake beams and so stenciled, if found with wooden brake beams.

Rule 57.—Cars not equipped with M. C. B. Standard 1⅜ in. air brake hose.



M. C. B. HOSE LABEL AND APPLICATION.

The use of rectangular label in addition to the band label is optional with any railroad, provided space between the two labels is not closer than two inches.

After October 1, 1914, the delivering line will be responsible for hose not conforming with the 1913 M. C. B. Standard specifications and so labeled, except that 1905 M. C. B. specification hose, the date of which shows it was manufactured before October 1, 1914, may continue in service until it is worn out.

Rule 58.—Missing air brake hose; missing or damaged cylinders, reservoirs, triple valves, angle cocks, cut-out cocks, brake pipe strainers or dirt collectors, pressure-retaining valves, release valves, pipe, pipe fittings, or any parts of these items, except as specified in Rule 59.

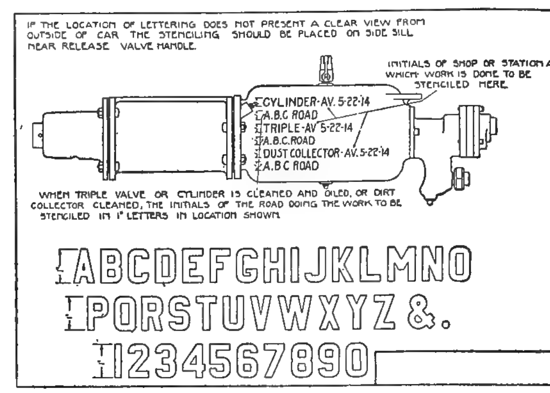
OWNERS RESPONSIBLE, RULES 59-60.

Rule 59.—Air hose burst, torn or worn out; air hose labels illegible or missing from wear; air hose couplings that have become defective in fair usage; release valve rods defective or missing; leaky pipe or pipe fittings on account of rust or seams; broken pipe or pipe fittings on account of insecure fastenings; defective interior parts of cylinder or triple valve; failure or loss under fair usage of other parts of brakes.

Rule 60.—Cylinders or triple valves not cleaned, oiled and tested or dirt collectors not cleaned within twelve months, and the initial of road, together with date of last cleaning, oiling and testing, preferably stenciled on the brake cylinder or auxiliary reservoir, or if same is not readily visible, in a convenient location at release rod, with white paint.

Triple valves cleaned must be tested in accordance with the M. C. B. code of tests for repaired triple valves.

A method of marking brake apparatus which has been cleaned, oiled and tested, is illustrated. In order



SEE RULE 60.

to condense the stenciling as much as possible, the words "cleaned and oiled" and "tested" have been omitted, as their significance is well known. Old markings must be erased before new stenciling is applied.

Rule 62.—In replacing air-brake hose on foreign cars, new 1913 M. C. B. Standard specification hose must be used.

TRUCKS.

DELIVERING COMPANY RESPONSIBLE, RULES 63-65.

Rule 63.—Damage of any kind to the truck due to unfair usage, derailment or accident, that requires renewal or repairs.

Rule 65.—Journal bearings (regardless of previous condition) and journal-box bolts which require renewal, when delivering company is responsible for change in wheels and axles.

OWNERS RESPONSIBLE, RULE 67.

Rule 67.—Defective, missing or worn-out parts of trucks not elsewhere provided for, which have failed under fair usage, or if any part of the truck frame

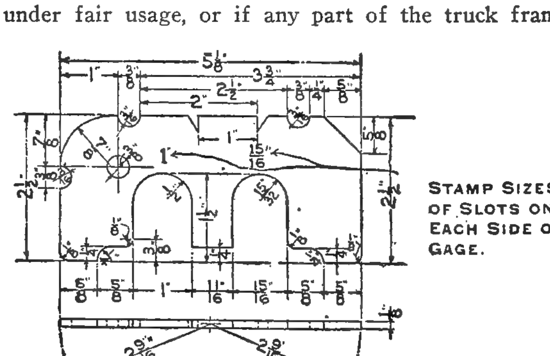


FIG. 1.—WHEEL DEFECT AND WORN COUPLER LIMIT GAGE.

or attachments is less than 2½ in. above the top of the rail.

WHEELS.

DELIVERING COMPANY RESPONSIBLE, RULES 68-70.

Rule 68.—Flat sliding, cast-iron, cast-steel, wrought-steel or steel-tired wheels; if the spot is 2½ in. or over in length, or if there are two or more adjoining spots, each 2 in. or over in length, the same responsi-

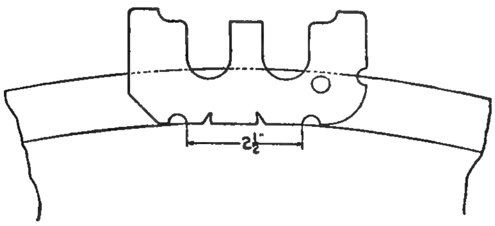


FIG. 2.—METHOD OF GAGING SHELLED AND FLAT SPOTS. SEE RULES 68 AND 71.

bility to apply to mate wheel, regardless of length of slid spot.

Rule 69.—Broken flange; chipped flange, if chip exceeds 1½ in. in length and ½ in. in width. Broken rim, if the tread, measured from the flange at a point ⅝ in. above tread, is less than 3¾ in. in width (see Fig. 5), provided these defects are caused by derailment or wreck.

Rule 70.—Cars equipped with wrought-steel or steel-

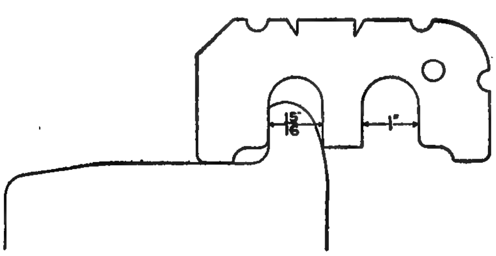


FIG. 3—METHOD OF GAGING WORN FLANGES—SEE RULE 74.

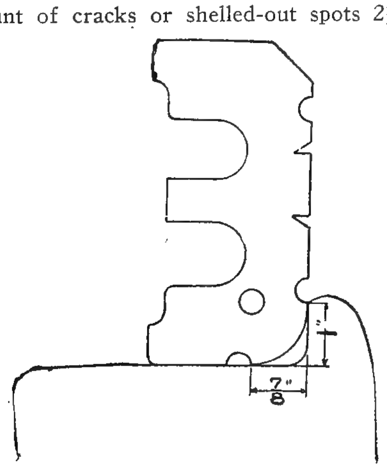
tired wheels and so stenciled, if found with cast-iron or cast-steel wheels.

Cars equipped with cast-steel wheels and so stenciled, if found with cast-iron wheels.

Wrought-steel wheels may be substituted for cast-steel wheels.

OWNERS RESPONSIBLE, RULES 71-81.

Rule 71.—Shelled out: wheels with defective treads on account of cracks or shelled-out spots 2½ in. or



FI FIFIG. 4.—METHOD OF GAGING WORN FLANGES—SEE RULE 74.

over, or so numerous as to endanger the safety of the wheel.

Brake burn: wheels having defective treads on account of cracks or shelling out due to heating.

Rule 72.—Seams ½ in. long or over at a distance of ½ in. or less from the throat of the flange, or seams 3 or more in. long, if such seams are within the limits of 3¾ in., as shown in Fig. 5.

Rule 73.—Worn through chill: when the worn spot is 2½ in. or over in length. Care must be taken to

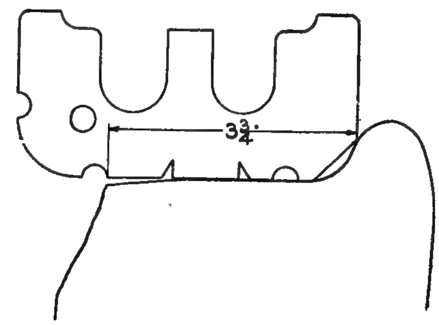


FIG. 5.—METHOD OF GAGING CHIPPED RIMS. SEE RULES 69 AND 78.

distinguish this defect from flat spots caused by sliding wheels.

Rule 74. — Worn flanges — cast-iron or cast-steel wheels: wheels under cars of less than 80,000 lb. capacity, with flanges having flat vertical surfaces extending 1 in. or more from tread, or flanges 15/16 in. thick or less, gaged at a point ⅜ in. above tread. Wheels

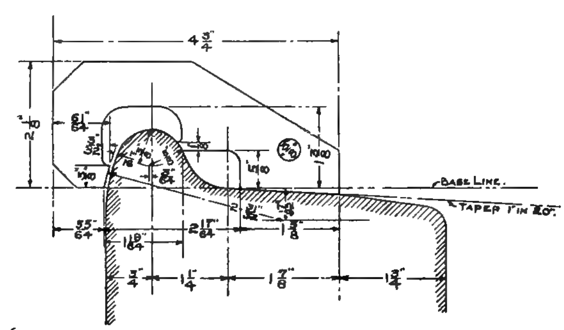


FIG. 6.—MAXIMUM FLANGE THICKNESS GAGE, FOR ALL WHEELS CAST AFTER JANUARY 1, 1908.

under cars of 80,000 lb. capacity or over, with flanges having flat vertical surfaces extending ⅞ in. or more from tread, or flanges 1 in. thick or less, gaged at a point ⅜ in. above tread. (See Figs. 3 and 4.)

Worn flanges—wrought-steel or steel-tired wheels: flanges having flat vertical surfaces extending 1 in. or

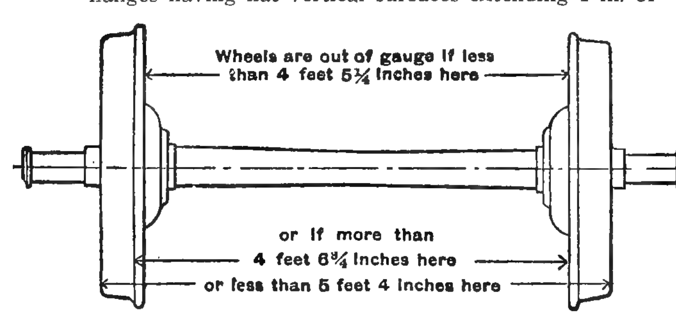


FIG. 7.—MEASUREMENTS TO BE MADE AT THE SAME HEIGHT ON THE WHEELS AS THE CENTER OF THE AXLE. FOR WHEELS CAST PRIOR TO THE M. C. B. STANDARD TREAD AND FLANGE ADOPTED IN 1907.

more from tread, or flanges 15/16 in. thick or less. (See Figs. 3 and 4.)

Rule 75.—Thick flange: flange over 1 19/64 in. thick for cast-iron wheels having increased flanges and tread standards of 1907 and 1909. (See Fig. 6.)

Rule 76.—Tread worn hollow: if the tread is worn

sufficiently hollow to render the flange or rim liable to breakage.

Rule 77.—Burst: if the wheel is cracked from the wheel fit, outward, by pressure from the axle.

Rule 78.—Cracked or broken flange, chipped flange if it exceeds 1½ in. in length and ½ in. in width;

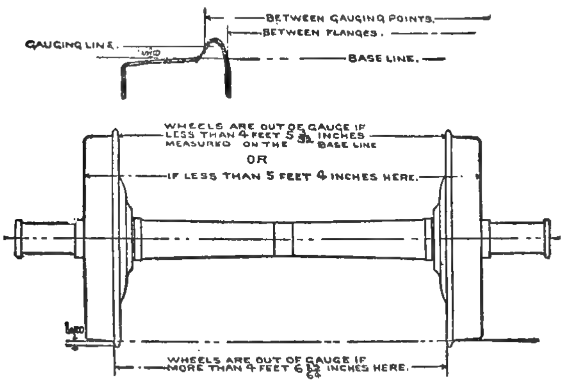


FIG. 8.—MEASUREMENT TO BE MADE AT THE SAME HEIGHT ON THE WHEELS AS THE CENTER OF THE AXLE. FOR WHEELS CAST AFTER JANUARY 1, 1908.

broken or chipped rim, if tread measured from the flange at a point ⅝ in. above tread is less than 3¾ in. in width (see Fig. 5); cracked tread, cracked plate, one or more cracked brackets, or broken in pieces, provided these defects were not caused by derailment or wreck.

Rule 80.—Wrought-steel or steel-tired wheels loose; broken or cracked hubs, plates, bolts, retaining ring or tire, under fair usage.

Rule 81.—Wheels loose or out of gage. (See Fig. 7 for wheels cast prior to the M. C. B. Standard tread and flange adopted in 1907, and Fig. 8 for wheels cast after January 1, 1908.)

Rule 83.—The determination of flat spots, worn flanges and chipped treads shall be made by a gage, as shown in Fig. 1, and its application to defective wheels, as shown in Figs. 2, 3, 4 and 5. The determination of thick flanges for all wheels cast after January 1, 1908, shall be made by a gage shown in Fig. 6.

AXLES.

DELIVERING COMPANY RESPONSIBLE, RULE 84.

Rule 84.—Cut journals, axles bent or axles rendered unsafe by unfair usage, derailment or accident.

OWNERS RESPONSIBLE, RULES 85-86.

Rule 85.—Axles broken or having seamy journals, fillets in back shoulder worn out, the length of journal increased ½ in. over standard length, or collars broken off or worn to ¼ in. or less, under fair usage.

Rule 86.—Axles less than the following prescribed limits:

FOR CARS MARKED CAPACITY, MAXIMUM WEIGHT OR LIMIT WEIGHT II.

Capacity	Maximum Weight or Limit Wt. II.	Journal, In.	Wheel Seat, In.	Center, In.
140 000	210 000	5½	7⅜	6 1/16
100 000	161 000	5	6¾	5⅞
80 000	132 000	4½	6¼	5⅜
70 000	112 000	4¼	6	5¼
60 000	95 000	3¾	5½	4¾
50 000	79 000	3½	5¼	4⅝
40 000	66 000	3¼	4⅞	4¼
30 000	58 000	3	4¾	4⅛

All cars to have their light weight and capacity in pounds stenciled on them, as per paragraph (*j*) Rule 3.

IMPROPER REPAIRS.

COMPANY MAKING REPAIRS RESPONSIBLE, RULES 87-88.

Rule 87.—Any company making improper repairs is solely responsible to the owners, with the exception of the cases provided for in Rules 56, 57 and 70, and excepting that a company applying axles smaller than thc limits given under Rule 86 shall not be held responsible for improper repairs if the cars is not stenciled showing the capacity or maximum weight or Limit Weight II.

Rule 88.—The company making such improper repairs must place upon the car, at the time and place the work is done, an M. C. B. defect card, which card must state the wrong material used.

Rule 90.—If an intermediate road finds it necessary for safety to standardize wrong repairs, it may render bill against the car owner for the expense, except as provided in Rules 56, 57 and 70. The billing repair card of such intermediate line shall be final as to the fact that such wrong repairs existed and shall perform the same function as a joint evidence card.

INSTRUCTIONS FOR BILLING.

Rule 91.—Bills may be rendered for work done under Rule 16, except in cases where owners are not responsible and the car bears no defect card covering the defects repaired, stating upon the bill the date and place where the repairs were made; the billing repair card or defect card to accompany the bill.

NOTE.—The following rules of the Association of American Railway Accounting Officers must be observed when rendering or correcting bills:

(*a*) Bills should not be rendered for amounts less than 25 cents in aggregate, but charges for items less than 25 cents may be held until they amount to that sum, provided said aggregate is rendered within 60 days.

(*b*) No bills should be returned for correction on account of incorrect car numbers, but shall be passed for payment at once and the alleged errors in car numbers brought to the attention of the company rendering same, within 60 days from date of receipt of bill.

The billing company shall furnish correct car reference, or shall issue within 30 days countercharge authority as per form shown.

Name of Railroad..

Place..*191*...

This will authorize the..*Railroad Company*

to counterbill the..*Railroad Company*

.... *dollars*

to offset charges in our bill No.. ....*Amount $*...........................

$.........................   ....

Signature of person issuing..

This authority must be attached to bill.

M. C. B. Association Counterbilling Authority.

SEE RULE 91.

(*c*) No bills shall be returned for correction on account of other error or questionable charges unless the net amount involved exceeds 10 per cent of the total amount of bill, but shall be passed for payment at once and the alleged error brought to the attention of the billing company within 60 days from date of receipt of bill. The billing road must furnish proper explanation or shall issue within 30 days countercharge authority on form shown.

(*d*) Undercharges shall be similarly adjusted on regular authority of the company against which the bill has been rendered.

(*e*) When bills are returned for correction, all defect cards and billing repair cards, except those in question, must be retained by the company against which the bill has been rendered.

Rule 92.—In rendering bills, cars shall be treated as belonging to companies or individuals whose name or initials they bear, except in case of Line Cars, where the equipment list of the general officers of the Line designates a party to make settlement.

Rule 93.—Separate bills must be rendered for cars destroyed.

All charges for repairs made to cars on account of owner's defects, defect cards and rebuttal authorities must be consolidated against any one company into one bill.

Separate statements to be made:

First.—For owner's defects for each calendar month.

Second.—For all charges based on defect cards, including rebuttal charges.

NOTE.—Totals only of these statements to be shown on the recapitulation.

Rule 94.—For repairs made on defect cards, the card must accompany the bill as voucher for the work done, but no bill shall be rendered for repairs which have not been made, except as follows: In the case of repairs covered by defect card, if the owner changes the original standard of parts so involved, the charge must be no greater than if the original design had been followed.

If the owner elects to dismantle the body or trucks, or both, charge may be made for such material as would have been required for the repairs covered by the defect card, but no labor shall be charged in such case, except in so far as labor is already included in M. C. B. prices for material.

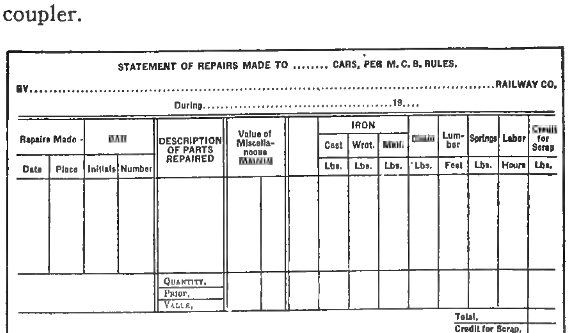
Rule 95.—Bills may be rendered against car owners for the labor only of replacing the following material when lost on the line of the company making the repairs, viz.:

Brake beams, including shoes, heads, jaws, key bolts, cotters, brake pins and hangers, when lost with the brake beam.

Brake levers, lever guides, key bolts, pins, cotters, top and bottom brake rods, whether or not they are lost with the brake beam.

Labor and material may be charged for key bolts, cotters and brake pins when lost independently of the above items.

Couplers, including yokes, springs, followers, and friction draft gears complete, when lost with the coupler.


STATEMENT OF REPAIRS MADE TO .... CARS, PER M. C. B. RULES.

BY...RAILWAY CO.

During...19....

Repairs Made -		[illegible]		DESCRIPTION OF PARTS REPAIRED	Value of Miscellaneous [illegible]		IRON			[illegible]	Lumber	Springs	Labor	Credit for Scrap
							Cast	Wrot.	[illegible]					
Date	Place	Initials	Number				Lbs.	Lbs.	Lbs.	Lbs.	Feet	Lbs.	Hours	Lbs.
				Quantity,										
				Price,										
				Value,										

Total,
Credit for Scrap,
Net Charge,

SEE RULE 96.

Rule 96.—In making bills under these rules, the information necessary should be embodied on the form shown, whether the same is made as a bill or a statement to accompany a bill.

Rule 97.—Billing repair cards for wheel and axle work must make specific mention of each wheel and axle removed and applied. If no marks are found on wheels or axles removed, a notation to that effect must be made.

Rule 98.—Bills rendered for wheels and axles shall be in accordance with the following schedule of prices for material, with the proper debits and credits:

	New	Average Credit Price.
One 36-in. cast-iron wheel	$10.50	$5.25
One 33-in. cast-iron wheel	9.00	4.75
One 33-in. cast-steel wheel	19.50	4.75

	New.	Second-hand.	Scrap.
One 33-in. wrought or rolled steel wheel	$19.50	......	$4.50
One axle, 140,000 lb	25.50	$15.25	4.50
One axle, 100,000 lb	19.50	11.75	3.70
One axle, 80,000 lb	16.50	10.00	3.00
One axle, 60,000 lb	13.00	7.75	2.00
One axle, 50,000 lb. or under	10.00	5.00	1.65
And with an additional charge for all labor for each pair of wheels and axles removed from all types of trucks	2.25	......	......
Removing, turning and replacing a pair of wrought-steel or steel-tired wheels for all types of trucks	3.25	......	......

The following average scrap credit prices must be allowed for wheels removed from dismantled cars, under the provisions of Rule 120:

One cast-iron wheel	50 000 lb. capacity or under	$2.75
One cast-iron wheel	60 000 lb. capacity	2.90
One cast-iron wheel	80 000 lb. capacity	4.75
One cast-iron wheel	100 000 lb. capacity	4.75

If new wheels and axles are substituted for average credit price wheels and second-hand axles, proper charges and credits shall be allowed, although such substitutions be made on account of only one loose or defective wheel or a defective axle, with the following exceptions: In case the owner of a car removes a damaged wheel or axle, no charge shall be made for any difference in value between the parts used and those removed that are not damaged.

The price for new wrought-steel wheels shall be based on the scrap value of $4.50 for metal inside the condemning limit (which is ¼ in. above the limit groove) plus $0.625 for each 1/16 in. of service metal (on radius of tread) in connection with standard full flange contour, also base of limit groove not less than 29½ in. in diameter. In no case shall a charge or credit for service metal be made in excess of 1½ in.

IN CASE OF OWNER'S DEFECTS.

No credit will be allowed owner for loss of service metal due to turning off wheels. Should there be a further loss of service metal, however, due to the application of other wheels, the proper credit for such additional loss must be given the owner. Any increase in the amount of service metal, due to the application of other wheels, may be charged to the owner.

DELIVERING LINE DEFECTS.

When repairs are not covered by a defect card, the proper credit for any loss of service metal must be given the owner, at the rate of $0.65 for each 1/16 in. of service metal removed, measured on radius of tread, in connection with full standard tread and contour, and charges shall be made against the owner for any increase in the amount of service metal, due to application of other wheels.

DELIVERING LINE DEFECTS.

When the repairs are covered by the defect card of another company, charge covering such repairs shall be made against the owner of the car, the defect card and the billing repair card to be attached to the bill.

The owner to render counter-bill on the authority of the defect card against the company issuing same, including an additional charge to cover the loss of service metal, on account of the defects covered by the card. Should there be an additional loss of service metal, on account of the application of other wheels, the company making the repairs shall allow the proper credit to the owner to cover such additional loss of metal. Should there be an increase in the amount of service metal, due to the application of other wheels, such increase may be charged to the owner.

The above provisions shall govern any loss or increase of service metal on account of the mate wheel, even if same is not defective, when both wheels are turned off to correspond.

The necessary information must be given in all cases, as provided in Rule 10.

In cases of slid-flat wheels ⅛ in. for loss of service metal will be allowed for flat spots 2½ in. long and 1/16 in. for each additional inch or fraction thereof.

Any additional loss of service metal that is necessary to remove on account of worn flange or tread must be borne by car owner.

Rule 99.—If car owner elects, on account of improper repairs, to remove M. C. B. standard axles suitable to the marking of the car, he shall make charge for second-hand axles, and allow credit for second-hand axles if they are in good order. If M. C. B. standard axles unsuitable to the marking of the car are removed, they should be credited as scrap regardless of their condition and charge made for new or second-hand axle, whichever is applied. Axles removed below the journal limits for cars marked capacity, maximum weight, or Limit Weight II, as per Rule 86, should be credited as scrap when removed.

When axle is removed on account of owner's defects on wheel, and the journal has increased in length more than ⅜ in. or the collar is worn to less than 5/16 in., or the diameter of the journal is not at least ⅛ in. greater than the limiting diameters given in Rule 86, the axle shall be considered as scrap and credit allowed accordingly.

Rule 100.—Bills or statements which do not embody all the information called for by the headings of the columns may be declined until made to conform to the requirements of the rule.

Rule 101.—Bill for repairs made under these rules and for material furnished shall be in conformity with schedule of prices and credits for the articles enumerated below:

MATERIAL	8-in.	10-in.
Air-brake Equipment:		
Air-brake hose, 1⅜-in. M. C. B. standard, complete with fittings, applied to car, charge	$2.00	$2.00
Air-brake hose, M. C. B. Standard, average credit for fittings for same	.60	.60
Angle cock, plain handle	1.50	1.50
Angle cock, self-locking handle	1.80	1.80
Angle cock handle plain	.08	.08
Angle cock handle, self-locking, complete	.40	.40
Angle cock handle, self-locking	.25	.25
Auxiliary reservoir, detachable type	2.75	6.25
Auxiliary reservoir, combined type	2.75	6.25
Brake pipe air strainer, 1¼-in	.60	.60
Brake pipe air strainer union nut	.12	.12
Brake pipe strainer union nut swivel	.12	.12
Centrifugal dust collector, 1-in	1.20	1.20
Centrifugal dust collector, 1¼-in	1.50	1.50
Centrifugal dust collector deflector and plug	.30	.30
Check valve cap	.25	.25
Cut-out cock	1.30	1.30
Cut-out cock handle	.07	.07
Cylinder body	2.00	3.50
Cylinder front cap gasket (New York triple)	.15	.15
Cylinder piston and rod	1.00	1.50
Cylinder piston follower	.08	.25
Cylinder piston packing leather	.60	1.00
Cylinder piston packing leather expander	.05	.06
Cylinder piston release spring	0.50	0.50
Cylinder non-pressure head	.60	1.25
Cylinder pressure head plain	.50	.75
Cylinder pressure head with lever brackets, lugs and bolts	$1.50	$1.75
Cylinder gasket	.06	.08
Exhaust piston	.20	.20
Exhaust piston head	.40	.40
Exhaust piston seat	.10	.10
Gasket, air hose coupling	.04	.04
Gasket, leather, union, all sizes	.04	.04
Pipe nipple on end of train line, threaded, 12 in. or less in length	.12	.12
Piston stop	.10	.10
Pressure-retaining valve, two position	1.00	1.00
Pressure-retaining valve, three position	3.00	3.00
Release valve	.60	.60
Release valve handle	.10	.10
Release valve rubber seat	.02	.02
Release valve vent valve, complete	.10	.10
Release valve rod applied, net	.11	.11
Retaining valve handle	.05	.05
Retaining valve cock key, two position	.15	.15
Retaining valve cock key, three position	.20	.20
Retaining valve case, two position	.10	.10
Retaining valve case, three position	.40	.40
Retaining valve spring	.03	.03
Retarding device body	.80	.80
Retarding device screws (each)	.04	.04
Retarding device stem	.50	.50
Retarding device spring	.05	.05
Rubber seat, for triple emergency valve, check valve or vent valve	.05	.05
Side cap	.20	.20
Train pipe air strainer (1¼-in.)	.60	.60
Triple check-valve case	1.00	1.00
Triple cylinder cap (drain cup)	.75	.75
Triple cylinder front cap type K-3' 4, 5, 6,-N. Y	.75	.75
Triple cylinder front cap type F and H-N. Y	.60	60
Triple cylinder or main cylinder gasket	.40	.40
Triple emergency valve all classes	.60	.60
Triple emergency valve seat	.55	.55
Triple emergency valve piston	.50	.50
Triple emergency valve piston ring only	.15	.15
Triple emergency check valve, metal	.25	.25
Triple emergency check valve spring	.02	.02
Triple emergency check case gasket	.10	.10
Triple graduating spring	.05	.05
Triple graduating stem	0.15	0.15
Triple graduating stem nut	.20	.20
Triple graduating valve, round type	.05	.05
Triple graduating valve, flat type	.25	.25
Triple graduating valve spring	.02	.02
Triple main piston and ring	2.00	2.00
Triple main piston K type	3.00	3.00
Triple main piston ring (only)	.25	.25
Triple slide valve, old type, W. A. B. Co	.75	.75
Triple slide valve, F-1, N. Y	.75	.75
Triple slide valve, H-1, N. Y	.90	.90
Triple slide valve, K type	1.50	1.50
Triple slide valve spring	.03	.03
Triple union nut	.10	.10
Triple union swivel	.10	.10
Triple valve body, complete, old style W. A. B	5.50	5.50
Triple valve body, complete, old style N. Y	6.00	6.00
Triple valve body, K type	8.00	8.00
Triple valve seat, metal	1.50	1.50
Triple valve strainer	.05	.05
Triple valve gasket	.20	.20
Triple vent piston	.70	.70

NOTE.—Other air brake material to be charged at catalogue prices.

MATERIAL	Charge.	Cred t
Altering height of one end of car, by adjusting center plates or body bolsters, net. (This also applies to renewing full length shims)	$1.40	.....
Altering height of one end of car, shimming springs, net (this includes renewing of shims)	.60	.....
Bolts, nuts and forgings, finished, per pound	.03	$0.005
Box lids, pressed steel, including bolt and spring, all sizes, each, net	.20	.....
Brake shoe applied, no credit for scrap	.36	.....
Brake shoe, reinforced back, applied; no credit for scrap	.42	.....
Brake shoe key applied; no credit for scrap	.04	.....
Cardboard (for defect or destination card), complete, applied, each	.30	.....
Castings, rough iron, per pound	.02	.005
Castings, rough, malleable, per pound	.04	.005
Castings, rough steel (other than those referred to in Rule 105):		
Weighing 100 lb. and less, per pound	.055	.005
Weighing over 100 lb. each, including bolsters, side frames, etc., per pound	$0.04	$0.005
Chain, per pound	.04	.005
Coupler, M. C. B., complete, new, steel 5"x5" shank	9.00	.....
Coupler, M. C. B., Temporary Standard, complete, new, steel 5"x5" shank	10.50	.....
Coupler, M. C. B., complete, new, steel 5"x7" shank	9.50	.....
Coupler, M. C. B., Temporary Standard, complete, new, steel 5"x7" shank	11.00	.....
Coupler body, M. C. B., one, new, steel 5"x5" shank	5.90	1.10
Coupler body, M. C. B., Temporary Standard, one, new, steel 5"x5" shank	7.40	1.25
Coupler body, one, malleable 5"x5" shank	.....	1.10
Coupler body, M. C. B., one, new, steel 5"x7" shank	6.40	1.20
Coupler body, M. C. B., Temporary Standard, one, new, steel 5"x7" shank	7.90	1.35
Coupler body, one, malleable, 5"x7" shank	.....	1.20
Coupler knuckle, one, new, open	.....	.40
Coupler knuckle, one, new, solid, applied	2.25	.40
Coupler knuckle pin, one, new, applied	.25	.05
Coupler lock, one, new, applied	.60	.06
Coupler release clevis, applied, net	.06	.....
Coupler release clevis link, applied, net	.06	.....
Coupler release clevis pin or bolt, applied separately, net	.04	.....
Other individual malleable, wrought or steel parts, per pound	.04	.....

MATERIAL	Charge.	Credit.
Door hook refrigerator car, one, applied, net	$0.08	.....
Door hook staple or eye, one, applied, net	.05	.....
Door, for end of box or stock car, wooden, each, applied; no credit for scrap	2.00	.....
Door, for end of box or stock car, ventilated (wooden frame with iron rods), each, applied; no credit for scrap	3.50	.....
Door, for side of box or stock car, wooden, each, applied; no credit for scrap	5.25	.....
Door, for side of box or stock car, ventilated (wooden frame with iron rods), each, applied; no credit for scrap	7.25	....
Door, for side of carriage, automobile or furniture car, wooden, each, applied; no credit for scrap	6.00	.....
Door, for side of stock car, with iron rods, each, applied; no credit for scrap	7.00	.....
Door, for roof of coke car, wooden, each, applied; no credit for scrap	1.50	.....
Door, for roof of stock car, wooden, each, applied; no credit for scrap	1.50	.....
Half door, for side of box or stock car, each, applied; no credit for scrap	3.25	.....
Half door, for end of furniture, carriage or automobile car, each, applied; no credit for scrap	6.00	.....
Handhold, one, applied, net	.40	.....
Hatch cover, for roof of refrigerator car, wooden, each, applied; no credit for scrap	1.75	.....
Hatch plug, for refrigerator car, wooden, each, applied; no credit for scrap	2.00	.....
Iron, galvanized, per pound	.0425	.....
Journal bearings, brass or bronze, lined or unlined, per pound, applied	.18	$0.12
Journal bearings, filled brass or bronze shell, per pound, applied	.14	.12
JOURNAL BEARINGS: WEIGHT TO BE CHARGED AND CREDITED AS FOLLOWS:	Lbs.	Lbs.
For journals 7 in. long and over, but not 8 in	10	6
For journals 8 in. long and over, but not 9 in	13	8
For journals 9 in. long and over, but not 10 in	20	12
For journals 10 in. long and over, but not 11 in	25	15
For journals 11 in. long and over	37	23
Journal bearings, cast steel or malleable iron back, credit for scrap, per pound	...	.02
Key ring, one, applied, net	.05	.....
Lag screws, each, no credit for scrap	.01	.....
Labor, per hour	.28	.....
Lumber.—Yellow, White and Norway Pine, Poplar, Oak, Hickory and Elm, dressed and framed, per foot B.-M. required to make the part	.04	.....
Nails, per pound	.03	.....
Nut-lock, one, applied; net	.03	.....
Paint, lead, freight car, mixed per pound	.15	.....
Paint, mineral, freight car, mixed, per pound	.07	.....
Pipe, ⅜-in., per foot	.03	.0025
Pipe, 1-in., per foot	.05	.005
Pipe, 1¼-in., per foot	.07	.01
Ratchet wheel key, one, applied; net	.05	.....
Spring cotters or split keys, each, renewed when not used with application of other parts being renewed, net	.03	.....
Spring cotter or split key, one, renewed, when used in connection with other parts being repaired or renewed, net	.01	.....
Staple, one, applied, net	.01	.....
Steel for springs, rough, per pound	.03	.005
Steel helical springs, per pound	.035	.005
Steel, pressed and flagged, per pound	.035	.005
Steel, plate and structural, per pound	.025	.005
Stenciling sides and ends when done to preserve identity of car, when not necessitated by other repairs, net (per Rule 102)	.60	.....
Turnbuckles, all sizes, each, net	.50	.....

Rule 102.—Not more than one pound of mineral paint can be charged for 15 sq. ft. of surface covered, and not more than one pound of lead paint for 12 sq. ft. of surface covered. No charge to be made for lettering except when done to preserve the identity of the car and not necessitated by other repairs.

In computing charges for lumber, if finished length of the piece in odd inches is under 6 in., the half foot will be allowed for rough length; if 6 in. or over, the even foot will be allowed. Finished thickness, if under 1 in., consider as 1 in. rough; if 1 in. or over, but under 1½ in., consider as 1½ in. rough; 1½ in. or over, but under 2 in., consider as 2 in. rough; and upward on corresponding scale. The same scale to apply to width, except for matched sheathing, roofing, lining and flooring, which shall be charged according to M. C. B. specifications for rough width. The total amount of each item may be charged in even feet B. M.; if fractional amount is less than ½ ft., it should be dropped.

Rule 103.—Whenever scrap credits are allowable the weights of scrap credited shall be equal to the weights of the new metal applied, except as otherwise provided in the rules, and except in the case of scrap M. C. B. couplers, and parts of same, and material applied on defect cards, in which cases the weight and kind of metal removed shall be credited.

Rule 104.—Second-hand M. C. B. couplers or parts, or second-hand metal brake beams may be used in repairs, but must be charged at 75 per cent of value new.

Second-hand M. C. B. couplers or parts removed, must be credited at 75 per cent of value new. Credits shall be confined to the body, lock, knuckle and knuckle pin, whether second hand or scrap.

Second-hand parts of metal brake beams removed must be credited at 50 per cent of value new.

In applying new M. C. B. coupler or new metal brake beam it shall be so charged, whether or not it be of same make as that removed.

Rule 105.—Manufactured articles not included in Rules 98 and 101 must be charged at current market prices:

NOTE.—Manufactured articles are those which are not subject to com- petitive prices, and which can only be obtained from one manufacturer or concern.

Rule 106.—No percentage to be added to either material or labor.

Rule 107.—The following table shows the number of hours which may be charged for labor in doing the various items of work necessary to complete each item of work enumerated, which includes all work necessary to complete each item of repairs, except in so far is labor is already included in charges for material:

	Ordinary Cars		Refrigerator Cars	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
Advertisements, temporary, tacked on car, removing per car	....	$0.50	....	$0.50
Advertisements, temporary, pasted, glued or varnished on cars, removing, per car	....	1.00	....	1.00
Air-brake equalizer or fulcrum, one, renewed	¾	.21	¾	.21
Air-brake block or plate (plus labor charge for R. and R. cylinder, when necessary to do so), one, renewed	2	.56	2	.56
American continuous draft rods, one rod, welding	2½	.70	2½	.70
Anchor rod (bolster and dead wood), one, renewed	¾	.21	¾	.21
Anchor rod (bolster and dead wood), blacksmith labor repairing, including R. and R.	1¾	.49	1¾	.49
Anchor rod, head block tank car or Gould draft one, renewed	1	.28	1	.28
Anchor rod. head block tank car or Gould draft, blacksmith labor repairing, including R. and R.	1¾	.49	1¾	.49
Anchor tank band, one, renewed	1	.28	....	..
Anchor tank band, blacksmith labor, repairing, including R. and R.	2	.56	....	....
Anchor tank band "Y" bolt, one, renewed	½	.14	....	....
Anchor tank band "Y" bolt, blacksmith labor repairing, including R. and R.	1¼	.35	....	....
Anchor or lug straps, one, renewed	1	.28	1	.28
Anchor or lug straps, blacksmith labor repairing, including R. and R.	1¾	.49	1¾	.49
Arch bars, 1 or 2, replaced on same end of truck	3½	.98	3½	.98
Arch bars, blacksmith labor, each, repairing	2½	.70	2½	.70
Arch bar, drawing down	1	.28	1	.28
Arch bar tie strap, one, renewed	1	.28	1	.28
Arch bar tie strap, blacksmith labor, one, repairing, including R. and R.	2	.56	2	.56
Belt rail or girth (end), renewed, when two posts or braces are renewed, per end	1½	.42	1½	.42
Belt rail or girth (end), renewed, when not associated with renewal of posts or braces, per end	3	.84	4	1.12
Belt rail plank (end) when renewed separately, per end	1½	.42	1½	.42
Belt rail plank (side) when renewed separately	2	.56	2	.56
Bolster, body, composite, one, replaced	12	3.36	15	4.20
Bolster, body, metal, one, renewed	9½	2.66	9½	2.66
Bolster, body, wood, one, renewed	9½	2.66	12	3.36
Bolster, body, metal, one, renewed when draft timbers extend through same	15	4.20	17	4.76
Bolster, body, plain, metal or wood, one, renewed when one or more defective sills are renewed	2½	.70	2½	.70
Bolster, composite, one, renewed, when one or more defective sills are renewed	3	.84	3	.84
Bolster, truck, one, renewed	9	2.52	9	2.52
Bolster, truck, one, and one spring plank in same truck, renewed	13	3.64	13	3.64
Bolster, truck, one, renewed, when no bolts or rivets require removal to remove bolster from truck (not including Bettendorf design)	3½	.98	3½	.98
Body truss rod bearing or queen post, closed, one, renewed	1	.28	1	.28
Body truss rod bearing or queen post, closed, two on same rod, renewed	1½	.42	1½	.42

	Ordinary Cars		Refrigerator Cars	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
Body truss rod bearing or saddle block, open, one, renewed	¾	$0.21	¾	$0.21
Body truss rod, washer, renewed	½	.14	½	.14
Body truss rod, full length, renewed	2½	.70	3¾	1.05
Body truss rod, per section, renewed	1¾	.49	3	.84
Body truss rod, per section, or full length, blacksmith labor repairing	1¼	.35	1¼	.35
Body truss rod, tightening and replacing on saddle	½	.14	½	.14
Braces, side or end, one, renewed	4½	1.26	6½	1.82
Braces, side or end, each, renewed, when associated with the renewal of posts	2¾	.77	4¾	1.33
Brake beam, one, replaced, including attachments and connections	2	.56	2	.56
Brake beam, metal, one, blacksmith labor repairing	2	.56	2	.56
Brake beam, wooden truss, repairing	1¼	.35	1¼	.35
Brake beam guide or finger guard, one, renewed	¼	.07	¼	.07
Brake beam head (wooden beam), one, renewed	¾	.21	¾	.21
Brake beam head (wooden beam), two on same beam, renewed	1	.28	1	.28
Brake beam safety chain, separately, one, renewed	¼	.07	¼	.07
Brake beam suspension spring hanger or link, one, renewed	½	.14	½	.14
Brake beam suspension spring and cap, single or double, either or both, renewed	¾	.21	¾	.21
Brake beam hook bolt, one, renewed	½	.14	½	.14
Brake chain, one, renewed	½	.14	½	.14
Bfake connection rod or lever, one or both, renewed	½	.14	½	.14
Brake connection, repaired and replaced	1	.28	1	.28
Brake hanger, repaired and replaced	1	.28	1	.28
Brake hanger, separately, one, ienewed	½	.14	½	.14
Brake hanger bearing, double, secured to spring plank, one, renewed	1	.49	1¾	.49
Brake hanger shackle box or bearing and cap, one, renewed	¾	.21	¾	.21
Brake hanger trimmer block, one, renewed	1½	.42	1½	.42
Brake hanger eye bolt, separately, one, renewed	½	.14	½	.14
Brake lever guide or carrier, one, renewed	½	.14	½	.14
Brake lever bracket, one, renewed	¾	.21	¾	.21
Brake pawl, one, renewed	¼	.07	¼	.07
Brake pin oi key bolt, separately, one, ienewed	¼	.07	¼	.07
Brake rod caitier, one, renewed	1	.28	1	.28
Brake shaft, one, renewed	1	.28	1	.28
Brake shaft, blacksmith labor repairing, including R. and R	1½	.42	1½	.42
Brake shaft brace or support, one, renewed	½	.14	½	.14
Brake shaft brace or support, blacksmith labor repairing, including R. and R	1	.28	1	.28
Brake shaft carrier or bow, one, renewed	½	.14	½	.14
Brake shaft carrier or bow, blacksmith labor repairing, including R. and R	1	.28	1	.28
Brake shaft ratchet wheel, one, renewed	¾	.21	¾	.21
Brake shaft step board plate, only, one, renewed	1	.28	1	.28
Brake shoe, renewed on authority of defect card when brake beam is not renewed or replaced	½	.14	½	.14
Brake step board, one, renewed	2	.56	2	.56
Brake wheel, one, renewed	½	.14	½	.14
Buffer block, one, cast-iron, renewed	1	.28	1	.28
Bolts—				
Carrier iron bolts, 6 in. or less, each	¼	.07	¼	.07
Carrier iron bolts or draft timber bolts, over 6 in. long, either or both, renewing at same end of car.				
5 or less, each	½	.14	½	.14
6 or more, all	3	.84	3	.84
Center plate bolts, one or more, or all at one end, renewing	3	.84	3	.84
Center plate bolts and center plate, at one end, renewing	3	.84	3	.84
NOTE.—If center plate bolts pass through draft timbers, they shall be termed center plate bolts and charged accordingly.				
Coupler stop bolts, lug strap bolts, draft timber cross-tie bolts or coupler follower guide bolts, at same end of car when coupler is not removed.				
5 or less, renewing	½	.14	½	.14
6 or more, all renewing	3	.84	3	.84
Draft timber bolts, or carrier iron bolts, over 6 in. long, either or both, at same end of car, renewing.				
5 or less, each	½	.14	½	.14
6 or more, all	3	.84	3	.84
Journal box bolt or column bolt, one, renewed	1½	.42	1½	.42
Each additional bolt renewed, in same truck	½	.14	½	.14
Bolts, 6 in. or less in length, other than those provided for, each, renewed	¼	.07	¼	.07
Bolts, over 6 in. in length, other than those provided for, each, renewed	½	.14	½	.14
Cap, discharge valve for tank car, one, renewed	½	.14	....	....
Cap, dome, for tank car, one, renewed	¾	.21	....	....
Carline, one, renewed	4	1.12	....	....
Carline, one, replaced, when out of place	1¼	.35	....	....
Carrier iron, one, renewed	¾	.21	¾	.21
Carrier iron, blacksmith labor repairing, including R. and R	1½	.42	1½	.42
Carrier iron, one, tightening	¼	.07	¼	.07
Chute plank, top, middle or bottom, side, each, renewed	1½	.42	....	....
Chute plank, end, each, renewed	1	.28	....	....
Column casting, one or both, renewed, on same side of truck	3	.84	3	.84
Column casting, two, renewed, on opposite sides, same truck	5½	1.54	5½	1.54
Column casting, when arch bar is off, one or two, renewed	½	.14	½	.14

	Ordinary Cars		Refrigerator Cars	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
Column guide, one, renewed	1	$0.28	1	$0.28
Column guide, two, at same end of bolster, renewed	1½	.42	1½	.42
Center pin (head), renewed	1	.28	1	.28
Center pin (head), renewed, and placing car on center	2	.56	2	.56
Center pin (key or plain), renewed, including placing car on center if necessary	2	.56	2	.56
Center plates, one or two, at same end, renewed	2½	.70	2½	.70
Corner band, one, renewed	1	.28	1	.28
Coupler, and complete gear, key attachments, renewing or replacing	4	1.12	4	1.12
Coupler, with stem attachments, coupler springs, one or more follower plates, American continuous draft key, American continuous draft rods, one or more coupler stops, renewing or replacing one or all, at same end of car, at same time	3½	.98	3½	.98
Coupler, with pocket attachments, coupler springs, one or more follower plates, one or more coupler stops, coupler stop bolts, coupler pocket, coupler pocket rivets, renewing or replacing, any or all at same end of car, at same time	5	1.40	5	1.40
(This does not include coupler stops riveted, which should be charged for on a per rivet basis, in addition to the cost of removing and replacing, when it is necessary to do the riveting).				
Coupler, with key attachments, renewing or replacing	2	.56	2	.56
Coupler key attachment cross key, renewing or replacing	1	.28	1	.28
Coupler yoke bolts, renewed, one or two, at same end of car (coupler not R. and R.)	1	.28	1	.28
Coupler yoke, blacksmith labor repairing	1½	.42	1½	.42
Coke rack cleat (wooden rack), each, renewed	¾	.21	....	....
Coke rack gate (2 bars), renewed	1	.28	....	....
Coke rack gate (3 bars), renewed	1¼	.35	....	....
Coke rack gate guide, each, renewed	¾	.21	....	....
Coke rack gate slat, each, renewed	¾	.21	....	....
Coke rack stake clamp, each, renewed	½	.14	....	....
Coke rack stake clip, each, renewed	¼	.07	....	....
Coke rack thimble or catch, each, renewed	¼	.07	....	....
Cross-tie timber, one, renewed	6	1.68	7	1.96
Cross-tie timber, one, renewed, when one or more defective sills are renewed	1½	.42	2	.56
Dead block, wooden, renewed, at one end of car	3½	.98	3½	.98
Dead block, metal, renewed, at one end of car.	2½	.70	2½	.70
Deck bearer, upper (stock car), one, renewed	1	.28	...	....
Deck, upper, flooring, per board, renewed	½	.14	....	....
Door, end, old, rehanging	1	.28	....	....
Door, side, old, rehanging	2	.56	3	.84
Door bar (stock car), renewed	1	.28	....	....
Door siding, renewed, including fixtures and trimmings, per lin. ft. (not including R. and R. door)	....	.24	....	.24
Door batten or stile (nailed door), renewed, not including R. & R. door	1	.28	1	.28
Door rail or stile (framed door), renewed, not including R. & R. door	2	.56	2	.56
Door cap or housing (wood), renewed	2	.56	2	.56
Door cap or housing (metal), renewed	2	.56	2	.56
Door cap block or casting, separately, one, renewed	¼	.07	....	....
Door cap for small end door, renewed	1	.28	....	....
Door, end, old, rehanging on automobile car	3	.84	....	....
Door hanger or roller, either or both, renewed, except when door is rehung	1	.28	....	....
Door hinge, one, renewed, except when door is rehung	1	.28	1	.28
Door guide bracket, one, renewed	1	.28	....	....
Door guide rail bracket, one, renewed	¼	.07	....	....
Door hasp or keeper, one or both, renewed	½	.14	....	....
Door seal hook and chain, one, renewed	....	....	¼	.07
Door stop, iron, one, renewed	½	.14	....	....
Door stop, wood, one, renewed	1½	.42	....	....
Door rod (lock), one, renewed, not including door rehung	1½	.42	1½	.42
Door rod (lock), blacksmith labor repairing	1	.28	....	....
Door rod bearing, only, one, renewed	½	.14	....	....
Door rod shoe, only, one, renewed, except when door is rehung	½	.14	....	....
Door track, top or bottom, one, renewed, not including door rehung	2	.56	....	....
Door track, top or bottom, blacksmith labor repairing	1	.28	....	....
Door track repaired on car	¾	.21	....	....
Draft timbers, one, renewed	7	1.96	9	2.52
Draft timbers, two on same end, renewed	11	3.08	13	3.64
Draft timbers, one, extending beyond body bolster, renewed	12	3.36	15	4.20
Draft timbers, two, extending beyond body bolster, renewed	16	4.48	19	5.32
Draft timbers, one, renewed, when its center sill is renewed or spliced, at same end of car	2½	.70	2½	.70
Draft timbers, one, renewed, when its opposite center sill at same end of car is renewed or spliced	3½	.98	3½	.98
Draft timber filler block, renewed, when draft timbers are not renewed	2	.56	2	.56
Draft timbers, tightened, each; no additional labor for tightening when draft bolt or bolts are renewed in same timber	¼	.07	¼	.07
Draft rod key, repaired	1	.28	1	.28
Drop end gate, replacing on authority of defect card	1	.28	....	....
Drop end gate (1 plank), plain, renewed	1½	.42	....	....
Drop end gate (1 plank), metal bound, renewed	2	.56	....	....
Drop end gate (2 or 3 plank), plain, renewed.	3	.84	....	....

	Ordinary Cars Hours.	Ordinary Cars Charge for Labor.	Refrigerator Cars Hours.	Refrigerator Cars Charge for Labor.
Drop end gate (2 or 3 plank), metal bound, renewed	5	$1.40	....	....
Drop end gate plank, plain, one, renewed	1½	.42	....	....
Drop end gate plank, plain, two on same end, renewed	2	.56	....	....
Drop end gate plank, metal bound, one, renewed	2½	.70	....	....
Drop end gate plank, metal bound, two, same end, renewed	4½	1.26	....	....
Drop end gate cleat or stop, one renewed	1¼	.35	....	....
Drop end gate hinge, one, renewed	1	.28	....	....
Drop end gate keeper or latch, one, renewed	½	.14	....	....
Drop door chain, one, renewed	½	.14	....	....
Drop door hinge, one, renewed	1	.28	....	....
Drop door plank, each, renewed	1	.28	....	....
Drop door reach or connecting rod, one, R. and R. or renewed	½	.14	....	....
Drop door reach or connecting rod, blacksmith labor repairing	¾	.21	....	....
Drop door shaft and ratchet, either or both, renewed	1½	.42	....	....
Drop door shaft, blacksmith labor, repairing	1½	.42	....	....
Drop door shaft pawl, one, renewed	½	.14	....	....
Drop door shaft key, one, renewed	¼	.07	....	....
End plank on gondola cars.				
Without corner bands, one plank, renewed	3½	.98	....	....
Without corner bands, each additional plank, renewed on same end of car	2	.56	....	....
With corner bands, bolted or riveted, one plank, renewed	5	1.40	....	....
With corner bands, bolted or riveted, each additional plank, renewed on same end of car	3½	.98	....	....
End plate, one, renewed	14	3.92	15½	4.34
Fascia or drip molding, renewed, per lineal foot	....	.03	....	.03
Fascia, renailing, one or two ends, or one side	¼	.07	¼	.07
Flooring boards, renewed, per lineal foot	....	.22	....	.30
Flooring, short, over center sills, between drop doors, per lineal foot	¼	.07	....	....
Follower guide or rest plate, steel, steel underframe or steel center sill cars, tightened, per end	¼	.07	¼	.07
Follower tie strap, one, renewed	½	.14	½	.14
Hand hold, removed and straightened, one	1	.28	1	.28
Hand hold, straightened on car, one or two	¼	.07	¼	.07
Hand rail rod or pipe, per side, separately renewed	1½	.42	....	....
Hand rail post, including rail removed and replaced	2	.56	....	....
Hand rail post, renewed, each additional	½	.14	....	....
Hay box, complete, renewed	3½	.98	....	....
Hay box door, one, renewed	2	.56	....	....
Head block casting (tank car), one, renewed	3	.84	....	....
Journal boxes, on arch bar truck.				
One, renewed	2	.56	2	.56
Each additional, on same truck, renewed	1½	.42	1½	.42
Journal boxes, on solid pedestal truck.				
One or two, renewed, on same axle	4	1.12	4	1.12
Three or four, renewed, on same truck	7	1.96	7	1.96
Journal box lid, one, renewed	½	.14	½	.14
Journal, truing up, one or two, on same axle	2	.56	2	.56
Journal wedge, renewed or replaced, separately	¾	.21	¾	.21
Key for center pin, separately, one, renewed	¼	.07	¼	.07
Ladder, complete (wood), renewed	2½	.70	2½	.70
Ladder stile (wood), one, renewed	1½	.42	1½	.42
Ladder treads (wood), one or two, renewed	½	.14	½	.14
Lag screw, one, renewed	¼	.07	¼	.07
Letter or number board, one, renewed	¾	.21	¾	.21
Lining, renewed, per sq. ft	....	.03	....	.04
Lining, renailing, per end or side section from door to end of car, either above or below belt rail	....	.07	....	....
Nuts only, 1¼ in. or under, four or less, renewed	¼	.07	¼	.07
Nuts only, 1⅜ in. or over, one or two, renewed	¼	.07	¼	.07
Pedestal tie bolt or casting, either one or both renewed	½	.14	½	.14
Pedestal tie strap, one, renewed	½	.14	½	.14
Pipe hanger cap or clamp, one, renewed	¼	.07	¼	.07
Pipe hanger, complete, renewed	½	.14	½	.14
Pipe hanger, blacksmith, labor repairing	½	.14	½	.14
Pipe hanger, tightening, one or two	¼	.07	¼	.07
Platform end sill plank, one, full length, renewed	2	.56	2	.56
Platform end sill plank, one half section, renewed	1	.28	1	.28
Post, center, door, automobile cars, one, R. and R., to repair door (when attached to door)	1½	.42	....	....
Post, door or side, each, renewed	3½	.98	6	1.68
Post, corner or end, each, renewed	4½	1.26	7	1.96
Post, corner, door, end or side, each renewed, where associated with renewal of side sill, or inside end sill, side or end plate	2½	.70	3½	.98
Push rod guide, one, renewed	½	.14	½	.14
Push pole pocket (bolted), one, renewed	¾	.21	¾	.21
Push pole pocket, blacksmith labor repairing, including R. and R.	1¼	.35	1¼	.35
Release lever (coupler), one, renewed	¾	.21	¾	.21
Release lever (coupler), blacksmith labor repairing, including R. and R.	1¼	.35	1¼	.35
Release lever (coupler), repaired on car	¼	.07	¼	.07
Release lever bracket (coupler), one, renewed	½	.14	½	.14
Renailing roofing or siding, per lineal foot	....	.015	....	.015
Rod, vertical tie rod, one, renewed	¾	.21	¾	.21
Rod, vertical tie rod, blacksmith labor repairing, including R. and R.	1¼	.35	1¼	.35
Rod or pipe, side or center hitch (stock car), one, renewed	¾	.21	....	....
Rod, transverse tie, one, applied, first application, including drawing sides of car together	2	.56	....	....
Rod, transverse tie, one, renewed (except first application)	¾	.21	....	....

	Ordinary Cars Hours.	Ordinary Cars Charge for Labor.	Refrigerator Cars Hours.	Refrigerator Cars Charge for Labor.
Rod, longitudinal tie, full length, on hopper cars, one, renewed	$1¾	.49	....	....
Roof boards, single, including removing and replacing running board, per lineal foot	....	.10	....	$0.10
Roof boards, double board roof, including removing and replacing running board, per lineal foot	....	.15	....	.15
Roof purline, one, renewed	1	.28	1	.28
Roping staple, one, renewed	½	.14	½	.14
Roping staple, blacksmith labor repairing, including R. and R.	1	.28	1	.28
Running board, latitudinal, secured with bolts or screws, renewed, per single board	¾	.21	¾	.21
Running board, latitudinal, one, renewed, complete	3	.84	3	.84
Running board, longitudinal, complete, renewed	10	2.80	10	2.80
Running board, renewed, per lineal foot, per single board	....	.02	....	.02
Running board to secure with screws, per lineal foot of single board	....	.01	....	.01
Running board saddle, separate, one, renewed	½	.14	½	.14
Running board bracket, one, renewed	½	.14	½	.14
Running board bracket, blacksmith labor repairing, including R. and R.	1	.28	1	.28
Running board extension block, renewed	½	.14	½	.11
Safety chain hook or link (end sill), one, renewed	½	.14	½	.14
Safety valves, one or two, per tank, testing and stenciling only	1	.28	....	....
Safety valve, one, per tank, adjusting, testing and stenciling	2	.56	....	....
Safety valves, two, per tank, adjusting, testing and stenciling	3	.84	....	....
Side bearing, one, renewed	1½	.42	1½	.42
Side bearing, each additional, at same end of car, renewed	½	.14	½	.14
Spring plank, one, renewed	8	2.24	8	2.24
Side plank on gondola car.				
With corner bands, one, spliced	4	1.12	....	....
Without corner bands, spliced, one	3½	.98	....	....
Without corner bands, one plank, renewed	7	1.96	....	....
Without corner bands, same side of car, each additional plank, renewed	6	1.68	....	....
With corner bands, bolted or riveted, one plank, renewed	10	2.80	....	....
With corner bands, bolted or riveted, each additional plank, on same side of car, renewed	6	1.68	....	....
Side plate, one, renewed	35	9.80	45	12.60
Side plate, one, spliced	11	3.08	20	5.60
Side slat or end slat (stock car), nailed, one, renewed	½	.14	....	....
Side slat (stock car), inside or outside, bolted, one, renewed	1	.28	....	....
Siding removed and replaced, per lineal foot	....	.18	....	.22
Siding removed and replaced, per lineal foot, where nails are set and holes puttied	....	....	....	.26
Siding, short, above or below door openings, not including fixtures, R. and R., renewed, per lineal foot	¼	.07	¼	.07
Slat, end (stock car), bolted or riveted, one, renewed	1	.28	....	....
Sheave wheel, in brake rod, one, renewed	½	.14	½	.14
Sill nailing girth, longitudinal or end, for steel or steel underframe cars, applied (excluding all other operations, which should be paid for in accordance with M. C. B. Rules), per lineal foot for longitudinal or end girths, including removal	....	.04	....	.04
Sill step, bolted, one, renewed	¾	.21	¾	.21
Sill step, blacksmith labor repairing, including R. and R.	1¼	.35	1¼	.35
Sill steps, hand holds and ladder treads, tightening, four or less	¼	.07	¼	.07
Sills, short stub, bolted to side of full length single center sill, and extending from end sill to point back of body bolster, and to which draft timbers are bolted				
One, renewed	18½	5.18	....	....
Two, renewed, same end	23	6.44	....	....
1 center sill spliced, per end	22	6.16	30	8.40
2 center sills, spliced, same end	30	8.40	40	11.20
1 center sill, renewed	43	12.04	65	18.20
2 center sills, renewed	52	14.56	80	22.40
1 end sill, under siding, renewed	18	5.04	22	6.16
1 end sill, outside siding, renewed	8	2.24	8	2.24
1 end sill, under siding, renewed, when one or more defective sills are renewed or spliced	8	2.24	10	2.80
1 end sill, outside siding, renewed when one or more defective sills are renewed or spliced	4½	1.26	4½	1.26
1 intermediate sill, renewed	30	8.40	52	14.56
1 intermediate sill, short, for hopper cars, renewed	14	3.92	....	....
2 intermediate sills, short, for hopper cars, at one end of car, renewed	16	4.48	....	....
2 intermediate sills, renewed	37	10.36	72	20.16
3 intermediate sills, renewed	44	12.32	91	25.48
4 intermediate sills, renewed	51	14.28	110	30.80
1 intermediate sill and one center sill, renewed	50	14.00	84	23.52
1 intermediate sill and two center sills, renewed	59	16.52	99	27.72
2 intermediate sills and one center sill, renewed	57	15.96	103	28.84
2 intermediate sills and two center sills, renewed	66	18.48	118	33.04
3 intermediate sills and 1 center sill, renewed	64	17.92	122	34.16
3 intermediate sills and 2 center sills, renewed	73	20.44	137	38.36
4 intermediate sills and 1 center sill, renewed	71	19.88	141	39.48
4 intermediate sills and 2 center sills, renewed	80	22.40	150	42.00
1 intermediate sill, spliced	15	4.20	21	5.88
1 side sill and 1 center sill, renewed	59	16.52	91	25.48
1 side sill and 2 center sills, renewed	68	19.04	106	29.68

	Ordinary Cars		Refrigerator Cars	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
2 side sills and 1 center sill, renewed	75	$21.00	117	$32.76
2 side sills and 2 center sills, renewed	84	23.52	132	36.96
1 side sill, spliced	15½	4.34	20	5.60
1 side sill, renewed	39	10.92	58	16.24
Two side sills, renewed	55	15.40	86	24.08
One side sill and one intermediate sill, renewed	46	12.88	79	22.12
One side sill and two intermediate sills, renewed	53	14.84	97	27.16
One side sill and three intermediate sills, renewed	60	16.80	117	32.76
One side sill and four intermediate sills, renewed	67	18.76	135	37.80
Two side sills and one intermediate sill, renewed	62	17.36	105	29.40
Two side sills and two intermediate sills, renewed	69	19.32	124	34.72
Two side sills and three intermediate sills, renewed	76	21.28	143	40.04
Two side sills and four intermediate sills, renewed	83	23.24	162	45.36
One side sill, one intermediate and one center sill, renewed	66	18.48	110	30.80
Two side, one intermediate and one center sill, renewed	82	22.96	136	38.08
One side, two intermediate and one center sill, renewed	73	20.44	129	36.12
Two side, two intermediate and one center sill, renewed	94	26.32	160	44.80
One side, three intermediate and one center sill, renewed	80	22.40	148	41.44
Two side, three intermediate and one center sill, renewed	96	26.88	174	48.72
One side, four intermediate and one center sill, renewed	87	24.36	167	46.76
Two side, four intermediate and one center sill, renewed	103	28.84	193	54.04
One side, one intermediate and two center sills, renewed	75	21.00	125	35.00
Two side, one intermediate and two center sills, renewed	91	25.48	151	42.28
One side, two intermediate and two center sills, renewed	82	22.96	144	40.32
One side, three intermediate and two center sills, renewed	89	24.92	163	45.64
One side, four intermediate and two center sills, renewed	96	26.88	182	50.96
Two side, two intermediate and two center sills, renewed	98	27.44	170	47.60
Two side, three intermediate and two center sills, renewed	105	29.40	189	52.92
Two side, four intermediate and two center sills, renewed	112	31.36	208	58.24
Each side or intermediate sill spliced when longitudinal sills have to be renewed, or when other sills are spliced at same end	5	1.40	8	2.24
One center sill spliced, when intermediate or side sills have to be renewed	12	3.36	16	4.48
One center sill spliced when other center sill has to be renewed	8	2.24	10	2.80
Two center sills, spliced, when intermediate or side sills have to be renewed	20	5.60	27	7.56
Sill stiffener or furring strip, bolted, per section renewed	1	.28	1	.28
Sill stiffener or furring strip, nailed, per section, renewed	½	.14	½	.14
Stakes, end or side, on gondola cars, each, renewed	2	.56	....	....
Stake pocket, wooden car, each, renewed	½	.14	....	....
Stake pocket, blacksmith labor repairing, including R. and R	¾	.21	....	....
Stake pocket "U" bolt, one, renewed	¼	.07	....	....
Stake pocket "U" bolt, blacksmith labor repairing, including R. and R	½	.14	....	....
Strap or bolt, one, renewed	¾	.21	¾	.21
Strap or anchor bolt, blacksmith labor repairing, including R. and R	1¼	.35	1¼	.35
Striking plate, one, renewed	1	.28	1	.28
Striking plate, blacksmith labor repairing, including R. and R	1½	.42	1½	.42
Sub-flooring, including cleats, when not associated with sill renewals, per lin. ft	....	.04	....	.04
Tank head blocks, not including castings, one, renewed	4	1.12	....	....
Tank head block casting, one, renewed	3	.84	....	....
Tank raised to apply draft bolts, empty car, per end	4	1.12	....	....
Tank raised to apply draft bolts, loaded car, per end	6	1.68	....	....
Train pipe replaced and tightened, when shifted	1	.28	1	.28
Truck, R. and R., when necessary in connection with repairs made on a rivet basis	1	.28	1	.28
Truck hanger (swing motion truck), renewed	3½	.98	3½	.98
Truck hanger, two same end of car (swing motion truck) renewed	4	1.12	4	1.12
Truck hanger, blacksmith labor repairing, including R. and R	5	1.40	5	1 40
Truck hanger, each additional in same truck, blacksmith labor repairing, including R. and R	2	.56	2	.56
Truck hanger pin, separately (swing motion truck), renewed	2	.56	2	.56
Truck hanger pin, blacksmith labor repairing, including R. and R	2½	.70	2½	.70
Truck hanger pin seat, one, renewed	1½	.42	1½	.42
Truck spring, replacing, one or cluster, when out of place, both loaded and empty car	¾	.21	¾	.21
Truck springs, one or all, in same truck, renewed	2	.56	2	.56
Truck transom, one, wood, renewed	10	2.80	10	2.80
Truck transoms, two, wood, renewed, in same truck	12	3.36	12	3.36
Truck truss rod, outside, one, renewed	2	.56	2	.56
Truck truss rod, center, one, renewed	9	2.52	9	2.52
Truck truss rod, outside, blacksmith labor repairing, including R. and R	$03	.84	3	$0.84
Truck truss rod, center, blacksmith labor repairing, including R. and R	10	2.80	10	2.80
Truck truss rod saddle, one, renewed	2	.56	2	.56
Truss rod, body bolster, one, renewed	1½	.42	1½	.42
Truss rod, body bolster, blacksmith labor repairing, including R. and R	2½	.70	2½	.70
Trussing car, empty	1½	.42	1½	.42
Trussing car, loaded	2	.56	2	.56
Truss rod across end of car, one, renewed	1	.28	1	.28
Trussing truck bolster, empty car	1	.28	1	.28
Trussing truck bolster, loaded car	1½	.42	1½	.42
Truss rod turnbuckle, one, renewed	1	.28	1	.28
Turnbuckle lock, one, renewed	½	.14	½	.14
Weighing and re-stenciling stock cars, net	....	1.25	....	....
Weighing and re-stenciling other cars, net	....	1.00	....	1.00
When necessary to remove load to make repairs at one end of car	3½	.98	3½	.98

REPAIRS OF STEEL OR STEEL PARTS OF COMPOSITE CARS.

All rivets ½ in. diameter or over, 14 cents net per rivet, which covers removal and replacing of rivets, including removing, fitting, punching or drilling holes when applying patches or splicing and replacing damaged parts, not to include straightening.

All rivets ¼ in. diameter and less than ½ in. diameter, 8 cents net per rivet, which covers removal and replacing of rivets, including removing, fitting, punching or drilling holes when applying patches or splices and replacing damaged parts, not to include straightening.

Straightening or repairing parts removed from damaged car, 60 cents per 100 lb.

Straightening or repairing parts in place on damaged car; also any part that requires straightening, repairing or renewing, not included on rivet basis, 28 cents per hr.

Repairs of steel tanks of tank cars.

Labor, repairing and testing, per hr	$0.40
Steaming, per tank	.75
Water for testing, per 1,000 gal	.06

In making repairs to cars on a rivet basis, the cost of removing and replacing fixtures not secured by rivets, but necessarily removed in order to repair or renew adjacent defective parts, should be in addition to the rivet basis; rules covering wood-car repairs to govern.

DISMANTLING CARS—PER RULE 120.

Dismantling wood constructed cars, including trucks and all work necessary, including handling, assorting and weighing scrap.

Box, stock and other house cars, except refrigerators	$10.00
Flat cars	6.50
Gondola or hopper car having sides over 36 in	9.00
Gondola or hopper car having sides 36 in. and under	8.00
Refrigerator	12.00

Deduct $2.00 from the above prices when trucks are not dismantled.

Rule 108.—No labor to be charged for the inspection of cars, testing or adjusting brakes, adjusting angle-cocks or tightening unions.

No charge to be made for the material or labor of lubrication.

Rule 109.—When it is necessary to apply an M. C. B. coupler complete, on account of a broken or missing knuckle or lock, the usual labor charge for replacing a coupler can be made.

When one or more carrier iron bolts over 6 in. long are replaced, and pocket coupler at same end of car is removed and replaced, the regular labor charge for applying carrier iron bolts should be reduced one-fourth hour for each bolt.

When one draft timber is renewed the regular labor charge for renewing carrier iron bolts over 6 in. long, passing through or adjacent to mate draft timber, should be reduced one-fourth hour per bolt.

Where carrier iron bolts over 6 in. long do not pass through draft timber, the regular carrier iron bolt labor shall be reduced one-fourth hour per bolt when such bolts are renewed at same time one or both draft timbers or pocket coupler are renewed at that end of car.

Rule 110.—No additional labor to be charged for:

Applying end sheathing when end plate or end sill under sheathing is renewed or replaced, also side sheathing when side sill or side plate is removed or replaced.

Applying center pins or friction rollers or putting car on center when center plates or center-plate bolts are applied at same end.

Applying center plate or center-plate bolts when car

is raised to standard height by adjusting center plates or body bolster, at same end of car.

Applying dead block or platform plank when end sill is applied at same end.

Applying coupler when draft timber, one or both, is applied at the same end.

Applying brake hangers when brake beam is applied.

Rule 111.—The following table shows the labor charges allowable for air-brake repair work. The letters "R. & R." mean "removed and replaced."

Cents.

Air hose, R. & R. 4
Angle cock, R. & R. (including air hose, R. & R.) .. 8
Angle cock handle, renewed (including angle cock and air hose, R. & R.) 12
Angle cock, R. & R., and grinding in (including air hose, R. & R.) 28
Check valve case, spring gasket, or all, R. & R. 10

DETAILS.	Cents.
Disconnecting union	3
Check valve case (2 cap screws)	2
Emergency valve seat	5
Total	10

Coupler dummy, R. & R. (1 lag screw) 1
Cut-out cock, R. & R. 9

DETAILS	Cents.
1 pipe union disconnected	3
2 pipe connections	6
Total	9

Cut-out cock, grinding in, R. & R. 30
Cut-out cock handle, renewed 4
Cylinder, R. & R., detachable 23
Cylinder, R. & R., combined type 30

DETAILS.	Cents.
Push rod (1 connecting pin)	3
Clamping piston (1 cap screw)	2
Cylinder head, R. & R. (4 nuts, ½ inch, 1 cent each)	4
Disconnecting cylinder from reservoir (7 nuts, ½ inch, 1 cent each)	7
Reclamping cylinder piston (1 cap screw)	2
Removing cylinder from car (6 nuts, ⅝ inch, 2 cents each)	12
Total	30

Cylinder and reservoir, R. & R. 41

DETAILS.	Cents.
Removing push rod (1 connecting pin)	3
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Removing cylinder from car (6 nuts, ⅝ inch, 2 cents each)	12
Removing reservoir from car (2 nuts, ⅝ inch, 2 cents each)	4
Removing release rods	4
Removing release valve	2
Removing 2 plugs	2
Removing triple (2 nuts, ⅝ inch, 2 cents each)	4
Disconnecting train pipe union	3
Disconnecting retaining pipe union	3
Total	41

Cylinder and reservoir, tightened when loose (8 nuts, 1 cent each) 8
Cylinder cleaned, oiled, tested and stenciled, including obliterating old stencil marks 38

DETAILS	Cents.
Removing push rod (1 connecting pin)	3
Clamping cylinder piston (1 cap screw)	2
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Cleaning, testing and stenciling	29
Total	38

Cylinder release springs, R. & R. 11

DETAILS.	Cents.
Removing push rod (1 connecting pin)	3
Clamping cylinder piston (1 cap screw)	2
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Reclamping cylinder head (1 cap screw)	2
Total	11

Cylinder gasket, R. & R. 25

DETAILS.	Cents.
Disconnecting triple union	3
Disconnecting retaining pipe union	3
Disconnecting reservoir block (2 nuts, ⅝ inch, 2 cents each)	4
Disconnecting reservoir from cylinder (7 nuts, ½ inch, 1 cent each)	7
Removing push rod (connecting pin)	3
Clamping cylinder piston	1
Removing release rod	4
Total	25

Emergency check valve, grinding in 10
Emergency valve piston, R. & R. 10

DETAILS.	Cents.
Disconnecting union	3
Removing check valve case (2 cap screws)	2
Removing emergency valve seat	5
Total	10

Emergency valve seat, R. & R. (see E. V. piston)..10
Emergency valve, rubber seat, R. & R. 10

DETAILS.	Cents.
Disconnecting union	3
Removing check valve case (2 cap screws)	2
Removing riveted pin	4
Removing emergency valve nut	1
Total	10

Cylinder piston packing, R. & R. 13

DETAILS.	Cents.
Removing push rod (1 connecting pin)	3
Clamping cylinder piston (1 cap screw)	2
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Removing leather packing (4 nuts, ½ inch, 1 cent each)	4
Total	13

Cylinder piston, R. & R. 15

DETAILS.	Cents.
Removing push rod (1 connecting pin)	3
Clamping cylinder piston (1 cap screw)	2
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Removing leather packing (4 nuts, ½ inch, 1 cent each)	4
Reclamping cylinder piston (1 cap screw)	2
Total	15

Dirt collector in branch pipe, cleaned, drained and stenciled 5
Gasket, air hose, coupling, renewed 2
Graduating valve, reground, round type, 8-inch or 10-inch, each 15
Graduating valve, reground flat type, 8-inch or 10-inch, each 25
Oil plugs, R. & R., each 2
Packing leather expander, renewed (see cylinder piston) 7
Pipe, train or branch, R. & R., for each connection made 3
Push rod, R. & R. (1 connecting pin) 3
Release valve, renewed 6

DETAILS.	Cents.
Disconnecting release rod	4
Disconnecting release valve	2
Total	6

Release valve, removed, repaired and replaced (R. & R., 4 cents) 9
Release valve rod, removed and replaced (including repairs, if necessary) 2
NOTE.—If necessary to renew staple supporting release rod, add 1

DETAILS.	Cents.
1 spring cotter	2
Removing staple	1
Total	3

Reservoir, R. & R. 29

DETAILS.	Cents.
Removing from car (2 nuts, ⅝ inch, 2 cents each)	4
Disconnecting from cylinder (7 nuts, ½ inch, 1 cent each)	7
Removing release rods	4
Removing release valve	2
Removing 2 plugs	2
Removing triple valve (2 nuts, ⅝ inch, 2 cents each)	4
Disconnecting unions	3
Disconnecting union, retaining pipe	3
Total	29

	Cents.
Removing cylinder cap (3 nuts, ½-inch, 1 cent each)	3
Removing slide valve (3 nuts, ½-inch, 1 cent each)	3
Retaining valve, repaired	25

DETAILS.	Cents.
Retaining valve handle, R. & R.	2
Retaining valve case, R. & R.	1
Retaining valve, ground in	5
Retaining valve, cock key, ground in	15
Retaining valve, cock key, and springs, R. & R.	2
Total	25

Retaining valve, R. & R. (2 lag screws, 2 cents, valve 3 cents)	5
Slide valve, removed, ground in and replaced	33
Slide valve spring, R. & R.	6

DETAILS.	Cents.
Cylinder cap (3 cap screws)	2
Removing riveted pin	4
Total	6

Slide valve spring, R. & R., removing riveted pin	4
Strainer, renewed (disconnecting union)	3
Triple cylinder bushing, reground or refitted	$1.12
Triple cylinder cap, R. & R. (3 nuts, ½-in., 1 cent each)	3
Triple cylinder cap gasket, renewed (3 nuts, 1½ in., 1 cent each, gasket 2 cents)	5
Triple piston packing ring, renewed	22
Triple valve removed, cleaned, oiled, tested and stenciled	45

DETAILS.	Cents.
Train pipe union, disconnected	3
Retaining pipe union, disconnected	3
Removing triple (2 nuts, ⅝ inch, 2 cents each)	4
Check valve case (2 cap screws)	2
Emergency valve seats	5
Cylinder cap (3 bolts)	3
Cleaning, testing and stenciling	25
Total	45

Triple valve gasket, renewed	10

NOTE.—Not to be allowed when triple valve is oiled, cleaned or removed for other repairs.

DETAILS.	Cents.
Disconnecting branch pipe union	3
Disconnecting retaining pipe union	3
Removing triple (2 nuts, ⅝ inch, 2 cents each)	4
Total	10

Union, disconnected and connected	3

The following basic units must not be used in rendering bills in the foregoing schedule, but may only be used in determining cost of other combinations of air-brake repairs not mentioned.

	Cents.
Cap screws or bolts, R. & R., 1 or more	2
Cylinder cleaning, testing and stenciling	29
Emergency valve seat, R. & R.	5
Graduating stem nut, R. & R.	2
Lag or wood screws, R. & R., each	1
Nuts tightened when loose, each	1
Nuts, ½ inch or less, R. & R., 1 or 2 on same bolt	1
Nuts, ⅝ inch or over, R. & R., 1 or 2 on same bolt	2
Pins connecting, R. & R. (including split key)	3
Pins riveted, R. & R., each	4
Plugs, oil, R. & R., each	1
Threads on pipe, cutting, per coupling	5
Train or branch pipe, disconnected and connected or only connected, each connection	3
Triple valve, cleaning, testing and stenciling	25
Unions disconnected and connected	3

SETTLEMENT FOR DESTROYED OR DAMAGED CARS.

Rule 112.—When the body or trucks of a foreign car are destroyed or badly damaged, the owner shall, upon request, furnish depreciated value of body and trucks separately (the same to be figured from the date the car was originally built), and the party damaging shall have the option of rebuilding or settling under the depreciated value.

If it is decided not to rebuild, the owner must be immediately advised.

Rule 113.—For the mutual advantage of railway companies interested, the settlement for a car owned or controlled by a railway company, when damaged or destroyed upon a private track, shall be assumed by the railway company delivering the car upon such tracks.

When a car owned or controlled by a railway company is damaged or destroyed on the tracks of a road which is not a member of the per diem rules agreement of the American Railway Association, the road responsible for the per diem while in the possession of the non-subscriber shall be responsible to the owner for damage to or destruction of the car.

Rule 114.—If the company on whose line the car is destroyed elects to rebuild either body or trucks, or both, the original plan of construction must be followed, and the original kind and quality of materials used. In such cases no allowance shall be made for betterments.

Rule 115.—If only the body of a car is destroyed, and the company destroying it elects to return the trucks, they shall be put in good order, or accompanied by a defect card, covering all defects or improper repairs made by them for which owners are not responsible, and forwarded, within 60 days, free of freight or other charges, to the nearest point on the line of the company owning or operating the car, and the number, line and class of car destroyed shall be stenciled or painted on each truck so returned.

Except in cases of trucks of 50,000 lb. capacity or less, when the railroad company destroying the body of car may elect to retain the trucks and settle for them at their scrap value, except that second-hand value will be allowed for all metal brake beams good for further service and the average credit price for wheels. This paragraph will not apply to trucks belonging to individual ownership.

Rule 116.—The settlement prices of new eight-wheel cars shall be as follows, with an addition of $10 for each car equipped with 8-in. air-brake equipment and $35 for 10-in. air-brake equipment. The road destroying a car with air brakes may elect to return the air-brake apparatus, including such attachments as are usually furnished by the air-brake manufacturer, complete and in good condition:

BODIES OF 8-WHEEL CARS.

Wood.

Box, 40 feet long or over	$440.00
Box, 36 feet long or over, but under 40 feet	385.00
Box, 34 feet long or over, but under 36 feet	360.00
Box, 32 feet long or over, but under 34 feet	330.00
Box, under 32 feet long	265.00
Box, ventilated, 40 feet long or over	470.00
Box, ventilated, 36 feet long or over, but under 40 feet	415.00
Box, ventilated, 34 feet long, but under 36 feet	385.00
Box, ventilated, 32 feet long, but under 34 feet	350.00
Flat, plain, 40 feet long or over	200.00
Flat, plain, 32 feet long or over, but under 40 feet	155.00
Flat, plain, under 32 feet long	110.00
Gondola, drop bottom, 40 tons capacity or over	330.00
Gondola, drop bottom, 30 tons capacity or over, but under 40 tons	300.00
Gondola, drop bottom, 25 tons capacity or over, but under 30 tons	275.00
Gondola, drop bottom, 20 tons capacity or under	200.00
Gondola, hopper bottom, 50 tons capacity	440.00
Gondola, hopper bottom, 40 tons capacity or over, but under 50 tons	360.00
Gondola, hopper bottom, 30 tons capacity or over, but under 40 tons	330.00
Gondola, hopper bottom, 25 tons capacity, but under 30 tons	290.00
Gondola, hopper bottom, 20 tons capacity or less	220.00
Gondola, plain, 50 tons capacity or over	350.00
Gondola, plain, 40 tons capacity, but under 50 tons	300.00
Gondola, plain, 30 tons capacity, but under 40 tons	275.00
Gondola, plain, 25 tons capacity, but under 30 tons	250.00
Gondola, plain, under 25 tons	140.00
Stock, 34 feet long or over	330.00
Stock, 32 feet long or over, but under 34 feet	300.00
Stock, under 32 feet long	265.00
Self-clearing hopper, 30 tons, but less than 40 tons	295.00
Self-clearing hopper, 40 tons, but less than 50 tons	315.00
Self-clearing hopper, 50 tons capacity and over	400.00

The length of cars above mentioned refer to the lengths over the end sills.

The price for car bodies contained in the foregoing schedule are exclusive of the following items, the price of which may be added when a car is so equipped:

(a) Double-deck stock cars, per car	$25.00
(b) Metal body bolsters; also composite body bolsters in which the metal members are at least 8 in. in depth and have an aggregate minimum sectional area of 16 sq. in., provided car is 60,000 lb. capacity or over and so stenciled, and has trucks with journals 4¼ in. or over when new, per car	30.00
(c) Center sills or continuous metal draft members shall be figured per lineal foot per member, according to depth and weight as follows and including draft lugs riveted on, or cast integral on cast-steel extensions. (Where such cast-steel extensions are used, the metal center sills or continuous metal draft members to which they are attached must be figured full length of car.)	
8 in. in depth and not less than 18 lb. per ft. per member	.90
9 or 10 in. in depth and not less than 20 lb. per ft. per member	1.10
12 in. in depth and not less than 25 lb. per ft. per member	1.30
15 in. or over in depth and not less than 33 lb. per ft., per member	1.50
(d) Cover plate used on metal center sills or continuous metal draft members, per lineal foot of the sills actually covered, whether plate is applied top or bottom, or both, or in part on top and in part on bottom. (This price shall not apply to what is commonly known as tie plates, regardless of dimensions.) Price, per ft.	.65
(e) Metal draft arms extending 24 in. or more back from center line of body bolster, including draft lugs, whether riveted on or cast integral, per car	65.00
(f) Friction draft gears, per car	25.00
(g) Metal needle beams, when used in conjunction with metal center sills or continuous metal draft members, per car	10.00
(h) All-steel ends of the corrugated type, per car	40.00
(i) Where allowances as above are based upon length, fractional parts of a foot in the aggregate length shall be counted as 1 ft., if ½ or greater; if less than ½, they shall be dropped.	

NOTE.—Paragraphs (a), (f) and (h) to apply to all cars so equipped.

BODIES OF 8-WHEEL CARS.

Steel.

Box, wooden body, metal underframe, 50 tons capacity, 36 feet 6 inches or over, but less than 40 feet over end sills	$825.00
Box, wooden body, metal underframe, 50 tons capacity, 36 feet long or over, but less than 38 feet 6 inches over end sills	740.00
Box, wooden body, metal underframe, 50 tons capacity and over, 40 feet long or over, but less than 46 feet over end sills	850.00
Box, wooden body, metal underframe, 30 tons capacity and over, 36 feet long, over end sills	725.00
Box, wooden body, metal underframe, 40 tons capacity and over, but less than 50 tons capacity, 36 feet long and over, but less than 38 feet long over end sills	730.00
Box, wooden body, metal underframe, 40 tons capacity but less than 50 tons capacity 38 feet long but less than 40 feet long over end sills	775.00
Box wooden body metal underframe 40 tons capacity but less than 50 tons capacity 40 feet long or over, but less than 46 feet over end sills	800.00
	Per Lb.
Box, all steel, any capacity or length	.0325
Flat, wooden floor, metal underframe, any capacity or length	.0325
Gondola, wooden body, metal underframe, solid bottom, 30 tons capacity and over, but under 40 tons	$650.00
Gondola, wooden body, metal underframe, solid bottom, 40 tons capacity but under 50 tons	675.00
Gondola, wooden body, metal underframe, solid bottom, 50 tons capacity and over, but under 70 tons	700.00
Gondola, wooden body, metal underframes, solid bottom, 70 tons capacity and over	820.00
Gondola, all steel, any capacity or length, having either solid, drop or hopper bottom or self-clearing by floor dropping on side	Per Lb. .0325
Gondola, wooden body, metal underframe, hopper bottom, 32 feet over end sills, but under 40 feet	$650.00
Stock, wooden body, metal underframe, 50 tons capacity, 36 feet long or over, over end sill	775.00
Hopper, self-clearing wooden body, steel underframe, 50 tons capacity and over	750.00
Hopper, all steel (including coke cars), self-clearing, any capacity or length	Per Lb. .0325
Gondola, wooden body, steel underframe, self-clearing, by floor dropping on side, 40 tons capacity and over, but under 50 tons	$800.00
Gondola, wooden body, steel underframe, self-clearing, by floor dropping on side, 50 tons capacity and over	825.00
Stock, wooden body, metal underframe, less than 50 tons capacity, 36 feet long or over, over end sill	715.00

To the above prices for box or stock cars with metal underframe and steel framed composite superstructure, add $50.00 if built with sheathing boards on outside, or $100.00 if built with sheathing boards on inside only.

TRUCKS.

50,000 lb. capacity and less, with metal transoms and wooden bolsters, per pair	$215.00
60,000 lb. capacity or under, with wooden bolsters, per pair	215.00
50,000 lb. capacity, all metal trucks, per pair	225.00
60,000 lb. capacity, but under 80,000 lb., all metal, per pair	315.00
70,000 lb. capacity, but under 80,000 lb., with wooden bolsters, per pair	215.00
80,000 lb. capacity, but under 100,000 lb., all metal, per pair	350.00
100,000 lb. capacity or over, but under 140,000 lb., all metal, per pair	375.00
140,000 lb. capacity or over, all metal, per pair	600.00

Prices include brake beams complete, truck levers, dead-lever guides and bottom-connection rods.

For trucks with wrought or steel-tired wheels, an additional allowance of $84.00 per car shall be made.

All trucks in service of 60,000 pounds capacity or over, which consist entirely of metal with the exception of the spring plank, shall be known as all-metal trucks.

Rule 117.—In the case of wooden car bodies the depreciation due to age shall be figured at 6 per cent per annum upon the yearly depreciated value of such car bodies.

In the case of all-steel car bodies or car bodies with steel underframes and steel superstructure frames, the depreciation shall be figured at 5 per cent per annum. A steel superstructure frame car indicates a car having the side and end uprights, braces and plates riveted together.

In the case of car bodies with steel underframes and wooden superstructure, the depreciation shall be figured at 5½ per cent per annum, with the exception of steel underframe flat cars having wooden floors, which shall be figured at 5 per cent per annum.

The depreciation on the tanks of tank cars for handling non-corrosive substances shall be 4 per cent per annum; for the tanks of tank cars handling corrosive substances the depreciation shall be 5 per cent per annum.

The depreciation on trucks other than all-metal shall be figured at 6 per cent per annum.

The depreciation on all-metal trucks shall be figured at 5 per cent per annum.

Allowances for depreciation shall in no case exceed 60 per cent of the value new.

The amounts $10.00 and $35.00 for air brakes shall not be subject to any depreciation.

Rule 118.—The bodies of refrigerator cars, stock cars permanently fitted for stall shipments, and other freight cars, designed for special purposes, not referred to above, shall be settled for at the present cost price, as may be agreed to by the parties in interest, less the depreciation due to age, which shall be on the same basis as for regular freight equipment.

In the case of cars equipped with racks for carrying coke and for other such purposes, and also stock cars other than those permanently fitted for stall shipments with feeding and watering attachments, the actual cost of these equipments shall be added to the standard settlement price for such cars.

DISPOSITION OF WORN-OUT CARS.

Rule 120.—Where the labor cost of repairs exceeds 10 per cent of the base price of car body, as given in Rule 116, such car shall be jointly inspected by handling line and a representative of car owner or of a disinterested line (whichever can be most conveniently obtained), and forms furnished, as shown, showing all defects found on car and an estimated total cost of the repairs. Upon receipt of this information,

owner must authorize either destruction or repairs. In the latter case owner must forward to handling company necessary plans and specifications for such repairs.

........................RAILWAY COMPANY.

JOINT INSPECTION CERTIFICATE.

..............................19....

The undersigned has personally inspected (Initial) (Kind) Car No.................... and find it to be in the following condition:

REPAIRS REQUIRED.	NATURE OF DEFECTS.
Estimated Cost of Repairs	....

Signature.................................... Inspector for....................................

Signature.................................... Inspector for....................................

Size 8 by 10½ inches.

SEE RULE 120.

If owner authorizes destruction, handling line shall allow credit for all material at M. C. B. scrap prices, less labor cost of destruction.

The base price of car body under Rule 116, as referred to above, not to include value of air brakes, or other additions for special items as referred to in Rule 116.

FURNISHING MATERIALS.

Rule 122.—Companies shall promptly furnish to each other, upon requisition, and forward, freight or express charges collect from point of shipment, materials for repairs of their cars on foreign lines. If the material is for repairs of car owner's defects, the foreign company may bill the car owner for the entire freight charges, and in such case the car owner may reclaim freight charges for that portion of the movement over its own line. If the material is for repairs of user's defects, the foreign line may reclaim only for that portion of the movement over its line. A separate bill, with copy of freight or express bill attached, should be rendered for the freight or express charges, showing reference to bill covering repairs.

Requisitions for such material shall specify that same is for repairs of cars, giving car number and initial of such car, together with pattern number or other data to enable correct filling of requisition.

Material weighing less than 125 lb. gross weight ordered from car owner must be shipped by express.

The company having the car in its possession at the time shall provide from its own stock the following:

Lumber, forgings, hardware stock, paint, hairfelt, piping, air-brake material and all M. C. B. Standard material.

SETTLEMENT OF DISPUTES.

Rule 123.—In order to settle disputes arising under the rules, and to facilitate the revision of the rules at the annual conventions of the Association, an Arbitration Committee of five representative members shall be appointed annually by the Executive Committee; three members of this committee to constitute a quorum.

In case of any dispute or question arising under the rules between the subscribers to said rules, the same may be submitted to this committee through the Secretary, to receive consideration by the Arbitration Committee.

The abstract should set forth:

1. An agreed statement of facts.
2. Argument of plaintiff.
3. Argument of defendant.

The abstract should consist of not more than three typewritten pages, letter size, single space, and should be signed by both parties to the dispute.

Should one of the parties refuse or fail to furnish the necessary information, the committee shall use its judgment as to whether, with the information furnished, it can properly give its opinion. The decisions of the committee shall be final and binding upon the parties concerned. This committee shall report its decisions to the Association, and its report shall be incorporated in the annual report of proceedings of the Association.

REVISION OF THIS CODE OF RULES.

Rule 124.—The Arbitration Committee shall ask for suggestions of changes, amendments and additions to these rules prior to each annual convention, which it shall consider, and it shall report its recommendations to the succeeding annual convention.

Rule 125.—In the revision of these rules by the Association, a two-thirds vote shall be necessary for adoption.

Rule 126.—Voting powers shall be the same as prescribed in the Constitution of the Master Car Builders' Association on matters pertaining to the adoption of standards and the expenditure of money.

Rule 127.—This Code of Rules shall be introduced for the discussion and revision at one session of the Master Car Builders' Association convention each year.

CONDITIONS OF ACCEPTANCE OF THIS CODE.

Rule 128. Any car owner or railway company may become a party to this Code of Rules by giving notice through one of its general officers to the Secretary of the Master Car Builders' Association.

Railroad companies becoming subscribers to this Code of Rules must have a representative member in the Master Car Builders' Association.

Rule 129.—Any car owner or railway company that is a party to this Code of Rules shall be bound by same through its successive revisions, until one of its general officers files with the Secretary of the Master Car Builders' Association its notification of withdrawal.

Rule 130.—Acceptance or rejection of this Code of Rules must be as a whole, and no exception to an individual rule or rules shall be valid.

Rule 131.—This Code of Rules shall take effect October 1, 1915.

AMERICAN RAILWAY ASSOCIATION.
CAR SERVICE RULE 15.

Unless otherwise agreed, the cost of transferring the lading of freight cars or rearrangement of lading at junction points shall be settled as follows:

First.—The delivering road shall pay cost of transfer or rearrangement:

(a) When transfer is due to defective equipment that is not safe to run according to M. C. B. Rules, except where the repairs can be made under load as per M. C. B. Rule 2, Section (f).

(b) When transfer or rearrangement of load is due to contents being improperly loaded or overloaded, according to M. C. B. Rules, or the Interstate Commerce Commission Regulations for the Transportation of Explosives and Other Dangerous Articles by Freight and by Express, or when dimensions of the lading of open cars are in excess of the published clearances of any of the roads covered by the routing.

(c) When transfer is due to delivering line not desiring its equipment to go beyond junction points.

(d) When cars can not pass approved third rail clearances of The American Railway Association.

Second.—The receiving road shall pay cost of transfer or rearrangement—

(e) When cars can not pass clearances, except as provided in paragraph (d), or when cars and lading exceed load limit or can not be moved through on account of any other disability of receiving line.*

(f) When receiving road desires transfer to save cost of mileage or per diem.

* NOTE TO RULE 15 (*e*).—The word "cars" covers both closed and open cars, but not lading on open cars. The words "load limit" refer to the limits placed on bridges, tracks, etc., and not to car capacity.

Passenger Equipment.

Preface.—These rules make car owners responsible for, and therefore chargeable with, the repairs to their cars necessitated by ordinary wear and tear in fair service, so that defect cards will not be required for any defects thus arising.

Railroad companies handling cars are responsible for damage done to any car by unfair usage, derailment or accident, and for improper repairs made by them, and they should make proper repairs at their own expense, or issue defect card covering all such damage or improper repairs.

All inspection of passenger cars for interchange will be made in accordance with the following rules:

Rule 1.—Each Railway Company shall give to foreign cars, while on its line, *the same care as to oiling, packing, inspection and adjusting brakes that it gives its own cars,* except in case of cars on which work is done under special agreement existing between the company owning the cars and the road operating the same.

Rule 2.—The expenses of maintenance of passenger equipment operated in interchange or line service shall be divided into three classes, namely:

(a) Owner's defects.

(b) Delivering Company's defects.

(c) Line expenses proratable against the roads comprising the lines on a mileage basis.

Rule 3.—(a) Owner's defects are those due to ordinary wear and tear.

(b) Delivering company's defects are those due to unfair usage, derailment or accident. Delivering company is solely responsible to car owners for any improper repairs made by it.

(c) Line expenses shall consist of the expense of terminal cleaning.

Oil lighting (oil, chimneys, wicks, burners, shades).

Gas lighting (gas, mantles, tips, domes, globes, bulbs, bowls).

Electric lighting (fuses, incandescent bulbs, charging current, shades and belts).

Heating (terminal heating and coal furnished for individual car heaters en route).

Candles and broken glass.

(d) Equipment and tools missing from the inside of baggage, mail and express cars are an owner's responsibility.

All inside or concealed parts of passenger equipment cars are at owner's risk.

Rule 4.—The railway making the repairs for the defects not proratable against the line is privileged to bill the car owner for these repairs, unless there is evidence to indicate that the damage was occasioned by unfair handling on the part of the delivering company.

Billing repair cards shall be furnished in all cases where repairs have been made.

Rule 5.—Information as to mileage made by cars must be furnished promptly on request of owners by railways over which cars are run.

Rule 6.—Each operating line at interest may charge one journal bearing only per journal per trip. The following information must be specified on billing repair card or on the bill itself:

Whether solid, filled or any other kind, removed and replaced.

Length of journal.

Box number.

Rule 7.—No labor charge shall be made for applying brake shoes, journal bearings, hose (air, steam or signal), incandescent bulbs, gas domes, gas globes, gas bulbs, gas bowls, gas pillars, mantles, tips, filling lamps, charging batteries, gasing tanks, icing or coaling cars.

Rule 8.—No credit to be allowed for burned-out incandescent bulbs, burned-out fuses or scrap brake shoes removed.

NOTE.—Steel back brake shoes not to be removed if over one-half (½) in. thick; gray iron shoes not to be removed if over three-quarters (¾) in. thick.

Rule 9.—Loss of metal from tires of steel-tired wheels, caused by flat sliding, is chargeable to the company on whose road the damage occurs.

NOTE.—Loss of service metal from steel-tired wheels as a result of sliding to be measured from point where slide begins. One-sixteenth (1/16) in. of metal to be allowed for flat spots under two and one-half (2½) in. long and one-eighth (⅛) in. of metal to be allowed for flat spots two and one-half (2½) to three and one-half (3½) in. in length, both inclusive.

Rule 10.—(a) Axles broken under fair usage or having journals one-half (½) in. or more under the standard for car (except for three and three-quarters by seven (3¾ by 7) in.) which will be condemned at three and one-half (3½) in., or having seamy journals, fillets in back shoulder worn out, the length of journal increased ½ in. over standard length, or collars broken off or worn to ¼ in. or less under fair usage, may be renewed at the expense of the car owner. Size of journals should be stenciled on truck.

(b) Cut journals, axles bent or broken or rendered unsafe by unfair usage, derailment or accident, shall be renewed at the expense of the railway on whose line the damage occurs.

(c) Where necessary to true up axles in cases of cut journals, where the journal is reduced below the limit as prescribed in Rule 10-a, axle must be changed at the expense of company cutting journal.

Rule 11.—(a) Charge for terminal car heating to be 25 cents per day of 24 hours or less.

(b) Cars lying at station for over forty-eight hours, expense of heating to be borne by railway in whose possession cars may be.

Rule 12.—(a) Brakes must be in perfect working order. Cylinders, triple valves and slack adjusters must have been cleaned and oiled within six (6) months, and in case of cars equipped with high-speed brakes, triple and high-speed valves must be cleaned every three (3) months and date of last cleaning and oiling stenciled on brake cylinder and triple valve with white paint.

(b) The adjustment of piston travel based on not less than seventy (70) lb. initial pressure must not be less than five (5) in. nor more than eight (8) in.

(c) On electrically lighted cars equipped with storage batteries or axle device, furnished to for-

eign roads, where no agreement is made, a charge of 75 cents per day shall be made for the use of electrical equipment.

(d) For repairs to electric lighting equipment on cars in interchange or leased cars, the instructions issued by the manufacturer of the apparatus should be strictly adhered to. In the absence of any agreement, the material furnished and applied must be of the manufacturer's make.

(e) On electrical head-end lighting system of passenger-equipment trains, a charge of 40 cents shall be made for the use of electrical equipment for each 100 miles train is run. The charge does not include the cost of coal and attendant. The expense of attendant may be added if furnished and charged for on a mileage basis.

DEFECTS IN WHEELS—OWNERS RESPONSIBLE.

Rule 13.—(a) Loose wheels.

(b) Variation from gage.

WHEELS—CAST-IRON.

Rule 14.—(a) Shelled out; wheels with defective treads on account of pieces shelling out; if the spots are over one (1) in. or so numerous as to endanger the safety of the wheel.

(b) Tread worn hollow; if tread is worn hollow ⅛ in. or over.

(c) Worn flanges; flanges having flat vertical surfaces extending ⅞ in. or more from tread, or,

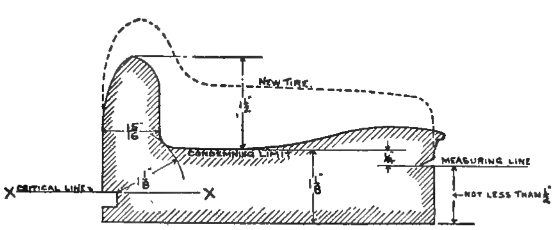


FIG. 1.—STEEL TIRE, RETAINING RING FASTENING.

flanges 1 in. thick or less, gaged at a point ⅜ in. above tread.

(d) Gage: for condemning worn flanges of cast-iron wheels under passenger cars to be the same as is used for condemning worn flanges of cast-iron

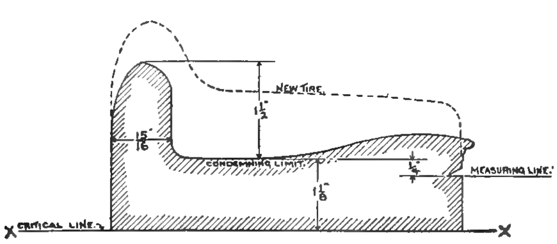


FIG. 2.—STEEL TIRE, SHRINKAGE FASTENING ONLY.

wheels under freight cars of 80,000 lb. capacity or over.

(e) Burst; if wheel is cracked from wheel fit outward by pressure from axle.

(f) Flange, rim, tread, plate brackets or any other part of wheel, either cracked, chipped or broken under fair usage.

WHEELS—STEEL-TIRED.

Rule 15.—(a) Loose, broken or cracked hubs, plates, bolts, retaining ring or tire, occurring under fair usage.

(b) Worn flange or tire; with flange 15/16 in. thick or less or having flat vertical surface extending 1 in. or more from tread, or with tire thinner than shown in Figs. 1, 2, 3 and 4.

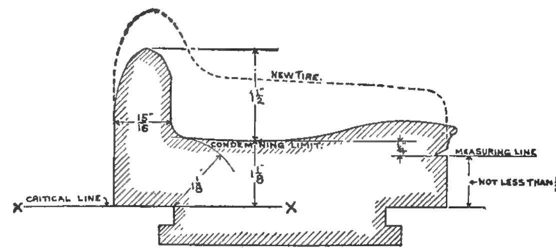


FIG. 3.—STEEL TIRE FASTENING.

(c) Gage for condemning worn flanges of steel and steel-tired wheels under passenger cars to be the same as is used for condemning worn flanges of steel and steel-tired wheels under freight cars.

DELIVERING COMPANY RESPONSIBLE.

Rule 16.—Flat spots; if flat spots, caused by sliding, exceed one inch in length.

Rule 17.—(a) If a car not in line service is transferred from one railroad to another, the receiving

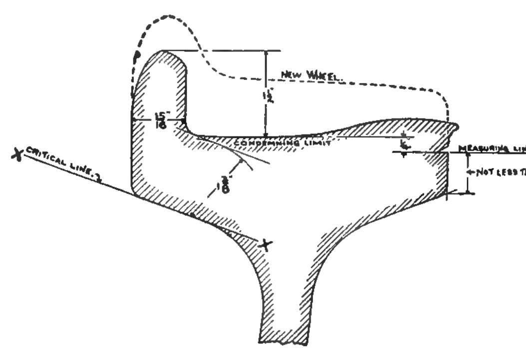


FIG. 4.—STEEL WHEEL.

road shall issue gas certificate authorizing the delivering road to bill against it for the number of atmospheres of gas and number of holders at the time car was received.

(Name of Road.)
GAS CERTIFICATE.

....

Car Number.........................Initial................

Number of Atmospheres..

Number o fHolders..

Size of Holders..

....................Station, ...19.....

..........................Inspector.

(b) Cars not in line service in interchange requiring holders to be filled, the receiving road shall be charged for the quantity of gas supplied.

(c) For cars stored in shops for repairs the company having car in its possession shall be responsible to the delivering company for the gas in holders. This will apply to sleeping-car companies when cars are in their possession and out of service.

(d) Private or other cars, except regular line cars, when offered in interchange equipped with steam hose couplings that will not couple with the standard on the receiving line must be changed by receiving company; the hose removed to accompany car and be reapplied when car leaves the line.

Rule 18.—The depreciation of all passenger equipment cars due to age shall be figured at 3 per cent

per annum, upon the yearly depreciated value of same, to continue not to exceed 50 per cent of its original value. The above method of depreciation applies equally to either bodies or trucks of such cars. No depreciation shall be allowed on the value of air brakes.

Rule 19.—This code of rules is to apply to all equipment interchanged in passenger trains.

Rule 20.—Bills for line charges shall be made and rendered monthly and prices for materials and labor shall be in accordance with accompanying schedule.

Rule 21.—Air-brake hose applied must be made in accordance with specifications for M. C. B. Standard 1⅜-in. hose, and so labeled.

Rule 22.—This Code of Rules shall take effect October 1, 1915.

LIST OF PRICES FOR MAINTENANCE OF PASSENGER EQUIPMENT IN INTERCHANGE

MATERIAL.	New.	Second-hand.	Scrap.
Axle, 50,000 lb. or under	$10.00	$5.00	$1.65
Axle, 60,000 lb	13.00	7.75	2.00
Axle, 80,000 lb	16.50	10.00	3.00
Axle, 100,000 lb	19.50	11.75	3.70
Axle, 140,000 lb	25.50	15.25	4.50

MATERIAL.	Charge.	Credit. Average Credit.
Air-brake hose, M. C. B. Standard, 1⅜ in. complete with fittings, applied	$2.00	$0 60
Air-signal hose, complete, with fittings, applied	1.75	.60
		Credit.
Backs of seats, and cushions of passenger cars, either vestibule or common, removing and beating or cleaning by air, per car	.65	....
Bolts, nuts and forgings, per lb	.03	.005
Brake shoes, reinforced, renewed, each	.50	....
Brake shoes (flanged), renewed, each	.95	....
Brake shoe key, applied, no credit for scrap	.04	....
Burners, dual wick, renewed, each	.30	....
Burners, round wick, renewed, each	.55	....
Candles, per lb	.15	....
Castings, rough, iron, per lb	.02	.005
Castings, rough, malleable, per lb	.04	.005
Castings, rough, steel: (See note at end of this rule), Weighing 100 lb. and less, per lb	.055	.005
Weighing over 100 lb. each, including bolsters, side frames, etc., per lb	.04	.005
Chain, per lb	.04	.005
Chimneys, dual wick, renewed, each	.07	....
Chimneys, round wick, renewed, each	.11	....
Cleaning baggage cars, each:		
Inside	.35	....
Outside, including trucks	.25	....
Cleaning common passenger and combination cars, each:		
Inside	.45	....
Outside, including trucks	.35	....
Cleaning mail cars, each:		
Inside	.90	....
Outside, including trucks	.35	....
Cleaning mail-apartment cars, each:		
Inside	.90	....
Outside, including trucks	.30	....
Cleaning carpets, seats, draperies, etc., parlor and sleeping cars, by beating or by air, including cleaning inside, per car	1.75	....
Cleaning parlor and sleeping cars, outside, including trucks	1.00	....
Cleaning vestibule passenger and combination cars, including vestibules and trucks, each:		
Inside, single windows	.80	....
Inside, double windows	.90	....
Outside, single windows	.50	....
Outside, double windows	.60	....
Coal, Anthracite (including labor), per ton	7.00	....
Conductor's valve or signal cord and couplings, renewed, per car	.75	....
Drinking water container, cleaning and steaming, including R. and R., each	.10	....
Gas mantels, renewed, each	.40	....
Gas, Pintsch, per receiver	.85	....
Glass, setting, per light	.35	....
		Average Credit.
Hose, 1⅝ in.. straight port, steam, complete with fittings, renewed	5.00	$2.50
Hose, as above, 1¼ or 1½ in	5.00	2.50
		Credit.
Ice (including labor), per cwt	.40	....
Journal bearings, brass or bronze, lined or unlined, per lb., applied	.18	.12
Journal bearings, cast steel or malleable iron back, credit for scrap, per lb	....	.02
Journal bearings, filled brass or bronze shell, per lb., applied	.14	.12
Journal bearings. Weights to be charged and credited as follows:		
For journals—	Lb.	Lb.
7″ long and over, but not 8″ long	10	.06
8″ long and over, but not 9″ long	13	.08
9″ long and over, but not 10″ long	20	.12
10″ long and over, but not 11″ long	$0.25	$0.15
11″ long and over	.37	.23
Labor, on lubrication, per hour	.28	....
Labor, on repairs, per hour	.35	....
Lumber, for framing (not exterior or interior finish), yellow, white and Norway pine, poplar, oak, hickory and elm, dressed and framed, per foot B. M. required to make the part	.05	....
Nails, per lb	.03	....
Oil, car, per gal	.22	....
Oil, coach, per gal	.35	....
Oil, illuminating, American roads, per gal	.11	....
Oil, illuminating, Canadian roads, per gal	.16	....
Shades, Acme or common lamp, renewed, each	.30	....
Steel, for springs, rough, per lb	.05	.005
Steel, helical springs, per lb	.035	.005
Waste, woolen, per lb., renewed	.125	....
Waste, cotton, per lb., renewed	.07	....
Wicks, dual, renewed, each	.01	....
Wicks, round, renewed, each	.02	....
Wheels, labor changing, center pair only	4.00	....
Wheels, labor changing, center pair with one pair outside wheels, in same truck	4.50	....
Wheels, labor changing, center pair, with two pair outside wheels, in same truck	6.00	....
Wheels, labor changing, outside pair, when center pair is not renewed	3.00	....
Wheels, labor changing, two outside pair in same truck, when center pair is not removed	4.50	....
Wheels, steel tired, average value service metal, per 1/16″ (on radius of tread in connection with full flange contour)	1.00	....
Wheels, wrought steel or steel-tired, turning to provide full flange and standard tread contour (not including R. and R.), per pair	1.25	....
Wheels, wrought steel, loss of service metal per 1/16″, 33″ wheel	.625	.625
Wheels, wrought steel, loss of service metal, per 1/16″, 36″ wheel	.875	.875

MATERIAL.	New.	Average Credit Price.	Scrap.
One 36″ cast iron wheel	$10.50	$5.25	....
One 33″ cast iron wheel	9.00	4.75	....
One 36″ wrought steel wheel	26.00	....	$5.00
One 33″ wrought steel wheel	19.50	....	4.50
One 33″ cast steel wheel	19.50	4.75	....

NOTE.—New 33-in. and 36-in. wrought steel wheels must have base of limit groove not less than 29½ in., respectively in diameter, must contain 1½ in. service metal (on radius of tread), above condemning limit (which is ¼ in. above base of limit groove).

In no case shall a charge or credit for service metal be made in excess of 1½ in.

NOTE.—Current market price should be charged for all material not covered in the list above (net Store Department cost).

Interior Finish or **Inside Finish** (Passenger Cars). Figs. 1586, etc. A term used to designate the fine wood or metal paneling and sheathing used on the walls, to distinguish it from the outside sheathing.

Intermediate Cross Tie. A timber sometimes framed across the longitudinal sills of wooden cars about half way between the cross tie timbers and the body bolster.

Intermediate Floor (Passenger Cars). A floor consisting of boards placed between the sills and between the deafening ceiling, or under floor, and the upper or main floor. Its purpose is to exclude noise and cold.

Intermediate Lining (Refrigerator Car). See BLIND LINING.

Intermediate Sill. 3, Fig. 364. The main longitudinal members of an underframe between the side sills and the center sills. Seldom used in steel construction.

Internal Cylindrical Gage. A very accurately made solid steel cylinder, used as a standard of measurement of cylindrical holes.

Internal Screw Gage. A solid steel cylinder with a screw thread on it, for testing the diameter of female screws.

Inverted Arch Bar. A bottom arch bar.

Inverted Body Queen Post. A post in the side of a car body which supports the inverted body truss rod or overhang truss rod. See QUEEN POST.

Inverted Body Truss Rod. A truss rod used as a HOG CHAIN.

J

Jack. Figs. 2763, etc. A machine for raising heavy weights, as a car. It commonly consists of one or more screws, turned by a lever and working in a

case, which rests upon the floor or ground, as shown in the illustrations. See SCREW JACK, RATCHET JACK.

Jacks take various names from their forms, sizes and shapes, and are designated as bell base, broad base, claw, low, ball-bearing, etc., and also from the uses for which they are designed, as journal box jack, traversing jacks, track jacks, etc. See HYDRAULIC JACK.

(Storage Battery.) Fig. 2490. A device used for breaking contacts when disconnecting cells.

Jack Arms (Steam Shovel). Heavy beams with jack screws at the ends which are put out on each side of the shovel at the forward bolster and supported on blocking. They prevent the car body from overturning due to the reaction of the dipper when digging.

Jack Screw (Pile Driver and Steam Shovel). A jack screw working on a jack screw pin or jack arms attached to the body, for relieving the springs of the cars from action and making the platform a rigid body. Tongs or crabs attached to the track are used to prevent the car body from rising when on the jack screws. Another device for this same purpose is a bolster jack screw.

Jacket for Steam Heating. Figs. 2212, etc. The illustrations show in detail the construction of the single jacket and double jackets. The inner or the water circulation pipes are of brass or copper, and therefore most efficient conductors of heat. Leakage of steam from the steam spaces past the water pipes is prevented by the packed glands.

Jacking Block. Fig. 328. A JACKING PLATE.

Jacking Plate. Fig. 477. A plate commonly applied to a steel side sill to protect it from damage when the car is being raised on jacks.

Jamb (of a Door). The door post on each side of the door proper.

Jaw Bolt A bolt with a forked end.

Jib (of a Derrick or Crane). More properly BOOM.

Joint Bolt. A bolt used for fastening two timbers when the end of one joins the side of another. The lug bolt is another form for the same purpose.

Journal. The part of an axle or shaft on which the journal bearing rests.

Journal Bearing. Figs. 1042, 1066, 1071. A block of metal, usually some kind of brass or bronze, in contact with a journal, on which the load rests. In car construction the term when unqualified means a car axle journal bearing. A standard shape has been adopted by the Master Car Builders' Association, but its composition is not specified. A lead-lined journal bearing is one coated on the inside with a thin sheet of lead to make it self-fitting on the journal. Babbitt metal in some of its many forms is used for car journal bearings occasionally, and almost universally for the bearings of machinery. In order that the journal bearing may be more easily removable, and to distribute the load more equally, a journal bearing key, or wedge, is used to hold the bearing in place.

Roller and ball bearings have been used to some extent. Figs. 1073-1075.

Journal Bearing Key. See JOURNAL BOX WEDGE.

Journal Bearing and Wedge Gages (M. C. B. Standard). Figs. 2831, etc. JOURNALS, 3¾ by 7, 4¼ by 8, 5 by 9 and 5½ by 10 inches.

In 1900 gages for journal bearings and wedges for journals 5 by 9 inches and 5½ by 10 inches were adopted as Standard.

In 1903 gages for journal bearings and wedges for journals 3¾ by 7 inches and 4¼ by 8 inches were advanced from Recommended Practice to Standard.

Journals, 6 by 11 inches. In 1913 gages for journal bearings and wedges for journals 6 by 11 inches were adopted as Recommended Practice.

In 1914 these gages were advanced to Standard.

Journal Bearings for Passenger and Freight Equipment Cars, Specifications for. (M. C. B. Recommended Practice.)

In 1915 the following specifications were adopted:

1. *Classification.*—This specification will cover two grades of bearings and will be known as A and B.

2. *Composition of Shell.*—The shell shall conform to the following requirements as to chemical composition:

Shell.	A.	B.
Lead..................	24.0 to 30.0 per cent.	8.0 to 16.0 per cent.
Tin, not less than.....	4.0 "	7.0 "
Zinc and other impurities, not over.....	3.0 "	3.0 "
Copper, not less than..	65.0 "	Not over 82.0 "

3. *Composition of Lining.*—The lining metal shall conform to the following requirements as to chemical composition:

Lining.	Up to ⅛ In.	⅛ In. and Over.
Lead..................	94.0 to 96.0 per cent.	Not over 88.0 per cen
Antimony and Tin....	3.0 to 5.0 "	" " 17.0 "
Tin..................	0.50 to 1.5 "	....
Other impurities, not over..............	0.5 "	0.75 "

4. *Analysis.*—The sample for chemical analysis shall be taken from the shell and lining at three points along the fractured surface, described in Section 5, either by drilling or by using cuttings thus obtained, well mixed.

5. *Tests.*—The finished bearing representing a lot for acceptance shall be broken along the center line of the bearing, without nicking, in order to ascertain the uniformity of the grain of the metal. When this fracture shows distinct signs of imperfect mixing, such as separation of component parts and dross or dirt spots, the lot shall be rejected.

6. *Number of Tests.*—Bearings shall be divided into lots of three hundred or less and one bearing shall be taken for test and chemical analysis from each lot.

7. *Gaging.*—All bearings shall conform to gages and dimensions shown on drawings, and when linings are required they shall conform to the gages and dimensions for linings as shown on drawings.

8. *Finish.*—All bearing surfaces shall be smooth and free from tool marks. The castings shall be sound and free from blow-holes, dross and mechanical defects.

9. *Marking.*—Each lot of three hundred or less shall bear a serial number, commencing with one at the beginning of the year and continuing consecutively until the end of the year, the year when cast, and the pattern number, legibly cast, by depressing the letters, on the sloping surface of the shoulder of the brass, and on the opposite sloping shoulder the railroad company's initials, M. C. B., and either "A" or "B," depending on the composition of the metal, and the figures to show the size of the journal bearing, and on the collar the manufacturer's name or trade-mark. All letters to be ¾ in. high, except the manufacturer's name or trade-mark, which should be the width of the shoulder or collar. The above marking shall be in accordance with Fig. 1.

10. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being per-

formed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the analysis of the material at his own laboratory or elsewhere. Such tests shall show the material to conform to Sections 2, 3, 4 and 5.

(*c*) All tests and inspection shall be so conducted

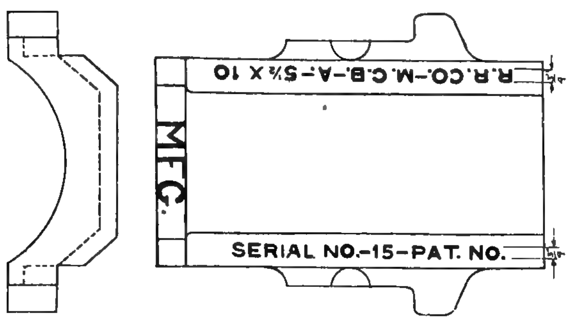


FIG. 1.

as not to interfere unnecessarily with the operation of the works.

11. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, shows any defects, shall be rejected and shall be replaced at the expense of the manufacturer.

12. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Journal Box. 3, Figs. 989, 991; Figs. 1024-1075. A metal box or case which incloses the journal of a car axle, the journal bearing and key, and which holds the packing for lubricating the journal. Also called an axle box, car box, grease box, housing box, oil box, and pedestal box. British, usually axle box.

Journal Box Bolts. The bolts on either side of the journal box which secure it between the arch bars and the pedestal tie bar.

See ARCH BARS, COLUMN AND JOURNAL BOX BOLTS. (M. C. B. Standard.)

Journal Box Cover. See JOURNAL BOX LID.

Journal Box Cover Bolt. A bolt used to fasten covers which have no hinge, to the box.

Journal Boxes and Details (M. C. B. Standard). Figs. 2811, etc.

For Journals 3¾ by 7 Inches.

The journal box and details as shown in these drawings were adopted as standards of the Association, by letter ballot, in 1893, and revised in 1894 and 1896.

The revision made in 1894 consisted in correcting the drawing at the top of the journal box, and in leaving off the lugs at sides of arch bars. Also in changing the wedge and bearing so as to make the latter flat on top instead of curved, as theretofore, and in curving the top of the wedge, thus making this construction similar in general arrangement to the standard forms for the 4¼ by 8 inch journal box.

The revision made in 1896 consisted in the elimination of the dust guard and the addition of notes providing that any suitable dust guard might be used, and that a rivet or nut might be used instead of the cotter, if preferred, in the hinge pin of the lid. Also in the addition to the drawing of a similar note to the latter, and of notes concerning the lid spring and the wedge. At the same time the side lugs on the brass were increased so as to measure 1⅛ inches long, instead of 1 inch long, as they were formerly.

Additional notes were made on the drawings in 1898.

In 1899 the size of bolt hole was increased from 1 inch to 1 1-16 inches.

In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1908 a dimension of 3-16 inch was shown, it being the distance from the center line of bolt hole to inside bearing face of lid.

In 1915 a hole was added to the front flange of wedge to facilitate removal by use of a packing hook; and the arc recess on each side of the wedge was made optional.

For Journals 4¼ by 8 Inches.

The journal box and details as shown in these drawings were adopted as standards of the Association, by letter ballot, in 1893, and revised in 1896.

The revision of the drawings made in 1896 consisted in the elimination of the dust guard therefrom; also in removing the arch bar seat lugs and making the arch bar seat 4½ inches wide. Also in the addition of notes providing that any suitable dust guard might be used, and that a rivet or nut might be used instead of a cotter, if preferred, in the hinge pin of the lid. Also in the addition of a similar note to the latter, and of notes concerning the lid spring and the wedge. At the same time the side lugs on the brass were increased so as to measure 1⅛ inches long instead of ¾ inch long, as they were formerly.

The revision in 1901 consisted of cutting out entirely the inner dust guard wall at the top.

In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1908 the inside dust guard was restored at the top and joined to the inside side wall with an opening of 2¾ inches radius, the center being located one inch above the horizontal center line of the box.

In 1908 the distance from center line of box to edge of wedge stop was increased from 4⅝ inches to 4 11-16 inches to allow ⅛-inch clearance between wedge and stop.

In 1909 the vertical clearance of 1-16 inch between the side lugs on the journal bearings and the journal wedge was increased to ⅛ inch, to conform with the other standard journal boxes, the side lugs being reduced from ⅞ inch to 13-16 inch.

In 1915 a hole was added to the front flange of wedge to facilitate removal by use of a packing hook; and the arc recess on each side of the wedge was made optional.

For Journal 5 by 9 Inches.

The journal box and details shown in these drawings were adopted as Recommended Practice in 1896. In 1898 they were adopted as standards of the Association.

In 1900 the opening at the back end of the box, corresponding with the dust guard, was increased from

3 3-16 inches to 3⅜ inches radius, making the opening 6¾ inches wide, instead of 6⅜ inches, the height remaining unchanged.

The revision in 1901 consisted of cutting out entirely the inner dust guard wall at the top.

In 1902 the wedge stop lugs were increased in size and extended laterally to the sides of box.

In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1907 the inside dust guard was restored at the top and joined to the inside side wall with a 3-inch radius, with the center located 1 inch above the horizontal center line of the box. The opening in the outside wall was enlarged at the side and struck with a 4-inch radius all around. The distance from the center of the box to the inside of the lug for the journal bearing key, located in the top wall of the box, was increased to 5 3-16 inches. The width of the inside side lugs for the journal bearings was decreased to 2⅝ inches.

In 1908 the center of box from which the lower half of the circle is struck was raised ¼ inch, increasing the depth to 1⅝ inches.

In 1909 the vertical clearance of 1-16 inch between the side lugs of journal bearing and wedge was increased to ⅛ inch, to conform to the other standard boxes, the side lugs being reduced from 1⅛ to 1 1-16 inches.

In 1909 the dust-guard opening in this box was modified and words "cast steel" were omitted from the drawing of the wedge.

In 1912 the wedge was changed in design to provide increased bearing surface against side lugs.

In 1913 the distance from inside face of lid to center of pin hole was changed from 9-32 inch to 5-16 inch.

In 1914 the reference to skeleton wedge was omitted on drawing and note changed to read "Wedge shall be malleable iron or steel."

In 1915 a hole was added in the front flange of wedge to facilitate removal by the use of packing hook.

In 1915 the arc recess on each side of wedge was made optional.

For Journals 5½ by 10 Inches.

The journal box and details shown in these drawings were adopted as standard in 1900.

In 1901 the inner dust-guard wall at the top was cut out entirely to avoid all danger of the journal bearing striking the wall of the box at the rear.

In 1902 the wedge stop lugs were extended laterally to the sides of box.

In 1903 the radius of the dust-guard opening was changed to 3⅜ inches, and the diameter to 7¼ inches, to allow proper play for the wheel fit.

In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1907 the inside dust-guard was restored at the top and joined to the inside side wall with a 3-inch radius located 1½ inches above the horizontal center line of the box. The opening in the outside back wall was enlarged at the side and struck with two 4-inch radii, the lower one-half having its center line on the center line of box, the center of the upper one-half being ⅛ inch above the center line of the box. The distance from center of the box to the inside of the lug for the journal box key was increased to 5 11-16 inches. The width of the inside side lugs for journal bearings was decreased to 2⅝ inches.

In 1908 the distance from center line of box to face of wedge stop was increased from 5 11-16 inches to 5¾ inches, thus allowing ⅛ clearance between wedge and stop.

In 1908 the note reading "the total lateral [extreme positions of axle] equals ⅜ inch," was eliminated.

In 1909 the word "malleable" was stricken out and the words "drop forged" substituted for journal bearing wedge.

In 1911 the use of pressed or cast steel for journal box was authorized and reduction in thickness of metal and coring to lighten weight permitted, provided that the essential dimensions affecting interchangeability and the fitting of contained parts are adhered to.

In 1911 the note on the drawing referring to placing of letters "M. C. B." on top of box was changed from "arch bar seat" to "seat of truck sides."

In 1912 the wedge was changed in design to provide increased bearing surface against side lugs.

In 1913 the distance from inside face of lid to center of pin hole was changed from 9-32 inch to 5-16 inch.

In 1914 the reference to skeleton wedge was omitted on Sheet M. C. B. 12 and the note changed to read "Wedge shall be drop-forged or steel."

In 1915 a hole was added in the front flange of wedge to facilitate removal by the use of packing hook.

In 1915 the arc recess on each side of wedge was made optional.

For Journals 6 by 11 Inches.

The journal box and details shown in these drawings were adopted as Recommended Practice in 1913.

In 1914 the journal-box lid key was changed to conform with the key shown for the 5½ by 10 inch box.

In 1914 the journal box and details were advanced to Standard.

In 1915 the arc recess on each side of wedge was made optional.

Passenger Car Journal Box and Contained Parts for Journals 4¼ by 8 Inches.

In 1898 a Recommended Practice was adopted for passenger car journal box and contained parts for journals 4¼ by 8 inches. In 1901, as a result of letter ballot, this was changed to standard.

Passenger Car Journal Box and Contained Parts for Journals 5 by 9 Inches.

In 1911 the mouth and dust guard opening was changed to conform to similar journal box for freight car, and advanced to Standard.

Journal Box Guide. See Pedestal.

Journal Box Jack. See Journal Jack.

Journal Box Lid. 4, Figs. 989, 991; Figs. 1024-1075. A door or lid covering an opening in the end of the journal box, by means of which oil and packing are supplied and journal bearings are inserted or removed. Such covers are made of cast iron, malleable iron, pressed steel, and sometimes of wood. They are usually closed by a spring.

Journal Box Lid Spring. Figs. 1024, 1035, 1049, etc. A flat spring to hold the lid in place.

Journal Box Wedge. Figs. 1040, 1042, 1066-1068. A device used to hold the journal bearing in place, to distribute the load evenly over the bearing and to allow it to be removed easily. Also called a journal box key. See Journal Boxes and Details.

Journal Brass. A Journal Bearing.

Journal Cooler. Fig. 2099.

Journal Jack. Figs. 2626, 2627, 2629, 2632, 2635-37. A small jack used for relieving the weight from car journals for the purpose of changing bearings or brasses. See Jack.

Journal Packing. Waste, wool, or other fibrous material saturated with oil or grease, with which a journal box is filled to lubricate the journal. Commonly termed dope.

Journal Packing Guard. Fig. 1069. A device to keep journal packing in place.

Journal Spring. A spring supporting part of the weight of a car which is placed directly over the journal, and which usually rests on the journal box under the truck frame.

Jumper. Fig. 2501. A short conductor cable used to connect two electric circuits.

Jute. A course fiber raised in India for making bags, matting, ropes, etc.

K

Kalamined Iron. Sheet iron, coated with an alloy of zinc, lead, tin and nickel in the proportion of 29 lbs. of tin, 50 to 75 lbs. of zinc, 100 lbs. of lead, and three to six ounces of nickel. The alloy melts at a lower temperature than common zinc, and is claimed to give a more durable compound as well as a thinner and more adhesive coating. Galvanized iron is sheet iron coated in the same way with pure zinc.

Keeper. "A ring, strap, pocket, or the like device for detaining an object; as

"The box on a door jamb into which the bolt of a lock protrudes when shut. When the keeper is for a beveled latch bolt, which is moved by contact with it, it is more commonly called a strike plate. They are also further designated by the name of the lock or latch which they accompany. See illustrated section on Locks.

"The latch of a hook, which prevents its accidental disengagement."—Knight.

Key. In a general sense, a fastener; that which fastens; as a piece of wood in a frame of a building. Hence a pin inserted in a hole in a bolt, and used to secure the bolt or its nut. A Split Key is a special form.

"An instrument for opening or shutting a lock by pushing the bolt one way or the other." See Lock and Bit.

A block over the top of a journal bearing, called in full Journal Bearing Key. This part is also commonly called a wedge.

A beveled bar used with a gib to form a Gib and Key. See also King Bolt Key.

(For Lamps and Valves of Pintsch Gas Apparatus.) A substitute for the ordinary cocks of gas fixtures to prevent unauthorized tampering.

Key Bolt. A bolt slotted near the end to receive a key, which takes the place of a nut.

Key Hole Plate. An Escutcheon or Escutcheon Plate.

Key Pin (of a Lock). The pivot on which the key turns when inserted in the lock.

Key Ring Tire Fastening. A mode of securing the tire to the wheel, composed of two rings, one of U-section and the other nearly rectangular. The former ring holds the tire and wheel together, and the latter ring holds the former in place, filling up the groove in the tire. When both rings are in place the outer lip of the groove in the tire is slightly hammered over, thus gripping the second or key ring, and retaining it in place.

Kicker. See Coupler Knuckle Kicker.

Kicking Coil. A coil of wire consisting of about ten turns wound on a wooden core; it is located in the feed circuit between the lightning arrester and controller, and acts as an inductive resistance to the passage of lightning discharge through the apparatus. See Lightning Arrester.

Kilowatt. One thousand watts.

King Bolt or **King Pin.** See Center Pin.

King Post (of a Truss). A single post or distance piece between a truss rod and the chord of a truss or beam. If two such posts are used they are called queen posts.

Kitchen (Dining Car). A large compartment at one end of the car provided with all the facilities of a well-organized kitchen. For ranges and other equipment, see Figs. 1714, etc.

Kitchen Car. A combined day coach and dining car for use on trains where a regular dining car could not be profitably run. More commonly Cafe Car or Cafe Coach.

Knee Iron. An L-shaped or angle iron casting or froging which is fastened to the corner where two timbers are joined to strengthen the joint.

Knuckle (M. C. B. Couplers). Figs. 626-670. The rotating coupling hook by means of which coupling is effected when the knuckle is locked by the catch or lock. It must conform to certain contour lines adopted by the M. C. B. Association.

(Of a Hinge.) The central tubular projections which carry the hinge pin. The term is of wide and general application in mechanics to many similar parts.

Knuckle (M. C. B. Standard Specifications). See Automatic Car Couplers, Specifications.

Knuckle, Automatic Car Coupler (M. C. B. Standards). Fig. 2860.

In 1899 the vertical dimension of the knuckle was fixed at 9 inches as a minimum.

In 1903 the solid knuckle was adopted as a Standard of the Association to be used for all repairs and in all new couplers after January 1, 1904.

In 1907 a limiting dimension of not more than 1 inch was shown for the diameter of core hole in lug of knuckle to prevent a recurrence of the slotted knuckle weakness.

Knuckle Throw.—In 1905 the the following Recommended Practice was adopted: "That the use of a knuckle-throwing device which will throw the knuckle completely open and operate under all conditions of wear is favored by the Association. Advanced to Standard in 1910.

Knuckle Pivot Pin.—In 1899 the sizes of pivot pins were fixed as follows:

1½ inches or 1⅝ inches in diameter and 12½ inches from the under side of head to center of pin hole for ⅜-inch cotter.

In 1904, as a result of the letter ballot, the note in the lower left-hand corner of the drawing, relating to pivot pins, was changed to read as follows:

"Pivot pin must be of steel, 1⅝ inches in diameter, of sufficient length to permit applying a ⅜-inch cotter pin below the coupling lug."

Lock Lift.—In 1905 a recommendation was adopted that the knuckle lock lift be in the central longitudinal vertical plane of the coupler, located between the strik-

ing horn and contour lines and operate from the top by an upward movement. Advanced to Standard in 1907.

In 1908 the following notes were added to the drawing:

That the total lift of locking pin be not more than 6 inches.

That all couplers must have a 1 1-16-inch eyelet for locking device located immediately above locking pin hole.

Knuckle, Contour Line and Limit Gages. See AUTOMATIC CAR COUPLER.

Knuckle, Emergency. See EMERGENCY COUPLER KNUCKLE.

Knuckle Joint. "A joint in which a projection on each leg or leaf of a device is inserted between corresponding recesses in the other, the two being connected by a pin or pivot on which they mutually turn. The legs of dividers and the leaves of door hinges are examples of true knuckle joints. The term, however, has been somewhat commonly restricted to compound or universal joints designed to act in any direction."—Knight.

Knuckle Kicker. See COUPLER KNUCKLE KICKER.

Knuckle Lock. See COUPLER KNUCKLE LOCK.

Knuckle Opener. See COUPLER KNUCKLE OPENER.

Knuckle Pin (M. C. B. Coupler). Figs. 627-670. The steel pin holding the knuckle in the jaws of the coupler. Sometimes called pivot pin.

Knuckle Pin Plate. Used in connection with three-stem coupler.

Knuckle Pivot Pin Testing Machine (M. C. B. Standard). Fig. 2891.

In 1907 a design of apparatus for testing knuckle pivot pins was adopted as Recommended Practice, and is shown on the drawing.

L

Label. See AIR BRAKE HOSE, LABEL FOR.

Label Box (Postal Car). Fig. 1864. A small box in which the labels for letter pouches are carried.

Ladder. 24, Figs. 351, 352; 23, Fig. 364; Figs. 911, 952, 953, 955, 956, 960, 961. Bars of wood or iron attached to the side or end of a freight car or caboose so as to form steps by which persons may climb to and from the top of the car. The individual bars, whether of wood or iron, and whether round or square, are termed ladder rounds. They are sometimes fastened at their ends to ladder side rails. The handles alongside of the ladder are termed grab irons, or hand holds, or sometimes corner handles; the one placed on the roof near the ladder is called the roof grab iron or ladder hand rail. See SAFETY APPLIANCES and UPPER BERTH LADDER.

Ladder Bolt. A bolt designed especially for securing the ladder rounds at the corner post when two rounds are directly in line on the side and end of the car.

Ladder Round. 31, Figs. 287, 288. A round cross bar or step of a ladder. See SAFETY APPLIANCES.

Ladder Side Rails. The vertical side pieces to which the ladder rounds are attached.

Lag Screw. An iron bolt with a square or hexagonal head, and with a wood screw thread cut on it, intended to screw into wood.

Lamp. See ALCOVE LAMP, ARGAND LAMP, BERTH LAMP, CABOOSE DECK LAMP, DECK LAMP, ELECTRIC LAMP, GAS LAMP, OIL LAMP, SIDE DECK LAMP.

Lamp Alcove. A metal casing or lining for a recess in the side of a car to contain an alcove lamp.

Lamp Arms. Rods by which a lamp is attached to the ceiling of a car. Some lamp arms have bracket angles to support the shade, and are then called bracket arms.

Lamp Bottom. The lower portion of a lamp which is removable. Contains the wick, burner and oil.

Lamp Burner. That portion of a lamp by which the opening on the top of the reservoir is closed, which holds the wick, and by which the latter is adjusted. In gas lighting, the burner is the tip where the gas escapes and is ignited.

Lamp Canopy. A large and elaborate SMOKE BELL.

Lamp Chimney. A glass tube which incloses the flame of a lamp, conducts away the smoke and gases and produces the necessary draft.

Lamp Chimney Bracket. A projecting metal arm attached to the side of a car and carrying a chimney holder, by which a lamp chimney is held in place.

Lamp Chimney Reflector. Usually a reflector with a hole in the center in which the chimney is inserted.

Lamp Fount. The receptacle for the oil burned in a lamp. Also called lamp reservoir.

Lamp Globe. Figs. 2544, etc. A glass or porcelain case or vessel inclosing or surrounding the flame of a lamp or candle, and intended to protect the latter from wind. Lamp globes are approximately globular in form, in distinction from a lamp shade, which flares at the bottom, but are often made of different shapes, as round, pear-shaped, etc.

Lamp Globe Chimney. A metal tube attached to the top of a lamp globe for conducting away the smoke. A shade cap is an equivalent device for a lamp shade.

Lamp Hoop. A ring with an interior screw thread for attaching to cheap oil lamps to receive the burner.

Lamp House Hinge. Figs. 1839-1841.

Lamp Jack. Fig. 2278. A cap or covering over a lamp vent on the outside of a car to exclude rain and prevent downward currents of air.

Lamp Key (Gas). A substitute for the ordinary cock of gas fixtures, used to prevent unauthorized tampering with the burners.

Lamp Panel. A small switchboard placed generally in some locker of an electrically lighted car, upon which are mounted switches for controlling the lamps and ventilating fans.

Lamp Reflector. Figs. 2518, etc.

Lamp Regulator (Electric Lighting). Figs. 2442, etc. An automatic electrical device for maintaining constant voltage upon the lamps or, more popularly expressed, a device for insuring the constant brilliancy or candle power of the lamps. The lamp regulator is usually mounted underneath the car body where the heat which is dissipated in it may be easily taken care of and radiated. The lamp regulator may be of the rheostatic or counter electro motive force type. As a rheostatic device it varies resistance in series with all the lamps, responding to variations in lamp voltage and having a tendency toward maintaining constant lamp voltage. If it is of the counter electro motive force type, it acts in the same way as far as the lamps are concerned, but varies a counter electro motive force in series with the lamps instead of varying a resistance. In either case, the lamp regulator is governed by an auxiliary relay or equivalent device, generally placed inside of the car with the other electrical apparatus. See ELECTRIC LIGHTING.

Lamp Regulator Relay (Electric Lighting). Figs. 2434, etc. An automatic and very sensitive electrical device for controlling the action of the lamp regulator. Such device must be very sensitive in operation and robust enough in construction to withstand railway service. It is generally enclosed for protection against dust and accident, but when once adjusted should not require attention for long periods.

Lamp Reservoir. See LAMP FOUNT.

Lamp Shade. Figs. 2518, etc. A conical shaped reflector placed over a lamp to reflect the light downward.

Lamp Socket. A socket which holds an electric lamp.

A bracket for supporting a tail lamp. See SIGNAL LAMP SOCKET.

Lamp Stay. A horizontal bar, usually reaching from side to side of the clere-story, by which a car lamp is steadied, and also made more ornamental.

Lamp Switch (Electric Lighting). A switch for controlling the lamp circuit of the car and which, by opening or closing, turns off or throws on all of the lights. This switch is generally mounted on or near the lamp panel.

Lamp Vent. An opening in the roof through which the gases from a lamp escape.

Lantern. Figs. 2054, etc. A portable lamp the flame in which is protected from wind and rain by glass, usually in the form of a globe surrounded by wires, called guards. According to the number of these wires the lantern is called single, double or triple guard. The conductor's lantern is one with a large bail or handle, so as to be carried on the arm, leaving both hands free.

Lantern and Flag Holder. Figs. 2054, etc. A device for displaying signals on rear of trains. See MARKER BRACKET.

Lantern Globe. Fig. 2048.

Latch. The primary sense of this word is—to catch, to close, stop, or make fast; hence, an attachment to a door, window, etc., to hold it open or shut, is called a latch. The ordinary distinction between a latch and a lock is that a lock is closed and opened with a separate key, and usually has a square bolt; whereas, a latch has no separate key, and usually has a beveled bolt which snaps shut automatically by contact with the keeper or strike plate. The most exact distinction between a latch and lock seems to be the form of the bolt, and not the use or disuse of a key. See SASH LOCK. Latches named from the use which they subserve are the following, which see: BERTH LATCH, DECK SASH LATCH, SAFETY BERTH LATCH, SPRING DOOR LATCH, etc.

A sliding door latch, or lift latch, has a beveled hook instead of a beveled bolt, but operates upon substantially the same principle. Nearly all forms of latches are spring latches. A night latch is a large and carefully made form of an ordinary latch, which can be opened from the outside by a key. A cupboard latch is any form of small latch. A rim latch, like a rim lock, is one attached simply to the inside of the door, in distinction from a mortise or rabbeted latch (both rarely used), which is boxed into the door.

Lateral Motion (Truck). Figs. 1088, 1096. A movement sidewise. Rollers between the journal box and spring seat provide for this on pedestal trucks.

Lateral Motion Spring. A spring sometimes used to check lateral motion in trucks.

Lavatory. A room provided with washbowl, towels, combs, brushes, etc., in which passengers may make their toilet. Parlor and sleeping cars are provided with separate lavatories for men and women, which are separated from the saloons. The best and most modern coaches have a lavatory. A saloon is sometimes termed a lavatory. For the arrangement of water piping in a men's wash room see Fig. 1776, and for a Pullman drawing room sleeper see Figs. 1777 and 1778. See WATER SUPPLY and FOLDING LAVATORY. The term is also used in a more restricted sense to designate the wash basins and their equipment Figs. 1760, etc. (see BASIN), or the basin for dental purposes, which is termed a Dental Lavatory.

Lead-Lined Journal Bearing. A journal bearing which has its inner surface covered with a thin layer of lead, so that it may fit itself to the journal as soon as subjected to wear.

Leader (of Pile-Driver). The long vertical timbers serving to guide the HAMMER in its fall.

Leader Cap (Pile Driver). A cross piece connecting the two leaders at the top and carrying the main sheave and pile hoisting sheave of the hoisting gear.

Leader Stay. An oblique diagonal brace, attached at the upper end to top stringers, serving to stiffen the leaders.

Leakage Groove (Air Brake Cylinder). A small passage past the brake piston to prevent application of the brakes by trifling leakages of air.

Leatheroid. A substance somewhat resembling leather, and somewhat similar to vulcanized fiber in its general character and appearance. It is made by treating paper with sulphate of zinc.

Leg Rest (Reclining Seats). A bracketed and adjustable shelf, which may be used on a chair seat to support the limbs when the seat or chair is in a reclining position. It is adjusted by a leg rest ratchet and leg rest pivot casting, or by a leg rest slide fitting in a leg rest socket casting.

Lens. An optical instrument for conveying rays of light upon a fixed path or fixed point. See FRESNAL LENS.

Letter Board (Passenger Equipment Car Exteriors). A horizontal board under the cornice, extending the whole length, on which the name of the company to which the car belongs is usually painted. The letter board occupies the frieze of the car, and is sometimes so called.

Letter Case (Postal Car). Figs. 1866, etc. Used for the distributing of letters.

Letter Drop (Postal Car). Fig. 1861. A plate with a spring flap for receiving letters for the post. A letter box lid.

Letter Drop Chute (Postal Car). Fig. 1861. The chute extending from the letter drop on the outside of a postal car to the floor inside of the car.

Lettering. See also MARKING ON FREIGHT EQUIPMENT CARS.

Lettering Cars (M. C. B. Standard). Fig. 2880. In 1896 it was decided:

That on all box cars standing more than twelve (12) feet from top of rail to eaves, the height and width at eaves be stenciled in 3-inch letters on side of car, as near the bottom as convenient.

That all classes of cars have size of coupler, style of rear attachments, kind of draft gear and style of brake beams stenciled in 2 or 3-inch letters on each side of car at opposite ends, or on each end of car directly above coupler, where design of car permits it. Where the kind of draft gear implies the style of rear attachments, the marking for the latter may be omitted.

That where the construction of the truck permits, trucks shall be stenciled on each side, giving the size of journal, and the letters "M. C. B." if the axle is M. C. B. standard axle. If the axle is not M. C. B. standard, use dimensions from center to center of journal in place of M. C. B. This stenciling to be in 1 or 2-inch letters, and to be put on end or side of bolster in Diamond trucks, and on side truck frame in center on pedestal type of trucks.

Initials of the road should also appear in letters 1 or 2 inches high on one side of bolster or transom of each truck.

In 1901 this was changed from Recommended Practice to Standard, as a result of letter ballot. Modified in 1906 by the elimination of fractional sizes of figures and letters. Modified in 1908 and 1909.

In 1909 the following was adopted:

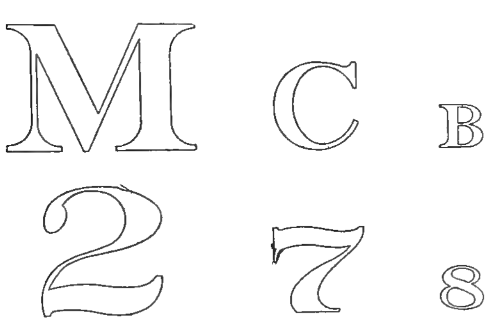
Flat cars should be stenciled with the length of car over end sills, measured at the center. The stencil, "Length 00 feet," to be located on side of car.

Drop end gondola cars should be stenciled with length of car inside of drop end doors, measured at the center; this stencil, "Inside length 00 feet," to be located on side of car.

In 1914 a note was added to the drawing to provide that where latitudinal running board is flush with eaves, the height should be given to top of latitudinal running board.

As a result of a special letter ballot in March, 1906, certain sized letters and numerals were adopted as Recommended Practice for the uniform lettering of cars, as follows:

1. That Roman letters and figures of the design shown on the drawing be used.
2. That the sizes of these letters and figures be confined to 1, 2, 3, 4, 7 and 9 inches.
3. That 7 and 9-inch letters or figures be used for the initials, names and numbers for the sides of cars, and 4-inch letters or figures for the lettering on the doors and ends of cars.



4. That for other car-body markings on sides and ends, such as capacity, couplers, brake beams, class of car, date built, outside and inside dimensions, and markings inside of car, 2 or 3-inch letters and figures be used, with the following exceptions:

(a) All weight marks to be 3 or 4-inch letters or figures.

(b) Trust marks, patent marks and other private marks should be 1-inch letters or figures.

5. That all marks on trucks be confined to 1 or 2-inch letters or figures.
6. That stenciling on air-brake cylinders or reservoirs be 1-inch letters or figures.

In 1911 these were advanced to Standard.

Lever. "In mechanics, a bar of metal, wood or other substance, turning on a support called a fulcrum." —Webster. See Brake Lever, Uncoupling Lever, etc.

Lever Faucet. A self-closing faucet, shut by a spring and opened by the movement of a handle or lever. Also called telegraph faucet. They are called vertical or horizontal according to the direction of the pipe or opening into which they are fastened.

Lever Frame (Hand Car). A wooden frame shaped somewhat like a letter A, on top of a hand car, which supports the lever shaft and lever.

Lever Frame Cap (Hand Car). A short horizontal piece of timber, to which the lever journal bearings are fastened.

Lever Frame Tie Rod (Hand Car). A vertical rod by which the lever frame cap is bolted to the floor frame.

Lever Guard. A guide on a platform rail for a platform uncoupling lever.

Lever Guide. See Lever Guard and Dead Lever Guide.

Lever Shaft (Hand Car). A short iron shaft to which the propelling levers are attached.

Levers, Marking of. See Foundation Brake Gear.

Library Car. Generally a parlor or observation car equipped with a small library containing books and periodicals for the use of passengers. See Car.

Lift. A finger hold attached to windows and window blinds to grasp in raising or lowering them. See Sash Lift.

Lift Latch or **Sliding Door Latch.** A lock, the latch of which is lifted by turning a knob, instead of drawing it backward.

Light Weight of Car, Stenciling of. See Foundation Brake Gear.

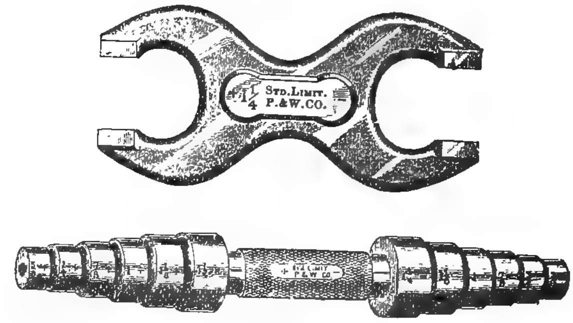
Lighting. See Acetylene Gas, Electric Lighting, Pintsch Gas Vapor System.

Lightning Arrester. Figs. 2695, etc. A device for protecting the electrical apparatus from damage by lightning.

Lignomur. A decorative head lining made from strawboard or paper, with figures stamped or embossed upon it. The figures are usually light colored, while the background is darker. It is glued to a thin narrow matched ceiling or may be applied directly to an old veneered ceiling.

Limit Gage. A term applied to many forms of gages which are used for determining whether pieces do not exceed or fall below a certain specified range of dimension. See Automatic Car Coupler.

Limit Gages for Round Iron (M. C. B. Recommended Practice). In 1893 limit gages and diameters for round iron were adopted as a Recommended Practice; these had formerly been Standard of the Association.



LIMIT GAGES FOR ROUND IRON.

In 1911 the limiting dimensions for 1½ inch and 1⅝-inch round iron were modified and limits for 1¾ inches and larger sizes added.

Limit gages such as shown herewith for 1¼-inch

iron are recommended for use in procuring round iron to take the Sellers' standard screw threads; round iron used to be of such size as will enter the large or + end of the gage intended for that size, in any way, and also of such size as will not enter the small or — end in any way.

The limiting diameters for certain nominal sizes of iron, together with the maximum variation allowable by such use of these gages, are given in the following table:

SIZES OF LIMIT GAGES FOR ROUND IRON.

NOMINAL DIAMETER OF IRON.—INCHES.	Large Size, + end. Inches	Small Size, — end. Inches	Total Variation. Inches.
¼	.2550	.2450	.010
5/16	.3180	.3070	.011
⅜	.3810	.3690	.012
7/16	.4440	.4310	.013
½	.5070	.4930	.014
9/16	.5700	.5550	.015
⅝	.6330	.6170	.016
¾	.7585	.7415	.017
⅞	.8840	.8660	.018
1	1.0095	.9905	.019
1⅛	1.1350	1.1150	.020
1¼	1.2605	1.2395	.021
1⅜	1.3860	1.3640	.022
1½	1.5115	1.4885	.023
1⅝	1.6370	1.6130	.024
1¾	1.7625	1.7375	.025
1⅞	1.8880	1.8620	.026

Round iron 2 inches in diameter and over should be rolled to nominal diameter.

Limit Gages for Inspecting Second-Hand Wheels. See WHEELS, LIMIT GAGES FOR INSPECTING.

Line Car. A short term to designate cars belonging to the various fast freight lines which run over several roads between the leading shipping points east and west.

Line Switch. Figs. 2679, etc. A combination of one or two unit-switches, assembled in a case, for handling main power currents.

Lining. 29, Figs. 287, 288; 27, Fig. 364; Fig. 478. The lining which is nailed to the insides of the posts of freight, baggage and other cars. In box cars it extends half way up only, to the girth. Inside lining becomes sometimes inside sheathing when it is carried up to the roof, and is the only sheathing for the car, the frame being left exposed.

See SIDING, FLOORING, ROOFING AND LINING; also LUMBER SPECIFICATIONS.

Lining for Outside-Framed Cars. (M. C. B. Recommended Practice). Fig. 2940.

In 1913 a section for lining for outside-framed cars was adopted as Recommended Practice.

In 1915 two additional sections, 1½ in. and 1¾ in. thick, respectively, were adopted.

Lining Strips. Wooden or metal strips put on the inside of freight or baggage cars to protect the inside of the car from being injured by freight or baggage.

Lining Stud. Vertical studs placed between the posts and over or under the braces, and to which the lining is nailed. See NAILING STRIP.

Link. "A short connecting piece, of circular or other equivalent shape; as one of the oval rings for divisions of a chain."—Knight.

Link Hanger. A SWING HANGER in the form of a link.

Link Hanger Eye Bolt. A bolt passing through the truck transoms, from which a short swing hanger is suspended.

Link Pin. A coupling pin.

Link and Pin Coupler. An old type of drawbar by which cars were connected by a link and a pin.

Link Suspension (Electric Lighting). A system in which the axle generator is suspended on a pair of parallel links supported on the truck frame, the adjusting of the driving belt or chain being accomplished by a device which swings the links slightly. See SUSPENSION.

Linoleum. A form of floor covering manufactured from linseed oil, prepared by a special process, mixed with ground cork and backed with canvas. Another floor covering of substantially the same nature as linoleum is known as corticine.

Lintel. The horizontal part of a door or window frame above the sash.

Lip Lamp Chimney. One with an indented ring near the bottom, for use with screw lamp burners.

Liquid Soap Fixture. Figs. 1754A, 1766, etc. A container placed above the wash basin for holding the liquid soap.

Live Lever. The one of a pair of truck brake levers to which the brake power is applied from the cylinder.

Loading Gage (British). American equivalent, CLEARANCE. The limiting dimensions of carriages or wagons as to height and width, in order that they may clear tunnels, bridges, station platforms, etc.

Loading Materials, Rules for. 2861, etc.. See RULES FOR LOADING MATERIALS.

Lock. Figs. 821, 828, 832, 1794-1847. Generally, a fastening of any kind operated by a key. Specifically, one having a dead bolt as distinguished from one having a spring latch bolt, the latter being technically termed a latch. A rim lock is one applied to the surface of a door. A mortise lock is one designed to be mortised into the edge of a door. A rabbeted lock is one with an offset front to conform in shape to a rabbeted door. A dead lock is one in which a bolt is moved by a key and not a spring. A latch is a lock with a spring bolt. A night latch is a lock with a spring bolt operated from the outside only by a key and from the inside usually by a knob. A padlock is a detached lock provided with a shackle adapted for engagement with a hasp or staple. According to their uses, locks are divided into berth locks, door locks, freight car locks, grain door locks, seat locks, sliding door locks, etc. See also SASH LOCK.

(M. C. B. Automatic Coupler.) The catch which drops in front of the knuckle horn and holds it shut, thus locking the couplers together.

Lock Case. The outside or covering part of a lock, more particularly a padlock.

Lock Chain. A chain by which a padlock is fastened to prevent its being lost.

Lock Keeper. See KEEPER.

Lock Lifter. See COUPLER LOCK LIFTER.

Lock Nut. Figs. 1551, etc. The outer one of a pair of nuts on one bolt, which, by screwing up separately to a tight bearing, locks the inner one. A large number of special forms of lock nuts and nut locks, which serve the same purpose, are in use which are not strictly included under the above definition.

Lock Seal. A piece of glass, lead or paper, which forms

a seal for a lock, so that the latter cannot be opened without its being known.

Lock Set. See COUPLER LOCK SET.

Lock Washer. Figs. 1572, etc. A washer for locking the nut in place while it is being tightened or drawn up.

Locker. A small compartment or closet for storage.

Locomotive Crane. A self-propelling car with a steam crane mounted upon it. See WRECKING CRANE.

Locomotive Valve (Steam Heating). The valve on the locomotive which admits live steam to the train line.

Lodging Car. A passenger or box car fitted up with sleeping accommodations for men at work on the line of a road. More commonly called boarding car.

Logging Car. Figs. 79, 80. A special type of car for carrying logs, usually consisting of two trucks and a skeleton frame. See CAR.

Logging Truck. A truck used in logging cars. The member corresponding to the body bolster in other types of trucks is called a Bunk and is so arranged that timber or logs may be chained in place on it.

Lookout (Caboose). See CUPOLA.

Loose Berth Hinge. A berth hinge, the two parts of which are detachable.

Lorry. Small push cars used in construction for moving rails, ties, etc.

Lounging Car. Figs. 182, 245. A term applied by some railways to a special type of parlor car arranged in two or more compartments, such as reception room, smoking room, etc., and generally having movable instead of fixed seats. Also called Club Car.

Lower Berth (Sleeping Cars). 1. Figs. 1600, 1601; Fig. 1666. The bed nearest the floor made up by pulling out the seats and dropping down the seat backs. The mattress for it is carried by day in the pocket formed by the upper berth. See BERTH.

Lower Brake Shaft Bearing. An eye or guide for a vertical brake shaft, near the lower end. The support at the lower end is preferably called the brake shaft step.

Lower Chord (of a Truss). The lower outside member. In the side trussing of a freight or passenger car the side sill is the lower chord.

Lower Deck. The main roof of a passenger equipment car on each side of the clere-story or upper deck.

Lower Deck Carline. A short carline extending under the lower deck or main roof only.

Lower Deck Headlining. The inside finish of the lower deck. It forms the top finish for the upper berth in sleeping cars. See HEADLINING.

Lower Deck Roof Support. See LOWER DECK CARLINE.

Lower Wainscot Rail (Passenger Car Interiors). A longitudinal rail immediately above the truss plank. The upper wainscot rail comes directly below the window.

Lubricator. An instrument used for applying a lubricant to a journal or other moving part. Also called oiler.

Lug. A propecting stud or ear to afford a bearing or point of attachment.

Lug Bolt. A STRAP BOLT with a lug turned up at one end to enter a mortise in the timber and in part to relieve the attaching bolts from strain.

Lumber Specifications.

In 1910 a joint committee of the American Railway Master Mechanics' Association and the Master Car Builders' Association working in conjunction with the Railway Storekeepers' Association and the various Lumber Manufacturers' Associations, submitted specifications and grading rules for car and locomotive lumber, which, on motion, were ordered submitted to letter ballot and adopted as Recommended Practice.

In order to have standard descriptions of the various woods used by railroads, the following standard names for car and locomotive lumber were agreed upon by the Joint Committee:

Description of various woods used by railroad companies for car and locomotive lumber.

1. *Ash* ....To cover White, Black, Blue, Green and Red Ash.
2. *Basswood* ....To cover Linden, Linn, Lind or Lime-tree.
3. *Beech* ....To cover Red and White Beech.
4. *Birch* ....To cover Red, White, Yellow and Black Birch.
5. *Buckeye* ....To cover wood from Horse chestnut tree.
6. *Butternut* ....To cover wood from tree of that name, also known as White Walnut.
7. *Cherry* ....To cover Sweet, Sour, Red, Black and Wild Cherry.
8. *Chestnut* ....To cover wood from tree of that name.
9. *Cottonwood* ....To cover wood from tree of that name. (Do not confuse with Popple or Poplar.)
10. *Cypress* ....To cover Red, Gulf, Yellow and East Coast Cypress, also known as Bald Cypress.
11. *Elm—soft* ....To cover White, Water, Gray, Red or Slippery and Winged Elm.
12. *Elm—rock* ....To cover Rock or Cork Elm.
13. *Douglas Fir*...........To cover Yellow, Red, Western, Washington, Oregon, Puget Sound Fir or Pine, Northwest and West Coast Fir.
14. *Gum* ....To cover Red Gum, Sweet Gum or Satin Walnut.
15. *Hemlock* ....To cover Southern and Eastern Hemlock; that is, Hemlock from all States east of and including Minnesota.
16. *Western Hemlock*.....To cover Hemlock from the Pacific Coast.
17. *Hickory* ....To cover Shellbark, Kingnut, Mockernut, Pignut, Black, Shagbark and Bitternut.
18. *Western Larch*........To cover the species of Larch or Tamarack from the Rocky Mountain and Pacific Coast regions.
19. *Maple—soft* ....To cover Soft and White Maple.
20. *Maple—hard* ....To cover Hard, Red, Rock and Sugar Maple.
21. *White Oak*............To cover White, Burr or Mossy Cup, Rock, Post or Iron, Overcup, Swamp Post, Live, Chestnut or Tan Bark, Yellow or Chinquapin and Basket or Cow Oak.

22. *Red Oak*.............To cover Red, Pin, Black, Water, Willow, Spanish, Scarlet, Turkey, Black Jack or Barn and Shingle or Laurel Oak.
23. *Pecan* ....To cover wood from tree of that name.
24. *Southern Yellow Pine*. To cover Long-leaf and Short-leaf Yellow Pine grown in the Southern States.
25. *White Pine*..........To cover wood from tree of that name grown in Maine, Michigan, Wisconsin, Minnesota and Canada.
26. *Norway Pine*.........To cover Norway or Red Pine grown in Michigan, Minnesota, Wisconsin and Canada.
27. *Idaho White Pine*.....To cover variety of White Pine grown in western Montana, northern Idaho and eastern Washington.
28. *Western Pine* ....To cover timber known as White Pine grown in Arizona, California, New Mexico, Colorado, Oregon and Washington; sometimes known as Western Yellow or Ponderosa Pine, or California White Pine or Western White Pine.
29. *Poplar* ....To cover wood from the Tulip Tree, otherwise known as Whitewood, Yellow Poplar and Canary Wood.
30. *Redwood* ....To cover wood from tree of that name.
31. *Spruce* ....To cover Eastern Spruce; that is, the Spruce timber coming from points east of and including Minnesota and Canada, covering White, Red and Black Spruce.
32. *Western Spruce*.......To cover the Spruce timber from the Pacific Coast.
33. *Sycamore* ....To cover wood from tree of that name, otherwise known as Buttonwood.
34. *Tamarack* ....To cover Tamarack or Eastern Tamarack, grown in States east of and including Minnesota.
35. *Tupelo* ....To cover Tupelo Gum and Bay Poplar.
36. *Walnut* ....To cover Black Walnut (for White Walnut, see Butternut).

CLASSIFICATION, GRADING AND DRESSING RULES FOR NORTHERN PINE CAR MATERIAL, INCLUDING WHITE AND NORWAY PINE AND EASTERN SPRUCE.

1. *Norway Pine.* To cover Norway or Red Pine grown in Michigan, Minnesota, Wisconsin and Canada.

White Pine to cover wood from tree of that name grown in Maine, Michigan, Wisconsin, Minnesota and Canada.

Spruce to cover Eastern Spruce; that is, the Spruce timber coming from points east of and including Minnesota and Canada, covering White, Red and Black Spruce.

2. *Northern Pine Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Northern Pine are knots, knot-holes, splits, shake, wane, worm-holes, pitch pockets, torn grain, loosened grain, sap, sap stain, checks and rot.

KNOTS.

4. Knots shall be classified as pin, small and large or coarse, as to size, and round or spike, as to form, and as sound, loose, encased, pith and rotten, as to quality.

5. A pin knot is sound and shall not exceed ½ inch in diameter.

6. A small knot is larger than a pin knot and shall not exceed 1½ inches in diameter.

7. A large or coarse knot is one of any size over 1½ inches in diameter.

8. A round knot is oval or circular in form.

9. A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

10. A sound knot is one solid across its face; is as hard as the wood it is in and is so fixed by growth or position that it will retain its place in the piece.

11. A loose knot is not firmly set, but still retains its place in the piece.

12. A pith knot is a sound knot with a pith hole not more than ¼ inch in diameter.

13. An encased knot is one surrounded wholly by bark or pitch.

14. A rotten knot is one not as hard as the wood it is in.

PITCH.

15. Pitch pockets are openings between the grain of the wood containing more or less pitch or bark, and shall be classified as small, standard and large pitch pockets.

16. A small pitch pocket is one not over ⅛ of an inch wide.

17. A standard pitch pocket is one not over ⅜ of an inch wide, or 3 inches in length.

18. A large pitch pocket is one over ⅜ of an inch wide or over 3 inches in length.

19. A pitch pocket showing open on both sides of the piece ⅛ of an inch or more in width shall be considered the same as a knot-hole.

WANE.

20. Wane is bark, or the lack of wood, from any cause, on edge.

SAP.

21. White or bright sap shall not be considered a defect in any of the grades provided for and described in these rules, except where stipulated.

MISCELLANEOUS.

22. Defects in rough stock caused by improper manufacture and drying will reduce grade, unless they can be removed in dressing such stock to standard sizes.

23. All lumber for uses described in these rules

shall be inspected on the face side to determine the grade, and the face side is the side showing the best quality or appearance.

24. Chipped grain consists in a part of the surface being chipped or broken out in small particles below the line of the cut, and as usually found should not be classed as torn grain, and shall not be considered a defect.

25. Torn grain consists in a part of the wood being torn out in the dressing. It occurs around knots and curly places, and is of four distinct characters; slight, medium, heavy and deep.

Slight torn grain shall not exceed 1/32 of an inch in depth, medium 1/16 of an inch, and heavy ⅛ of an inch. Any torn grain heavier than ⅛ of an inch shall be termed deep.

26. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the coarsest pieces *such grades may contain,* but the average quality of the grade shall be midway between the highest and lowest pieces allowed in the grade.

27. Lumber and timber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

28. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

29. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or mill work will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

30. The foregoing general observations shall apply to and govern the application of the following rules. The rules referred to under Sections 31, 32, 33, 34 and 35 govern 4 or 6-inch strips, and are intended to cover strips used for car siding, car lining and car roofing.

B and Better White Pine.

31. Material of this grade shall be practically clear and free of all defects, except will admit of not exceeding four pin knots, and bright sap not to exceed 25 per cent of the face of the piece.

C and Better Norway Pine.

32. Bright sap is no defect in this grade and stained sap will be admitted to the extent of not exceeding 1/5 the surface of the face of the piece, if not in combination with other defects. This grade shall be free from shake, rot and splits, but will admit of not exceeding four pin knots.

No. 1 Common White Pine, Norway Pine and Eastern Spruce.

33. This grade admits of small sound knots, but shall be free from large or coarse knots, knot-holes, should have practically no shake, wane or rot, but will admit of bright sap to any extent.

No. 2 Common White Pine, Norway Pine and Eastern Spruce.

34. This grade is similar to No. 1 described above, except that it will admit of spike knots, bright or stained sap, slight shake, slight wane or reverse side, but not a serious combination of any of these defects.

No. 3 Common White Pine, Norway Pine and Eastern Spruce.

35. This grade, in addition to the defects mentioned in No. 2, described above, will also admit of large or coarse knots, more shake, sap, wane on reverse side that does not affect the tongue or groove and torn or loosened grain, checks, pin worm-holes and splits, but no loose knots or knot-holes, nor a serious combination of the defects named.

No. 1 Common Norway Pine Car Decking or Flooring.

36. This grade will admit of sound knots, any amount of sap, and shall be free from shake, wane, rot and large or coarse spike knots.

37. STANDARD LENGTHS.

CAR SIDING—8, 9, 10 and 12 feet or multiples.

CAR ROOFING—5 feet or multiples.

CAR LINING—8, 9, 10, 12, 14, 16, 18 and 20 feet or multiples.

CAR DECKING—9 and 10 feet or multiples.

All orders shall be shipped in standard lengths, unless otherwise specified, but no lengths of either car siding, lining or roofing shall be shipped except in the lengths specified or multiples thereof. Those who do not desire stock shipped in multiple lengths should so specify.

CLASSIFICATION, GRADING AND DRESSING RULES FOR SOUTHERN YELLOW PINE CAR MATERIAL.

1. *Southern Yellow Pine.*—To cover Long-leaf and short-leaf Yellow Pine grown in the Southern States.

2. *Southern Yellow Pine Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Southern Yellow Pine are knot, knot-holes, splits (either from seasoning, ring hearts or rough handling), shake, wane, red heart, pith, rot, rotten streaks, dote, red heart worm holes, pitch streaks, pitch pockets, torn grain, loosened grain, seasoning of kiln checks and sap, sap stains and imperfect manufacture.

KNOTS.

4. Knots shall be classified as pin, standard and large, as to size; and round and spike, as to form; and as sound, loose, encased, pith and rotten, as to quality.

5. A pin knot is sound and not over ½ inch in diameter.

6. A standard knot is sound and not over 1½ inches in diameter.

7. A large knot is one any size over 1½ inches in diameter.

8. A round knot is oval or circular in form.

9. A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

10. A sound knot is one solid across its face; is as hard as the wood it is in and is so fixed by growth or position that it will retain its place in the piece.

11. A loose knot is one not held firmly in place by growth or position.

12. A pith knot is a sound knot with a pithhole not more than ¼ inch in diameter.

13. An encased knot is one surrounded wholly or in part by bark or pitch. Where the encasement is less than ⅛ of an inch in width on both sides, not

exceeeding one-half the circumference of the knot, it shall be considered a sound knot. (See Sections 10 and 17.)

14. A rotten knot is one not as hard as the wood it is in.

PITCH.

15. Pitch pockets are openings between the grain of the wood containing more or less pitch or bark, and shall be classified as small, standard and large pitch pockets.

16. A small pitch pocket is one not over ⅛ of an inch wide.

A standard pitch pocket is one not over ⅜ of an inch wide or 3 inches in length.

A large pitch pocket is one over ⅜ of an inch wide or over 3 inches in length.

17. A pitch pocket showing open on both sides of the piece ⅛ of an inch or more in width shall be considered the same as a knot-hole.

18. A pitch streak is a well-defined accumulation of pitch at one point in the piece, and when not sufficient to develop a well-defined streak, or where fiber between grains is not saturated with pitch, it shall not be considered a defect.

19. A small pitch streak shall be equivalent to not over one-twelfth the width and one-sixth the length of the piece it is in.

A standard pitch streak shall be equivalent to not over one-sixth the width and one-third of the length of the piece it is in.

WANE.

20. Wane is bark, or the lack of wood, from any cause, on the edge.

SAP.

21. Bright sap shall not be considered a defect in any of the grades provided for and described in these rules, except where stipulated.

SHAKE.

22. Shakes are splits or checks in timbers which usually cause a separation of the wood between annual rings.

Through Shake: A shake which extends between two faces of a timber.

Ring Shake: An opening between the annual rings.

MISCELLANEOUS.

23. Defects in rough stock caused by improper manufacture and drying will reduce grade, unless they can be removed in dressing such stock to standard sizes.

24. All stock except car sills and framing shall be inspected on the face side to determine the grade. Stock surfaced one side, the dressed surface shall be considered the face side. Stock rough or dressed two sides, the best side shall be considered the face, but the reverse side of all such stock shall not be more than one grade lower.

25. Pieces of siding, lining or roofing with 3/16 of an inch or more of tongue will be admitted in any grade, provided it does not run more than one-third the length of the piece.

26. In all grades lower than B and better, wane on the reverse side, not exceeding one-third the width and one-sixth the length of any piece is admissible; provided the wane does not extend into the tongue, or over one-half the thickness below the groove.

27. Chipped grain consists in a part of the surface being chipped or broken out in small particles below the line of the cut, and as usually found shall not be classed as torn grain and shall not be considered a defect.

28. Torn grain consists in a part of the wood being torn out in dressing. It occurs around knots and curly places, and is of four distinct characters—slight, medium, heavy and deep.

Slightly torn grain shall not exceed 1/32 of an inch in depth; medium, 1/16 of an inch; heavy, ⅛ of an inch; any torn grain heavier than ⅛ of an inch shall be termed deep.

29. Loosened grain consists in a point of one grain being torn loose from the next grain. It occurs on the heart side of the piece and is a serious defect, especially in flooring.

30. *Rot, Dote and Red Heart:* Any form of decay which may be evident either as a dark-red discoloration not found in the sound wood, or the presence of white or red rotten spots, shall be considered as a defect.

Firm red heart shall not be considered a defect in any of the grades of Common Lumber.

31. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the coarsest pieces *such grades may contain,* but the average quality of the grade shall be midway between the highest and lowest pieces allowed in the grade.

32. Lumber and timber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

33. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

34. Equivalent means equal, and in construing and applying these rules, the defects, whether specified or not, are understood to be equivalent in damaging effect to those mentioned applying to stock under consideration.

35. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or millwork will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

36. The foregoing general observations shall apply to and govern the application of the following rules:

37. *B and Better Car Siding, Lining and Roofing* will admit any two of the following, or their equivalent of combined defects: Sap stain not to exceed five per cent; firm red heart not to exceed fifteen per cent of the face; three pin knots; one standard knot; three small pitch pockets; one standard pitch pocket; one standard pitch streak; slight torn grain, or small kiln or season checks. Where no other defects are contained, six small pin worm-holes will be admitted.

38. *Select Car Siding* will admit of one standard pitch streak, one standard pitch pocket, or their equivalent; and, in addition, will admit of not exceeding five pin knots and two standard knots, or their equivalent; ten per cent sap stain; firm red heart; slight shake; heavy torn grain; defects in manufacture or seasoning checks. Pieces otherwise good enough for B, but containing a limited number of pin worm-holes shall be graded *select.* This grade is intended to be accumulated from running B and Better stock, and will consist of all the droppings which do not contain defects in excess of those mentioned in this paragraph.

39. *No.* 1 *Common Car Siding* will admit of the following defects or their equivalent: Sound knots, not over one-half of cross section of the piece at any point throughout its width; three pin knots or their equivalent; wane ½ inch deep on edge not exceeding 1½ inches wide and one-half the length of the piece; torn grain; pitch pockets; pitch; sap stain; seasoning checks; slight shakes; firm red heart and a limited number of small worm-holes well scattered. This grade is intended to be worked from fencing stock, either kiln or air dried.

40. *Select Car Lining and Roofing* will admit of one standard pitch streak; one standard pitch pocket, or their equivalent, and, in addition, sound knots not over one-half the width of the piece in the rough; ten per cent. sap stain; firm red heart; slight shakes; heavy torn grain; defects in manufacture, or seasoning checks. Pieces otherwise good enough for B, but containing a limited number of pin wormholes shall be graded *select.* This grade is intended to be accumulated from running B and Better stock, and will consist of all the droppings which do not contain defects in excess of those mentioned in this paragraph.

41. *No.* 1 *Common Car Lining and Roofing* will admit of the following defects or their equivalent: Sound knots not over one-half the cross section of the piece at any point throughout its length; three pin knots or their equivalent; torn grain; pitch pockets; sap stains; seasoning checks; firm red heart, and a limited number of pin or small worm-holes well scattered. This grade is intended to be worked from fencing stock, either kiln or air dried.

42. *Standard Patterns.* (Insert B/P reference, showing net sizes after working.)

43. *All-heart Car Decking or Flooring* will admit sound knots not over one-third of the cross section of the piece at any point throughout its length, provided they are not in groups; pitch pockets; firm red heart; shake and seasoning checks which do not go through the piece; loose or heavy torn grain, or other machine defects, which will lay without waste or will not cause a leakage in cars when loaded with grain. Must be strictly *all heart* on both sides and both edges.

44. *Heart Face Car Decking or Flooring* will admit of sound knots not over one-third the cross section of the piece at any point throughout its length; provided they are not in groups; pitch pockets; firm red heart; shake and seasoning checks which do not go through the piece; loosened or heavy torn grain, or other machine defects, which will lay without waste, or will not cause a leakage in cars when loaded with grain. Will admit of any amount of sap provided all of the face side of the piece is strictly all heart.

45. *No.* 1 *Common Car Decking or Flooring* will admit of sound knots not over one-half the cross section of the piece at any point throughout its length, provided they are not in groups; pitch pockets; sap stain; firm red heart; shake and seasoning checks which do not go through the piece; a limited number of pin worm-holes; loosened or heavy torn grain, or other machine defects, which lay without waste, or will not cause a leakage in cars when loaded with grain.

46. Standard Lengths:

Car Siding—8, 9, 10 and 12 feet or multiples.

Car Lining—8, 9, 10, 12, 14, 16, 18 and 20 feet or multiples.

Car Roofing—5 feet or multiples.

Car Decking or Flooring—9 and 10 feet or multiples.

All orders shall be shipped in standard lengths, unless otherwise specified, but no lengths of either car siding, lining or roofing shall be shipped, except in the lengths specified or multiples thereof. Those who do not desire stock shipped in multiple lengths should so specify.

CAR SILLS AND FRAMING.

47. *No.* 1 *Common Heart Car Sills and Framing* will admit of sound knots, provided they are not in groups, the mean or average diameter of which shall not exceed two (2) inches; pitch; pitch pockets; slight shake; seasoning checks, or other defects which will not impair its strength more than the defects aforementioned. Must be sawed from sound timber, free from doty or rotten red heart and true to measurements, or at least the measurements at no point on the sill shall be less than the size required.

Measurement of the girth at any point throughout the length of the piece must show at least 75 per cent heartwood.

Cubical contents shall not be used as basis for obtaining percentage of heartwood under this rule.

48. *No.* 1 *Common Car Sills and Framing* will admit of sound knots, provided they are not in groups, the mean or average diameter of which shall not exceed two (2) inches; pitch; pitch pockets; slight shake; seasoning checks; sap; sap stain, or other defects which will not impair its strength more than the defects aforementioned. Must be sawed true to measurements and from sound timber free from doty or rotten red heart; must be square cornered, except that one (1) inch of wane on one corner or one-half (½) inch of wane on two corners is admissible.

49. Sizes up to 6 inches in width shall measure full when green, and not more than ⅛ inch scant when dry or part dry. Sizes 6 to 12 inches in width shall measure full when green and not more than ¼ inch scant when dry or part dry. Sizes 12 to 16 inches in width shall measure full when green and not more than ⅜ inch scant when dry or part dry. Unless otherwise specified, one-fourth inch shall be allowed for each side which is to be dressed. In pieces 3 by 6 inches and under when ordered in lengths exceeding 30 feet, sound knots shall not exceed one-quarter the width of the face through which they project, and the grain shall not cross sufficiently to impair the strength.

CLASSIFICATION AND GRADING RULES FOR LOCOMOTIVE, FREIGHT AND PASSENGER CAR OAK.

GENERAL INSTRUCTIONS.

Those who are not familiar with the anatomy of the oak tree should, when reading over these rules, take into consideration that the rule describes the poorest piece that goes into the grade and that a large percentage is above the grade described.

The term "Construction Oak" means all such products of Oak in which the strength and durability of the timber is the controlling element in its selection and use. The following is a list of products which are recommended for consideration as "Construction Oak":

I.—Construction Oak.

(A), (B), (C) Cover Maintenance of Way Material.

(D) *Locomotive Timbers:* Sills, End and Truck Timbers.

(E) *Car Timbers:* Car Framing, including Upper Framing, Car Sills, End and Truck Timbers, Car Decking, Inside Lining.

(F)
(G)
(H)
(I) Cover Maintenance of Way Material.
(J)
(K)
(L)

II.—Standard Defects.

Definition of "Defect"—Fault, Blemish, Mark of Imperfection that will materially injure the strength.

Measurements which refer to the diameter of knots or holes shall be considered as referring to the mean or average diameter.

II.—(A) Knots.

(1) *Sound Knot.* A sound knot is one which is solid across its face, and which is as hard as the wood surrounding it; it may be any color and contain checks.

(2) *Loose Knot.* A loose knot is one not firmly held in place by growth or position.

(3) *Pith Knot.* A pith knot is a sound knot with a pith hole not more than ¼ inch in diameter in the center.

(4) *Rotten Knot.* A rotten knot is one that is not sound and not as hard as the wood surrounding it.

(5) *Pin Knot.* A pin knot is a sound knot not over ¾ inch in diameter.

(6) *Standard Knot.* A standard knot is a knot not over 2 inches in diameter.

(7) *Large Knot.* A large knot is a sound knot more than 2 inches in diameter.

(8) *Round Knot.* A round knot is one which is oval or circular in form.

(9) *Spike Knot.* A spike knot is one sawn in lengthwise direction. The mean or average width shall be considered in measuring this knot.

(10) *Bird Peck.* Bruises apparently caused by bird pecks during the growth process of the timber. Considered no defect.

II.—(B) Worm Defects.

(1) *Pin Worm-holes.* Pin worm-holes are very small holes caused by minute insects or worms. These holes usually are not over 1/16 inch in diameter, or smaller, and the wood surrounding them is sound and does not show any evidences of the warm-hole having any effect on the wood other than the opening.

(2) *Spot Worm Defects.* (Also known as Flag Worm Defects.) Spot worm defects are caused, like pin worm holes, by minute insects or worms working on the timber during its growth. The size of the hole is about the same as pin worm-holes, but the surrounding wood shows a colored spot as evidence of the defect. This spot is usually sound and does not affect the strength of the piece.

(3) *Grub Worm-holes.* Grub worm-holes are usually from about ⅛ to 3/16 inch in width and vary in length from about 3/16 inch to 1 inch, and are caused by grub worms working in the wood.

(4) *Wooden Rafting Pinholes.* This defect sometimes appears on river timber which has been rafted and holes bored in the solid wood for tying the timber and a solid plug or pin driven in the hole filling it completely. These defects must be treated and considered the same as knot defects. Ordinary metal rafting pin or chain dog hole is considered no defect.

II.—(C) Sap.

Definition of "Sap."—The alburnum of a tree—the exterior part of the wood next to the bark; sap wood not considered a defect.

Sound Heart. The term sound heart is used in these rules whenever heart of piece is split or opened and shows on outside of piece and its condition is sound and solid, not decayed. Openings between annual rings are checks not considered a defect.

II.—(D) Wane.

Wane is bark or lack of wood from any cause on edges of timber.

II.—(E) Shakes.

Definition of "Shakes."—Shakes are splits or checks in timber which usually cause a separation of the wood between the annual rings.

(1) *Ring Shakes.* Ring shakes are openings between the annual rings usually showing only on the end of the timber.

(2) *Through Shakes.* Through shakes are shakes which extend between two faces of the timber.

(3) *Checks.* A small crack in the wood due to seasoning; not considered a defect.

II.—(F) Grain.

Crooked or Cross Grain. Crooked or cross grain occurs where the grain crosses the piece within a section of 24 inches in running length of the piece. This is only considered a defect in certain smaller sizes of dimension for specific purposes.

II.—(G) Rot.

Any form of decay which may be detected as giving the timber a doty or rotten texture is a rot defect, including what is commonly known as dry rot. Water stain, or what are sometimes called scalded or burned spots, usually caused by timber lying in the water under certain conditions before it is sawed, and burned spots where the timber is improperly piled green, not considered defects, as they do not affect the strength of the piece.

III.—Standard Names for Construction Oak.

Standard names for Construction Oak timbers; White Oak and Red Oak. Unless specially mentioned, these terms include the following:

White Oak.	*Red Oak.*
White Oak.	Red Oak.
Burr or Mossy Cup Oak.	Pin Oak.
Rock Oak.	Black Oak.
Post or Iron Oak.	Water Oak.
Overcup.	Willow Oak.
Swamp Post Oak.	Spanish Oak.
Live Oak.	Scarlet Oak.
Chestnut or Tank Bark Oak.	Turkey Oak.
Basket or Cow Oak.	Black Jar or Barn Oak.
Yellow or Chinquapin Oak.	Shingle or Laurel Oak.

Term: Mixed Oak means any kind of Oak.

IV.—Standard Specifications for Structural Oak timbers.

(1) *General Requirements.* Except as noted, all structural timbers shall be white oak, to be sound timber and sawed specified sizes; free from ring shakes, crooked grain, rotten knots, large knots in groups, rot, dote and wane in amounts greater than allowed in these specifications.

(2) *Boxed Hearts.* Boxed hearts are permitted in pieces 5 by 5 square and larger. The center of the heart shall be boxed as near the center of the piece as practical, and not to exceed 30 per cent of the pieces can have the center of the heart nearer than 1½ inches from any face; 20 per cent may show one heart face, corner or edge, not to exceed 75 per cent of the length of the piece.

IV.—(3) Wane.

EXPLANATION.

The term 20 per cent of number of pieces or amount shipped refers to each item and size of each car shipped.

(a) Pieces 5 by 5 to 8 by 8 square may show 1 inch wane, side measurement on any two corners or edges, of the length of the piece singly, or 50 per cent in and this wane not to exceed more than 25 per cent aggregate. In the absence of wane on all corners excepting one, the one corner may contain wane 50 per cent of the length of the piece as above described; not to exceed 20 per cent of number of pieces may have this defect.

(b) Pieces over 8 by 8, including 12 by 12, square may show 1½ inches wane, side measurement, edge of any two corners or edges, and this wane not to exceed more than 33 1/3 per cent of the length of the piece singly, or 66 2/3 per cent in aggregate. In the absence of wane on all corners excepting one, the one corner may contain wane 66 2/3 per cent of the length of the piece as above described; not to exceed 20 per cent of number of pieces may have this defect.

(c) Pieces over 12 by 12 square may show 1¾ inches, side measurement, any two corners or edges, and this wane not to extend more than 40 per cent of the length of the piece singly, or 80 per cent. in aggregate. In the absence of wane on all corners excepting one, the one corner may contain wane 80 per cent of the length of the piece as above described; not to exceed 20 per cent of number of pieces may have this defect.

(d) In event that pieces have two faces as wide as above described and two faces narrower, the proportion of the amount of wane is admissible.

(e) Pieces 1 inch to 5 inches thick, not exceeding 8 inches wide, are governed by defect specifications above mentioned, with the exception that they shall not contain wane, and not to exceed 20 per cent of pieces 2 inches and thicker may show sound heart on one face; pieces under 2 inches thick must be free of heart. Pieces 8 inches and wider may contain wane as per paragraphs b and d.

(f) Rough sizes of structural timber shall not vary more than ¼ inch scant of specified size. Dressed sizes may be ½ inch scant after dressing.

V.—(B) Locomotive Timber Oak. Passenger Car Dimension Oak. Refrigerator Car Dimension Oak.

Thickness cut to order, widths cut to order, lengths cut to order. Unless otherwise noted, must be cut from white oak. This stock, wherever practical, should be cut outside the heart and must be free of heart shake in pieces under 6 by 6 square. No attempt should be made to box the heart in pieces smaller than 5 by 7, unless heart is very small and tight. When heart is well boxed it must be firm and tight, and the center of the heart must not be nearer than 2 inches from any face. Must be sawed full to sizes with square edges, and cut from sound timber and free from worm-holes, with the exception of a few small pin worm-holes well scattered, and an occasional spot worm. None of these defects, however, to affect the serviceability of the piece for the purpose intended. Must be free from split, rot or dote, large, loose, rotten or unsound knots, or, in other words, free of all defects affecting the strength and durability of the piece. Sound standard knots well scattered not considered a defect.

V.—(C) Freight Car Timber.

Freight car dimensions, including all cars other than refrigerator and passenger cars. Sizes cut to order. Unless otherwise ordered, must be sawed from good merchantable white or red oak timber. This stock must be free of rot, shakes and splits, large, loose, rotten or unsound knots, any of which will materially impair the strength and durability of the piece for the purpose intended. This stock is intended to work full size and length without waste for side posts, braces and end sills, end plates, drafting timbers, cross ties, etc., used in the construction of ordinary freight or stock cars. On pieces 3 by 4 inches or equivalent girth measurement and larger (nothing under 2 inches thick), heart check showing on one corner, admitted on twenty per cent of the pieces in each car shipment. Well-boxed, sound hearts admitted in this material in pieces 5 by 6 and larger.

On pieces 3 by 4 to 6 by 6, inclusive, or equivalent girth measurement and larger (nothing under 2 inches thick), in absence of heart defects, wane on one corner, ¾ inch side measurement, admitted on not to exceed twenty per cent of the number of pieces in each car shipment.

Pieces over 6 by 6 square may contain 1 inch wane, side measurement, on one corner, with other conditions same as 3 by 4 to 6 by 6 sizes.

CLASSIFICATION AND GRADING RULES FOR DOUGLAS FIR CAR AND LOCOMOTIVE MATERIAL.

1. The term "Douglas Fir" will cover the timber known likewise as Yellow, Red, Western, Washington, Oregon or Puget Sound Fir or Pine, Northwest and West Coast Fir.

2. *Douglas Fir Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Douglas Fir are knots, knot-holes, splits, checks, wane, rot, rotten, streaks, worm-holes, dog or picaroon holes, pitch seams, shake, pitch pockets, chipped grain, torn grain, loose grain, solid pitch, stained heart, sap stain and imperfect manufacture.

KNOTS.

4. Knots shall be classified as pin, small, standard and large, as to size; round and spike, as to form, and tight, loose and rotten, as to quality.

5. A pin knot is tight and not over ½ inch in diameter.

6. A small knot is tight and not over ¾ inch in diameter.

7. A standard knot is tight and not over 1½ inches in diameter.

8. A large knot is tight and any size over 1½ inches in diameter.

9. A round knot is oval or circular in form.

10. A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

11. A tight knot or sound knot is one solid across its face, is as hard as the wood it is in, and is so fixed by growth or position that it will retain its place in the piece.

12. A loose knot is one not held firmly in place by growth or position.

13. A rotten knot is one not as hard as the wood it is in.

PITCH.

14. Pitch pockets are openings between the grain of the wood, containing more or less pitch and surrounded by sound grain wood; they shall be classified as small, standard and large pitch pockets.

15. A small pitch pocket is one not over ⅛ of an inch wide.

16. A standard pitch pocket is one not over ⅜ of an inch wide, or 3 inches in length.

17. A large pitch pocket is one over ⅜ of an inch wide or over 3 inches in length.

18. A pitch shake or seam is a clearly defined opening between the grain of the wood and may be either filled with granulated pitch or not, but in either case is considered a defect in any of the grades hereinafter described.

19. A pitch streak is a well-defined accumulation of pitch at one point in the piece, and when not sufficient to develop a well-defined streak, or where fiber between grains is not saturated with pitch it shall not be considered a defect.

20. A small pitch streak shall be equivalent to not over one-twelfth the width and one-sixth the length of the piece it is in.

21. A standard pitch streak shall be equivalent to not over one-sixth the width and one-third of the length of the piece it is in.

WANE.

22. Wane is bark, or the lack of wood, from any cause on edge.

SAP.

23. Bright sap shall not be considered a defect, in any of the grades provided for and described in these rules, except where stipulated.

24. Sap stain shall not be considered a defect, except as provided herein.

25. Discoloration of the heart of the wood, or stained heart, must not be confounded with rot or rotten streaks. The presence of rot is indicated by decided softness of the wood where it is discolored or by small white spots resembling pin wormholes.

MISCELLANEOUS.

26. Defects in rough stock caused by improper manufacture and drying will reduce grade, unless they can be removed in dressing such stock to standard sizes.

27. All stock, except car sills and framing, shall be inspected on the face side to determine the grade. Stock surfaced one side, the dressed surface shall be considered the face side. Stock rough or dressed two sides, the best side shall be considered the face, but the reverse side of all such stock shall not be more than one grade lower.

28. Chipped grain consists in a part of the surface being chipped or broken out in small particles below the line of the cut, and as usually found, should not be classed as torn grain, and shall be considered a defect only when it unfits the piece for use intended.

29. Torn grain consists of a part of the wood being torn out in dressing. It occurs around knots and curly places, and is of four distinct characters—slight, medium, heavy and deep.

30. Slight torn grain shall not exceed 1/32 of an inch in depth; medium 1/16 of an inch, and heavy ⅛ of an inch. Any torn grain heavier than ⅛ of an inch shall be termed deep.

31. Loosened grain consists in a point of one grain being torn loose from the next grain. It occurs on the heart side of the piece, and is a serious defect, especially in flooring.

32. The grade of all regular stock shall be determined by the number, character and position of the defects, visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the *coarsest* piece *such grades may contain,* but the average quality of the grade shall be midway between the highest and lowest pieces allowed in the grade.

33. Lumber and timber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

34. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

35. Equivalent means equal, and in construing and applying these rules, the defects allowed, whether specified or not, are understood to be equivalent in damaging effect to those mentioned applying to stock under consideration.

36. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or millwork will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

37. The foregoing general observations shall apply to and govern the application of the following rules:

The rules referred to under Sections 38, 39 and 40 govern 4-inch or 6-inch strips, and are intended to cover strips used for car siding, car roofing and car lining.

The term "Edge Grain" is here used and synonymous with vertical grain, rift-sawn, or quarter-sawed. The term "Flat Grain" is synonymous with slash grain or plain sawed.

No. 2 Clear and Better Edge Grain.

38. Material of this grade shall be well manufactured, with angle of grain not less than forty-five degrees. This stock shall be kiln-dried and practically free from all defects, but will admit of bright sap on the face; not exceeding three small close pitch pockets not over 2 inches long, one pin knot, slight roughness in dressing, but not a serious combination of these defects.

No. 2 Clear and Better Flat Grain.

39. Material of this grade shall be well manufactured. The stock shall be kiln-dried and practically free from all defects, but will admit of bright sap on the face; not exceeding three small close pitch pockets not over 2 inches long, one pin knot, slight roughness in dressing, but not a serious combination of these defects.

No. 3 Clear.

40. Material of this grade shall be sound common lumber and will admit of roughness in dressing, bright

sap, and also may contain five pin, three small and one standard knot and five pitch pockets in any continuous 5 feet of length of the piece; or any combination of tight knots or pitch pockets equivalent to those mentioned above. This grade particularly refers to stock used for inside lining of freight cars.

Standard Car Decking or Flooring.

41. Material of this grade shall be well manufactured from sound, live timber and shall be free from splits, shakes, rot, bark or waney edges, and unsound knots, or pitch pockets, pitch seams or large knots which would weaken the piece for the use intended. This grade will admit of sound knots not to exceed one-third width of the piece, provided they are not in clusters, and sap.

Common Car Sills and Framing.

42. Material of this grade shall be well manufactured from sound live timber, sawed full size to sizes ordered and free from rot, unsound knots, cross grain, bark or waney edges or shakes, but will admit of sap and any number of sound knots, provided they are not in clusters, and do not exceed one-third width of piece; pitch pockets or pitch seams that would not weaken the piece for the purpose intended.

43. Sizes up to 6 inches in width shall measure full when green, and not more than ⅛ inch scant when dry or part dry. Sizes 6 to 12 inches in width shall measure full when green and not more than ¼ inch scant when dry or part dry. Sizes 12 to 16 inches in width shall measure full when green and not more than ⅜ inch scant when dry or part dry. Unless otherwise specified ¼ inch shall be allowed for each side which is to be dressed. In pieces 3 by 6 inches and under when ordered in lengths exceeding 30 feet, sound knots shall not exceed one-quarter the width of the face through which they project, and the grain shall not cross sufficiently to impair the strength.

44. *Standard Lengths.*

Car Siding—8, 9, 10 and 12 feet or multiples.

Car Roofing—5 feet or multiples.

Car Lining—8, 9, 10, 12, 14, 16, 18 and 20 feet or multiples.

Car Decking—9 and 10 feet or multiples.

All orders shall be shipped in standard lengths, unless otherwise specified, but no lengths of either car siding, lining or roofing shall be shipped, except in the lengths specified or multiples thereof. Those who do not desire stock shipped in multiple lengths should so specify.

CLASSIFICATION AND GRADING RULES FOR CYPRESS CAR MATERIAL.

1. *Cypress* to cover Red, Gulf, Yellow and East Coast Cypress, also known as Bald Cypress.

2. *Cypress Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Cypress are knots, knotholes, sap, worm-holes, shake, season checks, splits and wane.

KNOTS.

4. Knot shall be classified as standard and small, as to size, and sound or rotten, as to quality.

5. A standard knot is sound and not to exceed 1¼ inches in diameter.

6. A small knot is one not exceeding ¾ inch in diameter.

7. A sound knot is one solid across its face, is as hard as the wood it is in.

8. A rotten knot is one not as hard as the wood it is in.

SAP.

9. Stained sap or bright sap shall not be considered a defect in the material specified in these rules.

SEASON CHECKS.

10. Ordinary season checks are such as occur in lumber properly covered on yard or season checks of equal size in kiln-dried lumber.

WANE.

11. Wane is bark or lack of wood from any cause on edge.

MISCELLANEOUS.

12. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the *coarsest* pieces *such grade may contain,* but the average quality of the grade shall be better than the coarsest pieces allowed in the grade.

13. Lumber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

14. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

15. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or millwork will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

16. The foregoing general observations shall apply to and govern the application of the following rule. The rule referred to in the following section is intended to govern 4-inch or 6-inch strips and to cover strips used for car siding, car roofing and car lining.

CAR ROOFING AND SIDING.

"C and Better" Grade.—This grade will admit sound knots, stained sap, pin worm holes, very slight shake and other defects, but none that will prevent the use of each piece in its full width and length for car roofing and car siding; may be random or specified lengths and may be worked to pattern specified and graded from pattern side or S2S and C. M. and graded from the better side.

CAR LINING

Shall be specified widths and 8 to 20 inches in length. Will admit tight knots, stained sap, pin wormholes, slight shake and other defects, but none that will prevent the use of each piece in its full width and length for car lining purposes.

Lunch Counter Car. Figs. 165, 166. A passenger equipment car fitted up with a lunch counter for serving light meals.

M

Magazine (Base Burning Stove). A general term for a receptacle for coal before it reaches the fire-pot proper, usually situated directly above the latter.

Magnets, Application and Release. Used in connection with electro-pneumatic brakes. See ELECTRO-PNEUMATIC BRAKE.

Mail Apartment. Figs. 1881, etc. Similar to an alley apartment, but extending the full width of the car. See ALLEY APARTMENT.

Mail Bag Hook (Postal Car). Fig. 1867. A hook for securing the mail bags to the mail bag rack.

Mail Bag Rack (Postal Car). Figs. 1867, 1886. A rack for mail bags, etc.

Mail Car. See POSTAL CAR.

Mail Car Lamp. A lamp used for lighting mail or postal cars.

Mail Catcher Bracket. Fig. 1863. The brackets or sockets on either side of the postal door which hold the mail catcher.

Main Cock (Pintsch Gas Lighting). A cock usually placed in the saloon for the control of the low pressure supply. It regulates all the burners at once, in addition to which there are separate cocks to each.

Main Cock Cover (Pintsch System). A cast-iron cover with hinged lid to fit over the key shaft of the main cock. It is screwed to the side of a car or to a bulkhead.

Main Floor (Refrigerator Car). The top layer of boards in the floor of the car.

Main Reservoir (Air Brake). Fig. 1353. A cylindrical tank, carried on the locomotive, or motor car, to hold a supply of compressed air. So called in distinction from the auxiliary reservoirs under each car.

Main Roof (Refrigerator Cars). The outside roof. See CAR ROOF. On cars with clere-stories, the lower deck, or that part of the roof over the sides of the car and on either side of the deck or clere-story.

Male Center Plate. The body center plate is sometimes called a male center plate. See CENTER PLATE.

Malleable Iron. Cast iron which has been annealed and the brittleness greatly decreased by packing the castings in iron pots containing forge scale, hematite ore or some other oxide of iron and subjecting them to a continued red heat for from four to six days. They are then allowed to cool slowly. The change which takes place is internal, and while little or no carbon is removed its physical condition is changed from graphitic to amorphous or cement carbon and the iron is rendered less brittle. Malleable castings can be bent within moderate limits, but are not truly malleable like wrought iron.

Malleable Iron Castings for Passenger and Freight Equipment Cars, Specifications for. (M. C. B. Recommended Practice.)

In 1915 the following specifications were adopted:

1. *Process.*—Malleable-iron casings may be made by either the open-hearth, air furnace or electric furnace process.

2. *Annealing.*—Malleable castings shall be neither over nor under annealed.

3. *Tensile Test.*—The tensile strength of the standard test bar shall not be less than 38,000 lb. per sq. in. with an elongation, measured in 2 in., of not less than five per cent.

4. *Transverse Test.*—The standard transverse test bar, tested cope side up and on supports 12 in. apart, with the load applied at the center, shall show the following deflection:

900 lb. with 1.25 deflection in ½ in. specimen.
1400 lb. with 1.00 in. deflection in ⅝ in. specimen.
2000 lb. with 0.75 in. deflection in ¾ in .specimen.

Note.—The test specimen shall be 14 in. long, 1 in. wide and either ½, ⅝ or ¾ in. thick, these thicknesses to be proportional to the thickness of the material which they represent.

5. *Special Tests.*—In addition to the above tests, the inspector shall have the right to satisfy himself of the suitability of the metal used for malleable castings made under these specifications, by breaking a reasonable number of castings from the sand, to examine for excessive mottling or graphite spots. In the case of castings of special design or importance, the inspector may also call for suitable test lugs, bearing a proper relation to thickness, to be left on the castings for final inspection, not over ¾ in. by ⅝ in. in section.

6. *Test to Destruction.*—If the purchaser or his representative desires, a casting may be tested to destruction. Such casting shall show good, tough malleable material.

7. *Standard Test Bars.*—All test bars shall be cast without chills, and with the ends perfectly free in the molds, using heavy risers of sufficient height at each end to insure sound bars. Of the bars selected, two tensile and two transverse test bars shall be cast in one mold. Where the full heat goes into castings which are subject to specifications, two molds shall be poured within five minutes after tapping into the first ladle and two from the last iron of the melt. Molds shall be suitably stamped to insure identification of the bars, the bars being annealed with the castings. Where only a partial melt is required for work in hand, two molds shall be cast from the first ladle used and two after the required iron has been tapped.

(*a*) *Tensile Test Bars.*—The test bar as cast shown in Fig. 1 shall be used for all tensile tests.

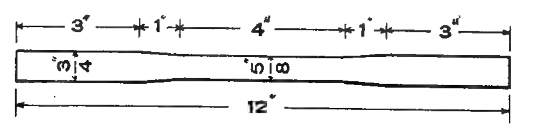


FIG. 1.—TEST SPECIMEN.

(*b*) *Transverse Test Bars.*—The purchaser and the manufacturer may agree upon a transverse test bar, as cast, the width of which shall be 1 in., the thickness ½ in., ⅝ in. or ¾ in., depending upon the thickness of the castings represented, and the length to be 14 in.

(*c*) *Test Bars from Finished Castings.*—If the purchaser or his representative so desire, a test specimen may be cut from the finished casting if possible.

8. *Number of Tests.*—Of the test bars required for each melt, two shall be tested for tensile strength and elongation and two for transverse deflection; these bars shall be taken from the hottest and coldest parts of the annealing furnace. The remaining bars are reserved for either the tensile or transverse test in case the other two bars fail to come up to the requirements through shrinkage spots.

9. *Finish.*—(*a*) Castings shall be true to patterns, free from blemishes, scale or shrinkage cracks. A variation of 3/32 in. per ft. shall be permissible.

(*b*) Irregular castings shall be cast with shrinkage prints so that they will be equally strong at all points. Castings failing to withstand the strains produced by riveting into place will be rejected, and shall be replaced by the manufacturer.

10. *Marking.*—Such markings as indicated by the purchaser shall be put on the castings in such a way as not to interfere with the casting.

11. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

12. *Rejection.*—(*a*) Material which, subsequently to above tests at the mills or elsewhere and its acceptance, does not conform closely to the blue-print, or if distorted by improperly matched flasks, improper annealing, undue wrapping or any other defects, or fails to satisfy requirements as herein specified, will be rejected.

(*b*) All rejected material shall be replaced by the manufacturer at his own expense.

13. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests the manufacturer may make claim for a rehearing within that time.

Manhole. An opening in a boiler or tank to enable a man to enter and make inspection or repairs.

Manhole Cover. 11, Fig. 340. A plate or lid to close a manhole.

Manhole Cover Chain. A chain with which a manhole cover is fastened to a tank to prevent it from falling when the manhole is open.

Manhole Hinge. A hinge by which a manhole cover is attached to the manhole ring.

Manhole Ladder (Tank Cars). An iron ladder extending down into the tank under the manhole to allow workmen to descend for purposes of cleaning, inspection or repairs.

Manhole Ladder Brace (Tank Cars). A wrought iron piece attached to the inside of the tank and to the manhole ladder to keep the latter in a vertical position.

Manhole Ring. A metal ring riveted around a manhole, and forming a seat for the cover.

Manifold. See THREE-PIPE MANIFOLD.

Mansell Retaining Ring. A mode of connecting steel tires to the wheel centers by a ring of an approximate L or U cross-section, which secures the tire to the wheel, so that every part of the tire is securely held, into however many pieces it may be ruptured. This ring is almost universally used in English passenger service. See WHEEL and CAR WHEEL.

Mantle. Figs. 2375, 2376. A device used as a burner in mantle gas lamps, so constructed that when the gas is ignited the mantle becomes in candescent. See PINTSCH MANTLE LAMP.

Mantle Lamp. See PINTSCH MANTLE LAMP and VAPOR SYSTEM.

Marker. A lamp or flag used to indicate the rear end of a train. See TAIL LAMP.

Marker Bracket. Figs. 1883-1886; 1888, 1891. A term used to indicate both the bracket or socket on a car which supports marker or tail lamps as well as flags; and the bracket or arm which fits into the socket and supports the tail lamp.

Marking on Freight Equipment Cars. (M. C. B. Standard.) Fig. M. C. B. 26-A. See also Lettering Cars.

In 1909 the following was adopted:

1. Freight Equipment Cars that have a superstructure which will permit, should be stenciled with markings on sides of car, in the following order:

Lettering (Initials or name of Road),
Number,
Capacity,
Light Weight.

This marking is to be located as nearly over the truck as the lettering will permit, preferably to the left of center line of side of car. On box and other house cars where doors slide to the left the above marking may be placed to the right of center line of side of car. On any other cars where the construction makes it necessary, this marking may be placed either to the right of center line of side of car, or in the center of side of car. The distance from the center line of coupler to the bottom of car number to be normally 2 feet 4½ inches, with a minimum dimension of 1 foot 10½ inches, and a maximum of 2 feet 10½ inches. The spacing of the remaining marking to be as shown on diagram.

The ends to show the initials or name of road, car number and light weight, in the upper half of end of car. On box or other house cars having end doors this lettering should be so located that it will not be obscured when doors are open.

Flat and low-sided gondola cars should show the lettering (initials or name of road), number, capacity and light weight on the side of car in the best available location offered by the construction of the car. Suggestions as to the arrangement of this lettering are shown on the diagrams. When possible the sizes of lettering and figures should correspond with present Recommended Practice. The end marking on flat cars may be omitted.

Side and end doors should be stenciled with the initials or name of road either on the outside or inside of door. If placed on the inside the stenciling should be so located that it will not be defaced by the sliding of the door.

In 1911 it was agreed that the "date weighed" should include the station symbol where weighed.

In 1912 the minimum height of number on steel underframe gondola cars above the center line of the coupler was changed from 1 foot 10½ inches to 1 foot 5 inches and the drawing changed accordingly. Advanced to Standard in 1913.

In 1913, in order to conform to the requirements of the American Railway Association Car Service Rule No. 11 as amended November 20, 1912, the word "new" was arranged to precede the word "weight" on the drawing.

In 1912 the following paragraphs were incorporated under this head and the star indication added:

"Wooden and steel underframe cars one year old should be reweighed and restenciled, the weight to be followed by one star; cars two years old should

be again weighed and stenciled, the weight to be followed by two stars; cars three or more years old should be again weighed and stenciled, the weight to be followed by three stars, which will indicate final weight.

"Steel cars should be reweighed and restenciled after they have been in service twelve months, the weight to be followed by three stars, indicating final weight."

In 1913 the above method of weighing and stenciling cars was modified as follows:

"(*a*) Each new car must be weighed separately and the light weight, capacity in pounds,‡ station symbol and the date (month and year) must be marked thereon at the car works, under the supervision of the owner's inspector. The accuracy of the scales used must be certified to by a railroad scale inspector appointed by the car owner.

"These provisions to be incorporated in the contract covering the purchase of the equipment.

"(*b*) Wooden and steel underframe cars should be reweighed and remarked at least once every twelve months during the first two years the car is in service, and thereafter once every twenty-four months. All-steel cars should be reweighed and restenciled at least once every thirty-six months. A car must be clean when weighed for marking.

"The station symbol and the date (month and year) of each reweighing should be marked the same as provided for new cars in paragraph (*a*).

"(*c*) When a car is materially changed by repairs, alterations or repainting, it should be reweighed and remarked.

"(*d*) Any car without marking or which has not been reweighed and remarked within the prescribed period should be immediately reweighed and marked. If the car is reweighed at any time and is found to have a variation of over one per cent between the marked and the actual weight, it should be immediately remarked. When a car is remarked the car owner should be notified of the old and of the new weights, with place and date. The proper officer to whom these reports should be made will be designated in 'The Official Railway Equipment Register.'

"(*e*) Whenever a weighmaster at a point not equipped for marking freight cars, as provided in paragraph (*d*), ascertains the light weight of a car which is not marked in accordance with this rule, he shall attach to the car the prescribed 'Light Weight Card' with the light weight and send two copies of the card to the designated officer of the railroad on which the scale is located, one copy to be sent to the owner of the car. The presence of the Light Weight Card on the car shall be authority for remarking the car at first available station."

In 1911 designating marks for cars equipped with United States Safety Appliance Standards were adopted as follows:

For cars built on or after July 1, 1911:

UNITED STATES
SAFETY APPLIANCES.
STANDARD

For cars built prior to July 1, 1911:

UNITED STATES
SAFETY APPLIANCES

The above markings to be used on each side of the car: letters, if stenciled, to be not less than 1 inch in height and as per M. C. B. standards for lettering for freight cars; letters, if on a metal badge plate, to be not less than 1/16-inch and have not less than ⅛-inch bar or staff. The arrangement of the words to be as near as possible as shown above.

UNITED STATES
SAFETY-APPLIANCES
STANDARD

A metal badge plate, 3½ by 10 inches, with the proper marking, is preferred, one plate to be secured on each side of the car by four bolts or rivets, if on metal cars, and by four bolts or screws if on wooden cars, the bolts, rivets or screws to be not less than ¼-inch diameter. The badge plate to be of metal as shown on the above drawing.

Master Car Builders' Association Pamphlet and Stationery Sizes (M. C. B. Standard). In 1893 a standard size of 6 inches by 9 inches was adopted for M. C. B. reports.

PAMPHLETS, CATALOGS, SPECIFICATIONS, ETC.

In 1894 standard sizes for publications of this nature were adopted and the size of postal card circular was changed in 1895 so that they are now as follows:

For postal card circulars, 3½ inches by 5½ inches.

For pamphlets and trade catalogs, 3½ inches by 6 inches, 6 inches by 9 inches, 9 inches by 12 inches.

For specifications and letter paper, 8 inches by 10½ inches.

In connection with these standards it was decided that a standard practice should be to have the proper standard dimensions, and the word "standard" printed on the upper left-hand corner of title-page or cover whenever practicable.

In 1912 the standard size of specifications and letter paper was changed to the Government standard, namely, 8 by 10½ inches.

Master Controller. See CONTROL SYSTEM.

Master Key. A key which commands many locks of a certain set, the keys of which are not interchangeable.

Match Box Holder. Fig. 2040.

Match Striker. Figs. 2039A, 2040, etc. A metal plate with a rough surface.

Match Striker Frame. A metal frame for holding a piece of sand or emery paper on which to strike matches.

Materials, Rules for Loading of. See RULES FOR LOADING MATERIALS.

Meat Timbers (Refrigerator Car). The vertical and horizontal timbers inside the refrigerating chamber on which the meat is suspended.

Menu Card Holder. Fig. 2041.

Mercury Vapor Lamp. A lamp consisting of a tube containing mercury through which the electric current is passed, vaporizing the mercury and giving out a greenish light.

Metal Hose. Figs. 2103, 2104, 2105. See HOSE.

Metal Screw Thread. A form of screw thread used when both the male and female screws are made of metal. Metal threads are made of the same size as the spaces between them, whereas the spaces between wood screw threads are made wider than the projections. See also SELLERS SYSTEM OF SCREW THREADS.

Meter. See CONDENSATION METER.

‡and cubical capacity, except for flat and tank cars.

Mica Chimney (Pintsch Lamp). A chimney for use on all center lamps, being placed immediately above the ring reflector, allowing a portion of the light to be directed toward the roof of the car.

Micrometer Gage. A form of gage for very minute and exact measurements.

Middle Door Rail. A horizontal bar in a door frame intermediate between the top and bottom rails. See DOOR FRAME.

Middle Transom (Six-Wheel Trucks). 21, Fig. 1010. The term applied to the two transoms nearest the center of the truck, in distinction from the two outside transoms.

Milk Car. Figs. 357, 358. A car similar to a refrigerator car, but generally built for operation in passenger trains for carrying fresh milk in cans.

Miller Coupler. A form of automatic coupler for passenger cars largely in use before the general adoption of the M. C. B. type of vertical plane coupler. It consisted of a shank and a head with a fixed projection or hook which engaged with a corresponding hook when cars were brought together, by side displacement of the drawbars. To uncouple, one or both of the drawbars were pulled to one side by an uncoupling lever and chain operated from the platform. A strong spring kept the drawbars normally in the center line of draft.

Mine Car. A small car for carrying minerals in mines, usually having four wheels, and provided with a dumping device by which the load may be quickly and completely discharged.

Mineral Wool. A substance having much the appearance which its name implies, manufactured from the slag of iron furnaces by throwing against it while in the molten state a strong blast of air. It is used for deadening in passenger cars and also largely as a non-conductor for coating steam pipes and boilers.

Molding. Figs. 1586, 1593, etc. "A mode or ornamentation by grooved or swelling bands or forms, following the line of the object."—Knight. Small moldings are often termed beads and also fillets. A cove molding is one of concave section. There are a great variety of other special technical terms for different forms of moldings. Moldings are either straight or waved. See also DECK EAVES MOLDING, EAVES MOLDING, WINDOW COVE MOLDING, WINDOW MOLDING, WINDOW SILL MOLDING.

(For Car Seats.) Also called seat back bands or seat molding. A metal band to finish the edge of the seat back. Plush or leather covered strips are also used.

Molding Joint Cover. A piece of wood or metal in some ornamental form for covering the joints of two pieces of molding.

Monitor Top. A CLERE-STORY.

Mortise Lock. A lock adapted to be inserted into a mortise in the edge of a door, so as only to expose the selvage or edge plate. See LOCK.

Motor (Electric). Fig. 2675, etc. A machine for converting electrical energy into mechanical energy of rotation. May be operated by either alternating or direct current.

(Gasolene). Figs. 2735, etc. An internal combustion engine, using gasolene as the means of power.

Motor Bearing. See Fig. 2686 for the details of railway electric motor bearing.

Motor Cut-Out. Fig. 2698. A switch in the bottom of a controller which, when opened, cuts out one motor of a two-motor equipment or two motors of a four-motor equipment.

Motor Car. Figs. 183-194; 2734, etc. A car driven by some form of motor which is carried by the car itself. The common types of motor cars are electric, which receive current from a third rail, trolley wire or storage batteries; gasolene, which are propelled by internal combustion engines; gasolene-electric or gas-electric, which obtain power from an electric generator driven by an internal combustion engine carried in the car; and steam, which obtain power from a steam boiler and engine located in the car. See CAR, and SELF-PROPELLED CAR.

Motor Controller. Fig. 2704, etc. See CONTROLLER.

Motor-Driven Air Compressor (Air Brake). An air compressor driven by a motor for use on electric cars. See AIR COMPRESSOR.

Motor Inspection Car. A small four-wheel car with seats, propelled by a gasoline engine. See INSPECTION CAR.

Motorman's Air Brake Valve. See BRAKE VALVE.

Muck Bar. "Bar iron which has passed once through the rolls. It is usually cut into lengths, piled, and rerolled."—Knight. Certain grades of iron axles are made directly from muck bars and contain no scrap.

Muffler (Vacuum Brake). A device to render noiseless the emission of steam at the ejector when brakes are applied. It is simply a collection of beads or shot, through the interstices of which the steam forces its way.

Muffler Exhaust. See EXHAUST MUFFLER.

Muley Axle. An axle without collars.

Mullion. A bar between panes of glass or panel work See DOOR MULLION.

Multiple Unit Control (Westinghouse). With the Westinghouse unit-switch system of automatic multiple-unit control the unit-switches, which perform the same functions as contactors, are operated by compressed air at 70 lbs. per sq. in., taken from the air-brake system, the pistons being controlled by electro-magnetic needle valves. These switches are interlocked and automatically make the proper combinations of motor connections with the resistances. A limit relay is used for arresting the sequence of switch movements when the main motor current valve rises above a safe amount. The master controller consists of a small box containing a horizontal drum or roller and suitable contact fingers. The operating handle revolves in a vertical plane, and when moved to the right the motors accelerate forward to full speed; when moved to the left the motors accelerate to full speed reverse. There are three points or positions in each direction. The first is the switching point and throws all motors in series with full resistance in circuit. The second point is the series position and the motors can be operated continuously in series at half speed with the handle in this position. The third point is the parallel position and the motors are connected in multiple with full power. To cut off the current, the pressure on the controller handle is released and a spring returns it to the "off" position. Current for the control circuit is obtained from a small storage battery of 7 cells, giving 14 volts. Multiple-unit control apparatus for single-phase equipments differs but slightly from that used for direct-current motors. The contractors control circuits of varying voltage taken from taps on the auto-trans-

former. The speed of the motors is thus regulated by varying the voltage impressed on them.

Multiple Unit Control System (Sprague-General Electric). See ELECTRIC MOTOR CAR. A system of control where one or more controllers are operated from a distance.

This system has been developed with special reference to the operation of a train consisting of several motor cars coupled together, all motors being controlled simultaneously by a single operator. Each motor car is equipped with a motor controller, one or two master controllers, and control couplers, together with such other apparatus as switches, fuses, rheostats, etc., as constitutes a complete operative motor car equipment.

The motor controller consists of a number of electrically operated switches, called "contactors," which close the various power and motor circuits, and which carry only the current for the operating coils of the contactors. These latter are designed to open the motor circuit contacts by gravity, and are provided with an efficient magnetic blowout for quickly and positively disrupting the arc thus formed. The motor controller also includes an electrically operated reversing switch, called "reverser," the function of which is to connect the motor armatures and fields in the proper relations for giving forward or backward movement of the car. The reverser consists of a drum having two positions and carrying the necessary contacts for engaging fixed contact fingers, together with two operating coils, one for throwing the reverser to each position. The operation of this reverser is also effected by the master controller.

The master controller is similar in construction to the ordinary hand controller, but very small and easily operated. It is provided with separate operating and reversing interlocked handles, and has a magnetic blowout for disrupting the arcs formed on opening the control circuit connections.

The combinations of motors, rheostats, etc., effected by the motor controllers are the same as those accomplished by ordinary hand controllers, giving series and parallel operation of motors and two economical running speeds. (See CONTROLLER.)

Where several cars are coupled in a train the control circuits of the various cars are joined by means of couplers located at the end of each car, so that all motor controller operating circuits and all master controllers are connected together, making all of the motor controllers operative from any master controller The cars may be coupled into a train without reference to their relative positions, and either end of any car may be coupled to any other car in the train

The couplings for connecting the control circuits between cars consist of a coupler socket fixed to the end of the car, and a jumper consisting of two coupler plugs connected by a multiple cable. The coupler sockets and plugs contain corresponding metal contacts for the connection of the electrical circuits.

A cut-out switch is provided on each car, by means of which damaged motors or motor controllers may be disconnected from the energizing circuits.

Multiplier (Electric Lighting). A device used in connection with a lamp regulator to prevent variations in the current supply to the lamps.

N

Nail. "A small pointed pieec of metal, usually with a head, to be driven into a board or other piece of timber, and serving to fasten it to the other timber." —Webster.

The common nails of commerce are divided into cut nails, clinch nails, and wire nails. They are distinguished in size by the number of pennies, as 10d., 20d., etc., nails.

Nailing Sill. See NAILING STRIP and FLOOR NAILING STRIP.

Nailing Strip. 53, Figs. 287, 288; 14, Fig. 335; 2, Fig. 364; 9, 10, 11, Fig. 404. A strip of wood laid over a metal frame and bolted to it, to which the boards are nailed in a combined wood and steel car. In refrigerator cars, where there is generally more than one floor course, nailing strips are also used. They are also used in some cases for fastening insulation. See also SIDE NAILING STRIP and FURRING.

Nailing Strip Bracket. A bracket secured to the sills to hold in place the NAILING STRIP.

Nailing Strip Cross Ties. Light members of a metal underframe extending across the sills for the purpose of supporting the nailing strips.

Nailing Strip Silencer. 17, Fig. 404. Serves a purpose similar to that of a NAILING SILL BRACKET.

Name Plate. See DOOR NAME PLATE and NOTICE PLATES.

Narrow Gage. The distance in the clear between the heads of the rails of a railroad when less than 4 ft. 8½ in. See GAGE.

Narrow Vestibule. See WIDE VESTIBULE.

Needle Beam. 28, Fig. 364; Fig. 476. The transverse members of the underframe of a car between the body bolsters which support the truss rod queen posts. Also act as crossties for the longitudinal sills. The term needle beam is sometimes applied to what is more properly a cross bearer or cross tie.

Needle Beam Bottom Tie Plate. A plate which extends across the bottom of a needle beam of the built-up type and ties the various members together.

Needle Beam Center Filler. A casting between the center sills, forming a part of a needle beam of the built-up type.

Needle Beam Truss Rod. A truss rod used in a built-up form of needle beam. Such a needle beam consists of the CROSS TIE TIMBER, QUEEN POSTS and TRUSS ROD. See also CROSS TIE TIMBER TRUSS ROD.

Negative. An arbitrary term used in electrical engineering to distinguish the pole or connection toward which current is considered to flow, from the positive pole or connection away from which current flows. Thus direct current always flows from the positive pole or brush of a battery or dynamo through the external circuit and back to the negative pole or brush. Positive poles are distinguished on drawings by a plus (+) sign, and negative poles by a minus (—) sign. In a ground return system the ground connection is always negative.

Nest Spring. A spiral spring with one or more coils of springs inside of it. See HELICAL SPRING.

Night Latch. Fig. 1794, etc. A spring door lock which requires a key to be opened from the outside, but which can be opened from the inside without one. See LATCH and LOCK.

Nipple (Pipe Fittings). Figs. 2259, etc. A short pipe with a screw thread cut on each end, used for connecting couplings, tees, etc., together or with some other object, as a tank or heater See AIR BRAKE HOSE NIPPLE.

Non-Pressure Head (Brake Cylinder). The cover for the end of the brake cylinder opposite to that having air pressure against it. It has an opening in the center for the piston rod.

Non-Vestibuled Car (Passenger Equipment). Fig. 124, etc. A car having either open platforms, with hoods, or having dummy ends.

Nosing (of a Lock). A KEEPER.

(Of Steps). The part of a tread board which projects beyond the riser, hence the metallic moldings used to protect that part of the tread board. The nosings should be distinguished from the step facings.

Notice Plate. Fig. 2033. Varieties are the platform notice plate, saloon notice plate, etc.

Nozzle. See TANK NOZZLE.

Nut. "A small block of metal or wood containing a concave or female screw."—Webster. Nuts take their name from the bolts, rods or other parts to which they are attached. They are usually either square or hexagonal. See SCREW THREADS.

Nut Fastener. See NUT LOCK.

Nut Lock. Figs. 1552, etc. A device for locking the nut in place on the bolt after it has been drawn up. See also LOCK NUT. Also called nut fasteners.

Nuts. See SCREW THREADS, BOLT HEADS AND NUTS.

O

Oakette. An artificial leather used for curtains and upholstering. It is made by coating a cloth fabric with a compound which gives it the appearance of leather.

Observation-Buffet Car. Fig. 179. See BUFFET CAR and OBSERVATION CAR.

Observation Car Figs. 175-177, 179. A car equipped with an observation end. See CAR and OBSERVATION END.

A special type of observation car is also in limited used in mountainous regions and generally has open sides and seats arranged in tiers.

Observation End or **Observation Room.** Figs. 175, 179. That end of a car which is fitted with an extended platform and large windows for the purpose of affording passengers an unobstructed view. Commonly applied to parlor, sleeping and business cars, which are run as the last car in a train, from which passengers may get a view of the country, and especially of the track and structures.

Observation Parlor Car. A parlor car with an observation end. See OBSERVATION END.

Observation Platform Railing. Figs. 582-584.

Observation Sleeping Car. Figs. 175-177. A sleeping car with an OBSERVATION END. See OBSERVATION END.

Officers' Car. A Business Car.

Oil Box. A JOURNAL BOX.

Oil Car. A car made especially for the transportation of mineral oil. Some oil cars are built for carrying barrels of refined oil. Crude oil and refined oil are usually carried in TANK CARS.

Oil Lamp. Figs. 2665, etc. A lamp for burning oil. See TAIL LAMP.

Open Door Stop. A block of iron or wood fastened to the side of a freight car to prevent a sliding door from sliding too far when opened.

Open Platform. A platform covered by a hood or canopy but not enclosed by a vestibule.

Ore Car. Figs. 37-41, 309-313. A hopper car made especially for carrying iron or other ores. Because of the great weight of ore relative to its bulk, ore cars are generally shorter and consequently of less cubic capacity than other forms of hopper cars. See also CAR.

Ormolu. A style of bronzing.

Ottoman. A carpet-covered movable cushion serving as a foot rest.

Outer Intermediate Sill. A term applied to the two intermediate sills next to the side-sills, to distinguish them from the two intermediate sills adjacent to the center sills, which are the inner intermediate sills.

Outlet Valve. (Tank Cars). 14, Fig. 340; Fig. 954. The valve by means of which the tank is emptied.

Outside Body Truss Rod. When two or more truss rods are used under each side of a car body those farthest from the center are called outside body truss rods, in distinction from the inside truss rods.

Outside End Piece (of Wooden Truck Frame). The end piece nearest the end of the car, in distinction from the inside end piece. See END PIECE.

Outside End Sill. A type of box car framing in which the end sill projects outside the sheathing, forming a narrow platform at the ends of the car.

Outside Hung Brake. Brake gear hung so that the shoes bear on the outer side of the wheels, or the side of the wheels away from the bolster.

Outside Sills. The side sills.

Outside Transom (Six-Wheel Trucks). 22, Fig. 1010. The term applied to the two transoms farthest from the center of the truck, in distinction from the middle transoms.

Outside Wheel Piece Plate. An iron plate fastened to the outside of a wheel piece to strengthen it.

Outside Window Sill. A horizontal piece of wood or iron under a window on the outside of a car on which the sash rests.

Outside Window Stop. A wooden or metal strip attached to a window post on the outside of a sash to hold the latter in its place.

Overhang (of a Roof). The projection beyond the sides.

(Of a Car Body.) That part of a car body between the body bolster and end.

Overhang Brace Rod (Passenger Equipment Car Framing). A truss rod extending over the side sills and between the sheathing and wainscoting. Its office is to sustain and stiffen that part of the underframe which overhangs at the ends and outside the bolsters.

Overhead Equalizer Spring (Vestibule). A face plate buffer spring is a more appropriate term, as it corresponds to the side stem buffer spring of a platform equipment.

Overhead Lining (Refrigerator Cars). See CEILING.

Overhung Door. A sliding door which is hung from or supported on a rail above the door.

P

P. C. Brake Equipment. Figs. 1348, 1349.

Package Rack. A basket rack.

Packing. Any substance used to fill a gland to make a tight joint around the valve stem or spindle. Leather, rubber or metal rings used to serve the same purpose on a piston. Also the oiled waste used for lubricating journals.

Packing Blocks. Rectangular blocks gained into the center sills and draft timbers, and serving the purpose of connecting them firmly together longitudinally. The term is borrowed from bridgework, in which the form of packing block is very common. They are called key blocks.

Packing Expander (Air Brake). A spring wire ring for spreading out the leather packing of the brake piston so as to make it fit air-tight.

Packing Leather (of Journal Boxes). A dust guard is sometimes called packing leather.

(Air Brake.) A ring of leather used in connection with brake cylinder pistons to make an air-tight fit. When so used it is always accompanied with a packing leather expander. A packing leather for a piston rod is called a cup leather, and is compressed by a piston spring. See PISTON PACKING LEATHER.

Packing Ring (Triple Valve). A circular metallic ring of variable rectangular cross-section which is placed in grooves in the edge of the piston to make it fit air-tight in the cylinder. The rings are turned slightly larger than the cylinder and cut apart diagonally at one point so that when compressed they will tend to spring open.

(Hose Coupling.) An India rubber ring in a coupling case which makes a tight joint between the two parts of the coupling.

Padlock. Fig. 1797, etc. A loose lock having a semi-circular shackle jointed at one end so that it can be opened, the other end of the link being locked when desired by the entrance of the sliding bolt into it. Such locks are used to secure a hasp or the like on a staple or similar device by passing the link through the staple. A spring padlock is one which snaps shut and locks by pressure only. A dead padlock has no springs.

Painting (of Passenger Equipment Cars). Consists usually of the priming, rough stuff or scraping filling coats, color coats and varnishing. The care and expense devoted to the process and the order and number of the coats are varied.

Pamphlets, Catalogs, Specifications, etc. See MASTER CAR BUILDERS' ASSOCIATION REPORTS.

Panel. A board inserted in the space left between the stiles and rails of a frame or between moldings. Sometimes metal plates are used for this purpose. Door panels in passenger cars are usually only the middle and lower or twin door panels. The upper door panel is usually of glass. Window panels come between the windows, and are distinguished as outside and inside. Wainscot panels come below the windows, between the upper and lower wainscot rails. Other interior panels are deck side panels and end panels, the latter sometimes called ventilator panel, and the end roof panel over the door.

(Of a Truss.) The space between two vertical posts or braces and the two chords of a truss.

(Electric Lighting.) A board or support for electric switches and other apparatus.

Panel Back Seats. Figs. 1681, etc. A car seat made with a loose panel in the back, pivoted and supported by springs set in the seat back frame. The panel pushes back and accommodates itself to the occupant's back.

Panel Ceiling. Any form of ceiling divided into panels. This term is commonly used synonymously with wood or Agasote ceiling.

Panel Furring. Nailing strips or block for panels.

Panel Lamp. An ALCOVE LAMP.

Pantagraph Trolley (Electric Motor Car). Figs. 2697, 2728. A current collecting device for an overhead conductor consisting of a diamond shaped jointed frame operated by springs or compressed air, and having a suitable collector at the top.

Pantasote. A substitute for leather used for upholstering and decorating cars and steamships. The material was first made by R. P. Bradley, a chemist, and the ingredients are secret. That it contains rubber or any animal substance is denied. It is made by sheeting two or more pieces of cloth or canvas together, with the warp running in different directions, to give strength. The sheet making the leather side is passed between heavy rollers many times, and each time it receives a very thin coat of pantasote material, and this is kept up until the cloth or canvas is thoroughly saturated and coated. The color is added to the pantasote material and is incorporated into the fabric. It is very like leather, and is not readily distinguished from it.

Paper Box (Postal Car). A box used for the distribution of papers.

Parallel. A method of connecting two or more pieces of electrical apparatus of a common circuit so that the positive poles of each are connected to a common positive conductor and the negative poles are connected to a common negative conductor. See SERIES.

Parallel Brake Hanger. See BRAKE BEAM ADJUSTING HANGER.

Parcel Rack. See BASKET RACK.

Parlor Car. Figs. 167-169, 134, 235. A car for day travel but of a more luxurious character than a day coach, having revolving seats, smoking compartment and other conveniences, and on which an extra fare is charged. Operated on many roads by the Pullman Company and often referred to as Pullman cars. The term chair car is also sometimes used, but incorrectly, as a chair car is properly a day coach with reclining seats, on which no extra fare is charged. See CAR.

Parlor Car Chair. Figs. 1667, etc.; 1686, etc.; 1702, etc. The most common type of chair for parlor cars is a simple arm chair revolving on a pivot which enters a fixed pedestal. In observation cars, etc., ordinary chairs are commonly used.

Parlor-Café Car. See CAFÉ-PARLOR CAR, CAFÉ CAR and PARLOR CAR.

Parting Bead or **Parting Strip.** A strip which acts as a distance piece between two objects, as a window and a window blind.

Parting Rail (Door Frame). A vertical rail between the bottom and middle or middle and top rails of a door or partition, dividing a panel into twin panels.

Partition Stop (Door Holder). So called in distinction from a floor stop.

Passenger Car. Figs. 138-195, 378-413. A car used for carrying passengers. This term is, however, generally confined to that class of passenger cars commonly known as day coaches, which are equipped with seats or reclining chairs for day travel. See CAR, COACHES, PARLOR CAR, and SLEEPING CAR.

Passenger Car Journal Box. See JOURNAL BOXES AND DETAILS.

Passenger Equipment Cars, Steam and Air Connections for. See STEAM AND AIR CONNECTIONS FOR PASSENGER EQUIPMENT CARS.

Passenger Train Car or **Passenger Equipment Car.** Figs. 124-195, 371-413. A car usually operated in passenger trains. See CAR.

Pawl. (Brake Ratchet Wheel). Figs. 1409, 1410. A pivoted bar adapted to fall into the notches or teeth of a wheel as it rotates in one direction, and to restrain it from back motion. Used in windlasses, capstans and similar machinery. See RATCHET WHEEL.

Pedestal (Postal Car). Standards which are used to carry the two longitudinal rods near the center of the car which support one side of the distributing tray, dumping tray or bridge. The pedestal fits in a socket in a base plate and is usually secured in place by bolts with wing nuts, so that it can be easily removed. Also called a center stand or standard.

Truck.) 5, Figs. 991, 1010; Fig. 1180. A casting of somewhat the form of an inverted letter U, bolted to the wheel piece of a truck frame to hold the journal box in its place, while permitting a vertical movement. The two projections of a pedestal are called pedestal legs, and the space between them a jaw, which is closed at the bottom by a pedestal tie bar. In Great Britain pedestals are called axle guards on cars and horn plates on locomotives.

(Revolving Chairs.) The stand by which the chair is supported; consists of three portions—base, column and seat frame.

Pedestal Jaw. The vertical side member of a truck pedestal. See PEDESTAL.

Pedestal, Passenger Car (M. C. B. Standard). Figs. 2850, 2852, 2853. For Journal 5 by 9 inches Adopted as Recommended Practice 1903. Revised 1909. Adopted Standard 1911.

For Journals, 3¾ by 7 inches. The pedestal shown on this drawing was recommended in 1874. See Proceedings 1874, page 40; again approved as standard in 1881; see Proceedings 1881, pages 14, 15 and 27. Also approved by the Master Mechanics' Association in the same year. Again adopted as standard in 1893. Weight, 141 pounds.

For Journals, 4¼ by 8 inches. In 1898 a Recommended Practice was adopted for passenger car pedestal for journal box with 4¼ by 8 inch journal. In 1901, as a result of letter ballot, this was changed to Standard, and is now shown on the drawing.

Pedestal Spring. A spring which rests on a journal box between the jaws of a pedestal.

Pedestal Stay Rod. 7, Figs. 991, 1010. A transverse rod connecting the pedestal tie bars on each side of a truck to prevent them from spreading.

Also a rod connecting the pedestal tie bars on four-wheel caboose cars.

Pedestal Strap. A Pedestal Tie Bar.

Pedestal Tie Bar. 6, Figs. 991, 1010. A bar extending across the mouth of a pedestal jaw underneath a journal box and bolted to the jaws of the pedestal. Also a bar sometimes called pedestal strap, connecting two or more pedestals on the same side of a truck or car.

Pedestal Timber (Four-Wheel Cabooses). A longitudinal member sometimes used on four-wheeled cars, which is placed under the floor or alongside the sill and to which the pedestals are bolted.

A term sometimes used to designate the WHEEL PIECE of trucks.

Pedestal Truck. Figs. 963, 965, 990-996, 998, etc. A truck which has its journal boxes held in and guided by pedestals which are either a part of or rigidly attached to the side frames. The axle and boxes can thus move vertically in the pedestals and shocks due to the unevenness of the track are not transmitted to the truck frames to the same extent as in a truck which has the side frames and journal boxes rigidly connected.

Pen Rack. Fig. 2037.

Pendant. Figs. 2627, etc. A small suspended lamp.

Perforated Veneer. A form of seat covering which consists of three, and sometimes four, layers of wood veneering, glued together and perforated.

Phosphor Bronze. "A term applied to an alloy of bronze or brass, or to a triple alloy of copper, tin and zinc, which has been given special purity and excellence by skillful fluxing with phosphorus. It is supposed that the presence of phosphorous gives the tin a crystalline character which enables it to alloy more completely and strongly with the copper. Whether for this reason or not, the phosphor bronzes, when skillfully made, are greatly superior to unphosphorated alloys."—Thurston.

Pilaster. "A square pier, like a flat column built against a wall, and having cap and base."—Knight.

Pilaster, Cap Bracket and Base. A decorative feature of a car interior, placed between the windows and covering the window post.

Pile Driver. Figs. 210, 211. A car used for driving piles in construction or maintenance-of-way repair work. Pile drivers are equipped with long bars, called leaders, which are held erect and act as a guide for a hammer or tup. In driving piles a pile is held between the leaders and driven by the hammer dropping on it after being hoisted by a cable and hoisting engine which are located on the car. For moving from place to place in trains the leaders fold back and the forward end is carried on a flat car. Pile drivers are usually self-propelling for short distances at low speeds, such as moving about yards, etc. See CAR.

Pile Hoisting Sheave (Pile Driver). A wheel placed at the side of the main sheave, for use in hoisting piles.

Pillar Crane. A style of crane having the mast supported from below, either by a mast pocket or a base plate.

Pillow Box (Sleeping Cars). The space under the seat in which pillows are stored when the berth is not made up.

Pinion. The smaller cog wheel of two wheels in gear.

Pintsch Gas Burner. Used on all Pintsch lamps other than the bracket lamps. It consists of a small lava tip of the "fish-tail" type, held in a special brass pillar.

Pintsch Gas Lamp. Figs. 2302, etc. A lamp for burning gas, the essential features of which are the closed globe at the bottom, the white porcelain reflector above the flames near the top of the globe, and the peculiar method of supplying air.

Various forms of cutter lamps are made, all on the regenerative principle, the inlet air being highly heated before reaching the flames, thereby producing extreme whiteness and steadiness of light.

Some of these lamps are supported by four ornamental arms, one of which forms the gasway. In all, the interior of the lamp is so constructed that a portion of the light is reflected outward and upward toward the roof of the car, illuminating it.

In all standard center lamps air is admitted to the lamp immediately above the upper dome, 101. Passing thence through the orifice in chimney, 313, it comes in contact with the sheet iron flues, 312, and in its downward passage becomes highly heated. It then issues into a space within the dome, 101, between the dome and the mica chimney, 109, and continuing its

course is, by the diaphragm, 315, deflected and constrained to pass close to the mica chimney, where it is still further heated. It now passes outward between diaphragm,. 315, and the ring reflector, 110, and through the orifices near the outer rim of this reflector into the bowl and to the flames. In its tortuous course the effect of drafts against the lamp is entirely nullified.

The products of combustion escape directly through the annular space between mica chimney, 109, and the cup reflector, 111. Thence by flues, 312, out through the crown at the top of the lamp, in the case of the four-arm lamps, and through the flues, 333.

In vestibule lamps, two or four-flame, air is admitted to the annular space between the parts of ventilating chimney, 324, through the shielded opening above the roof, immediately below the ventilator. Becoming heated in its downward passage, it passes through the diaphragm, 323a, and through the orifices in the body, 320, to the flames. The products of combustion escape through the flues, 321, and the chimney, 324, to the outside air. Any excess of air over and above what is required for proper combustion of the gas will also be carried off by the ventilating chimney which the air reaches from the space above the body by means of the passage around the outside of the chimney, 321.

Pintsch Gas Lamps (Method of Securing and Connecting). (Four-Arm Lamps.) The arms are secured by means of nipples, passing through the roof; a water-tight joint around the nipples on the roof being made by bedding putty close around the nipple, with a rubber washer above the putty, and an iron washer above the rubber. Lock nuts are then put on and forced down until the excess putty is forced out and the arm drawn firmly up to its place. The gas arm nipple is then supplied with the reducing elbow, the three blank arms with caps. The elbow is then connected with the ⅛-in. pipe to the flange tee on the roof line. The roof around the smoke bell is protected with a tin thimble, large enough to give a ½-in. air space around the smoke bell flue. The upper end of this thimble is made of proper size to receive the ventilator.

Pintsch Mantle Lamp. Figs. 2313, etc. An improvement on the standard Pintsch gas lamp whereby the same gas is burned with an incandescent mantle enclosed in a bulb, Fig. 2168. The candle power of the lamps is greatly increased with the same consumption of gas. No change is necessary in the piping of the car, but the regulator is adjusted to give a higher pressure in the car piping. The form of lamp used is very similar to the standard Pintsch gas lamp.

Pintsch Pillar. Used on bracket lamps below the burner. Where no globe holder is used a mill check is placed immediately below the pillar.

Pintsch System of Gas Lighting. Figs. 2298, etc. A system of car lighting which burns gas taken from a storage tank, where it is carried under a pressure of 150 lbs., or less, per square inch. The gas is an oil gas, made from crude petroleum or similar oils, and is able to withstand a high degree of compression without undue loss of *luminosity*. The pressure of 150 lbs. of the receiver tank is automatically reduced by the Pintsch regulator to a uniform pressure at the burners of about ½ oz., regardless of the pressure in the gas receiver.

The arrangement of the apparatus is shown in Fig. 2299. The receiver or gas holder, A, suspended beneath the car floor, is connected by a system of extra heavy ¼-in. pipes, with soldered joints and special fittings, to the regulator. The charging of the receiver is effected (from either side of the car) by means of hose, connecting the charging lines from the gas station with the filling valves. The gage communicating with the high pressure pipes connecting the various parts of the apparatus below the car, serves the double purpose of registering the amount of pressure in the receiver at any time and of showing the amount of gas consumed in lighting the car for any given period.

From the regulator the gas (with its pressure reduced to about ½ oz. per sq. in.) passes upward through the car toward the roof. At some convenient point, as in a saloon or locker, a main cock is placed, whereby the flow of gas to the lamps is controlled.

A ½-inch pipe is run along the roof, with ⅛-inch branches to each lamp or bracket. These branches are made by means of special flanged tees. Where ⅛-inch connections are necessary, passing downward from the ½-inch low pressure line on the roof to brackets or vestibule lamps, the flanged elbow or angle fitting is used.

For lamps and methods of suspending and connecting them see PINTSCH GAS LAMPS.

The burner is of the "fish-tail" type, and from one to six are used in each lamp or light, four being the number generally adopted. See PINTSCH GAS BURNERS.

Pintsch Washers. These washers are of lead and rubber, in three sizes, and are always used in pairs. The rubber is always placed first on the fitting, the lead outside with the collar inward. When pressure is brought upon the washer, the lead collar protects the inner edge of the rubber, the body of the lead washer protects the outside surface of the rubber, and the rib protects the outer edge of rubber. The rubber is entirely enclosed in metal, and protected from the action of the gas, which would otherwise destroy it. The scored surfaces of the flanges entering into the soft lead make a perfectly tight joint. These washers are used on all classes of flanged fittings, whether high or low pressure.

Pipe. "A tube for conveyance of water, air, or other fluids."—Knight. See BRAKE PIPE, etc.

Pipe Bracket. See PIPE CLAMP.

Pipe Bushing. See BUSHING.

Pipe Clamp. Figs. 1482, 1489, etc. A clamp for holding the air brake, signal or steam pipes in place under the car.

Pipe Clip or **Strap.** An iron band for fastening a pipe against or to some other object. They are usually single, but sometimes double, for two or more pipes. See CLIP.

Pipe Coupling. A short tube with a thread cut on the inside at each end, which is screwed on the ends of two pipes and used for uniting them together, or uniting one pipe with another object, as a cock or valve. In some couplings the thread at one end is right hand and the other left hand, but generally they are both right hand threads.

Pipe Fittings. The connections for systems of wrought iron, gas, water, and steam pipes. The more usual pipe fittings are bushings, elbows, tees, return bends (close or open), reducers, couplings, nipples, plugs, etc.

Pipe Hanger. A hanger for supporting a pipe.

Pipe Reducer. See BUSHING.

Pipe Screw Threads. Screw threads used for connecting wrought iron pipes. Such screws are cut "tapered";

that is, the end of the pipe, or the inside of the coupling where the thread is cut, forms part of a cone, so that in screwing up the pipe a tight joint can be made. Pipe threads are of a V-shape, sharp at the top and bottom, and their sides stand at the angle of 60° to each other. The following is the number of threads per inch for pipes of different sizes. The size is given by the inside diameter, but the actual bore of the smaller sizes is considerably larger than the nominal. The exterior diameter of ordinary gas pipe is from .27 to .37 inches greater than the inside diameter.

American Standard System of Pipe Threads.

Size of pipe.	Outside diameter. Ins.	Inside diameter. Ins.	Inside diam. Extra strong. Ins.	Inside diam. Double extra strong. Ins.	Threads per Inch	Whitworth's thread.
1/8 in.	.405	.27	.205		27	28
1/4 in.	.54	.364	.294		18	19
3/8 in.	.675	.494	.421		18	19
3/4 in.	1.05	.824	.736	.422	14	14
1 in.	1.315	1.048	.915	.587	11 1/2	11
1 1/4 in.	1.66	1.38	1.272	.884	11 1/2	11
1 1/2 in.	1.9	1.611	1.494	1.088	11 1/2	11
2 in.	2.375	2.067	1.933	1.491	11 1/2	11
2 1/2 in.	2.875	2.468	2.315	1.755	8	
3 in.	3.5	3.067	2.892	2.284	8	
3 1/2 in.	4.	3.548	3.358	2.716	8	
4 in.	4.5	4.026	3.818	3.136	8	
4 1/2 in.	5.	4.508			8	
5 in.	5.563	5.045			8	
6 in.	6.625	6.065			8	
7 in.	7.625	7.023			8	
8 in.	8.625	7.982			8	
9 in.	9.688	9.001			8	
10 in.	10.075	10.019			8	

That all wrought iron pipe for car work be threaded with a standard total taper of 3/4 inch in one foot, and that all pipe fittings be tapped to suit the standard pipe thread with a total taper of 3/4 inch in one foot, so that the thread on pipe and fittings will be uniform and taper-tight. See Illustrations on page 135.

Pipe, Welded, Specifications for. (M. C. B. Recommended Practice.)

In 1914, by letter ballot, specifications for welded pipe for passenger and freight equipment cars were adopted as Recommended Practice, as follows:

1. *Process.*—(*a*) Steel used in the manufacture of pipe shall be of a soft, weldable quality made by the Bessemer process.

(*b*) The wrought iron used in the manufacture of pipe shall be double-refined.

(*c*) All pipe 2 in. nominal diameter or under may be butt-welded, but all pipe larger shall be lap-welded.

2. *Tension Test.*—The material shall conform to the following minimum requirements as to tensile properties:

	Steel.	W. I.
Tensile strength, lb. per sq. in.	50,000	45,000
Elastic limit, lb. per sq. in.	30,000	......
Elongation in 8 in.	18	12

3. *Hydrostatic Tests.*—All pipe shall be tested to the following hydrostatic pressures:

Size.	Standard Grade Pipe Single Thickness. Butt.	Lap.	Extra Strong Pipe. Double Thickness. Butt.	Lap.
1/8	700	....	700	....
1/4	700	....	700	....
3/8	700	....	700	....
1/2	700	....	700	....
3/4	700	....	700	....
1	700	....	700	....
1 1/4	700	....	1,500	....
1 1/2	700	1,000	1,500	2,500
2	700	1,000	1,500	2,500
2 1/2	....	1,000	....	2,000
3	....	1,000	....	2,000
3 1/2	....	1,000	....	2,000
4	....	1,000	....	2,000

DIMENSIONS FOR STANDARD PIPE UNIONS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1/8-inch	375	.270	.105	.59	63	78	.80	.85	.89	1.05	.26	[illegible]	27	.2225	.08	.5625	1/4	.59	.615	.006	.05
1/4 "	496	.364	.132	76	.80	.96	.98	1.05	1.09	1.29	.33	5/16	[illegible]	.2625	10	.6925	5/16	.76	.76	.006	06
3/8 "	630	.494	.136	90	.95	1 11	1.13	1.20	1.24	1.45	.34	3/8	18	.2825	.11	.7325	3/8	90	.905	.006	07
1/2 "	783	.623	160	1.16	1 21	1.38	1.40	1.49	1 54	1 78	40	7/16	14	.3025	.12	.8225	[illegible]	1.03	1 20	.006	.08
3/4 "	992	824	168	1.38	1 43	1 61	1.63	1.72	1.77	2.02	42	1/2	14	.3225	.13	8725	[illegible]	1.24	1.43	.007	.09
1 "	1.246	1.048	198	1 74	1.79	1 98	2.01	2.13	2.19	2.49	49	9/16	11	.3625	15	1.0025	[illegible]	1 565	1 76	.007	.10
1 1/4 "	1 592	1 380	212	2.12	2 18	2 37	2.40	2.52	2.58	2.90	53	.6	11	.3825	16	1.0725	9	1.91	2.15	.007	.11
1 1/2 "	1.831	1.610	221	2.40	2 46	2 66	2 69	2.81	2 87	3 20	.55	7	11	4025	17	1.1225	1.0	2.18	2.40	.007	13
2 "	2 306	2 067	239	2.89	2.95	3 18	3.19	3.31	3 38	3.74	60	8	11	4225	18	1.2025	1.1	2 66	2.90	.008	14
2 1/2 "	2.775	2.468	307	3.39	3.45	3.67	3.70	3.86	3 93	4 30	77	.9	8	5225	23	1.5225	1.2	3.16	3.41	.008	.16
3 "	3.401	3.067	334	4.07	4.13	4.36	4.40	4.56	4.63	5 13	84	1 0	[illegible]	.5625	25	1.6525	1.3	3.81	4 08	.008	.18
3 1/2 "	3.901	3.548	353	4 61	4.68	4 91	4.95	5.11	5.19	5 72	88	1.1	8	6025	27	1.7525	1 4	4.31	4.63	.008	.20
4 "	4.4	4.026	.374	5.15	5.22	5 47	5.51	5.67	5 75	6.31	94	1.2	8	6225	28	1.8425	1 6	4.81	5 19	.008	.22

DESCRIPTION ACCOMPANYING TABLE OF MALLEABLE PIPE UNIONS.

NUMBERS AT THE HEAD OF THE COLUMNS ABOVE ARE THOSE GIVEN IN THE DIMENSION LINES ON TABLE A.

Column No. 1 in table represents the nominal diameter of pipe.

Column No. 2 represents diameter of pipe at one-half the height of full thread nearest solid section of pipe.

Column No. 3 represents the internal diameter of the pipe.

Column No. 4 represents the difference between columns Nos. 2 and 3, and is equal to twice the thickness of metal in pipe measured from inside line to one-half the height of thread, as specified before.

Column No. 5 represents the outside diameter of end of pipe union and is taken as *No. 2, plus twice No. 4*, plus an arbitrary increment.

Column No. 6 is equal to No. 5 plus an increment varying from .04 to .07 of an inch. This increment was allowed for the purpose of being able to slip the nut over upper swivel end of union.

Column No. 7 is No. 6 plus an amount varying between .15 and .25. This lip created is considerably in excess of what exists on present pipe unions for the reason that we find the surface between the lip and the corresponding part of nut is often damaged, and the bearing surface, when the full strength of the man is used on the wrench, is sufficient. We assume that a man would pull about 30 pounds on a wrench, with a possibility of using less force on pipes of small diameters. For that reason we made a variation in the width of lip, which lip, theoretically, would be uniform for all sizes of pipe. The nut itself has been strengthened to prevent the lip from deflecting upward.

Column No. 8 is No. 7, plus an increment varying from .02 to .04 of an inch.

Column No. 9 is No. 8, plus twice the height of the thread.

Column No. 10 is No. 9, plus an increment varying between .04 and .08 of an inch.

Column No. 11 is No. 10, plus one and one-half times No. 4.

Column No. 12 is two and one-half times No. 4, and was figured especially for bearing surface, so that the thread would not wear away too rapidly when the nut is occasionally removed.

Column No. 13 has been assumed arbitrarily, but in all cases is greater than the length of full thread on standard pipe.

Column No. 14 represents the number of threads per inch in length of nut. This thread, we believe, should be United States Standard form and not sharp thread.

Column No. 15 is taken arbitrarily, but is based on the probable requirements of manufacturers for tapping out the nut.

Column No. 16 is three-fourths of No. 4.

Column No. 17 represents the full height of nut, and is equal to No. 12, plus No. 15, plus No. 16.

Column No. 18 is the amount of projection outside of nut.

Column No. 19 is No. 2, plus No. 4, plus an arbitrary increment.

Column No. 20 is No. 7, less No. 16, with slight modifications.

Column No. 21 represents the clearance at several points, as indicated on print.

Column No. 22 is assumed arbitrarily.

SEE PAGE 135 FOR ILLUSTRATION WITH NUMBERED DIMENSIONS

(The European standard is the Whitworth pipe thread, which is quite different.)

Taper of Thread 3/4 in. per foot.

Pipe Shield (Steam Heating). A metal covering over the radiator pipes to protect surrounding parts or passengers' clothes from the heat of the pipes.

Pipe Unions (M. C. B. Standard). In 1903 the dimensions for pipe unions as shown on accompanying table were adopted as standard. In 1908 the following specifications were adopted:

4. *Flattening Test.*—A section of pipe 6 in. long shall be placed in a compression machine with the weld at the top and flattened until the distance between the plates of the machine is 60 per cent of original external diameter for wrought iron and 25 per cent for steel pipe. The pipe shall not show any opening, except that opening of the weld will not be considered cause for rejection.

5. *Bend Test.*—A sufficient length of pipe to be bent cold 180 deg. around a mandrel the diameter

of which is 18 times the nominal diameter of the pipe without any opening of weld or cracks in any portion of pipe.

6. *Test Specimens.*—Test specimens shall consist of sections cut from a pipe; they shall be smooth on the ends and free from burrs.

7. *Number of Tests.*—One of each of the above tests shall be made from each diameter of pipe for each 2,000 ft. or less.

8. *Weights.*—The standard weights for pipes of various inside diameters are as follows:

	STANDARD GRADE PIPE. Single Thickness.		EXTRA STRONG PIPE. Double Thickness.		
Nominal Diam., In.	Outside Diam., In.	Weight of Pipe per Lin. Ft. threaded with Couplings.	Outside Diam., In.	Weight of Pipe per Lin. Ft. Plain Ends.	No. of Threads.
⅛......	.405	.25	.405	.31	27
¼......	.540	.43	.540	.54	18
⅜......	.675	.57	.675	.74	18
½......	.840	.85	.840	1.09	14
¾......	1.050	1.13	1.050	1.47	14
1	1.315	1.68	1.315	2.17	11½
1¼......	1.660	2.28	1.660	3.00	11½
1½......	1.900	2.73	1.900	3.63	11½
2	2.375	3.68	2.375	5.02	11½
2½......	2.875	5.82	2.875	7.66	8
3	3.500	7.62	3.500	10.25	8
3½......	4.000	9.20	4.000	12.51	8
4	4.500	10.89	4.500	14.98	8

Ten per cent of each lot shall be weighed and a comparison made with the sample. All pipe shall be rejected that varies more than 5 per cent from that given in the above table.

9. *Workmanship.*—The finished pipes shall be circular within 0.002 in. All pipe shall be provided with the prevailing standard thread, which will make a tight joint when tested to the internal hydrostatic pressure at the mills. The threads shall not vary more than one and one-half turns either way when tested with a Pratt and Whitney standard gage. All burrs at the end shall be removed.

(*b*) *Couplings.*—Each pipe shall be provided with a standard coupling, having clean-cut threads tapped straight through and of such a pitch diameter that will make a tight joint. Coupling may be wrought iron or steel.

10. *Finish.*—The finished pipe shall be reasonably straight and free from injurious defects.

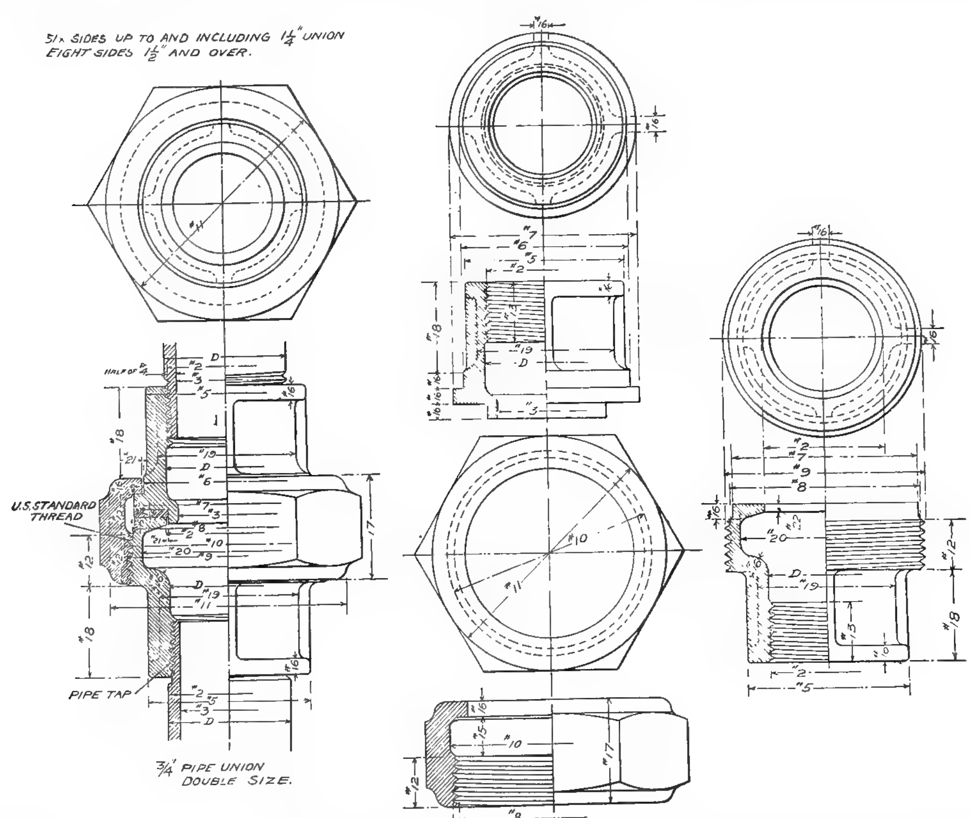
11. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operator of the works.

12. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance develops weak spots, cracks or imperfections, or is found to have injurious defects, will be rejected and shall be replaced by the manufacturer at his own expense.

13. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may claim for a rehearing within that time.



THREE-QUARTER INCH PIPE UNION WITH DIMENSIONS NUMBERED. SEE ALSO PAGE 134 FOR TABLE OF SIZES.

Piping. See LAVATORY and WATER SUPPLY. See also

illustrations in section on PASSENGER TRAIN HEATING APPARATUS and AIR BRAKES.

Piston. A metal disk with packing, etc., made to fit in a cylinder, and transmit the power caused by the pressure of a working fluid to the external rod and working parts of some form of engine. In a brake cylinder the piston transfers the pressure of the air to the foundation brake gear. A piston consists of a piston head, attached to a piston rod. The piston follower or follower plate lies at the back of the piston head, inclosing between them the piston packing rings, or (in air brake cylinders) the piston packing leather, which latter is provided with a packing leather expander. The follower plate is secured to the piston with follower bolts.

Piston Packing Expander (Air Brake). A spring wire ring for spreading out the leather packing of the piston so as to make it fit air-tight against the cylinder walls.

Piston Packing Leather (Air Brake). A circular ring of leather used as a substitue for piston packing rings, pressed into the cylinder so as to have an L-section. It is attached to and surrounds the piston and bears against the inside surface of the cylinder, being pressed against it by a piston packing expander.

Piston Packing Ring. See PACKING RING.

Piston Rod (Brake Cylinder). A rod attached to the piston of a passenger brake cylinder, by which the pressure against the piston is transmitted to the brake levers and shoes.

A tube attached to the piston of a freight brake cylinder to act as a guide to the piston as it is forced outward by the air pressure. In this case a PUSH ROD is attached to the levers and is inclosed by the tube. The push rod transmits the pressure on the piston to the levers and brake shoes, while it allows an application of the brakes by hand without pulling out the piston.

Piston Travel (Air Brakes). The amount of movement of the piston when forced outward as the brakes are applied. Running piston travel is the piston travel obtained when the car is in motion and is always greater than the travel obtained when the car is at rest, due to the fact that the slack or lost motion in trucks and brake gear as well as the elasticity of the car body is more easily taken up by the brake shoe pressure when the car is in motion. False travel is that due to some unevenness of the track or to some cause which occasions a momentary change.

Pitch (Of a Screw). The advance made by the thread in one complete revolution, usually expressed by the number of threads in a given space, as (in U. S. and Great Britain) an inch.

(Of a Roof.) The ratio of the rise of a roof to the horizontal distance covered.

Pitching Roof. A roof formed of one or more inclined plane surfaces. When the pitch becomes steep, the term is used to distinguish a roof formed of plane surfaces from one formed of curved or arched surfaces.

Pivot. "A pin or short shaft on which anything turns." —Webster.

Pivot Pin (M. C. B. Coupler). Another name for the KNUCKLE PIN. It is so called from the fact that the knuckle when opening swings about the pin as a pivot. See AUTOMATIC CAR COUPLER SPECIFICATIONS.

Placard Boards for House Cars. (M. C. B. Recommended Practice.)

In 1914 by letter ballot the following was adopted:

The space available for placards should be not less than 16 in. by 24 in. on each end and each side of car. House cars with sufficient space available on wood siding, or exposed lining, should have a rectangular space, painted black, on each side and each end. Other house cars should be provided with placard boards, made of soft wood, not less than 16 by 24 by 1 in. The vertical edge should be reinforced with metal protection, and the bolts fastening the boards to the car should be not less than six in number, and should pass through the metal reinforcing pieces, three through each. The boards may be made of more than one piece, and should then be tongued and grooved. The distance from the floor line of car to bottom of board should be not less than 4 ft. 6 in.

Routing boards, preferably the same size as the placard boards described, should be placed on the side of the car, as near as possible to the door seal.

Plain Triple Valve (Air Brake). A triple valve which has no provision for making emergency applications. See TRIPLE VALVE.

Plane Gage for Solid Steel Wheels. See WHEELS, SOLID STEEL, PLANE GAGE FOR.

Plank. A board piece of sawed timber, differing from a board only in being thicker.

Plastic Car Roof. Figs. 928, 930. A roofing material the body of which is composed of a very heavy layer of woolen felt, thoroughly saturated with a compound which it is claimed preserves the roofing itself and also the upper and lower boarding with which it comes in contact. See CAR ROOF.

Plate. (Architecture). "A piece of timber which supports the ends of the rafters."—Webster.

(Car Building.) A horizontal member on top of the posts of a car body supporting the roof car-lines or rafters. Also called side plate, in distinction from an END PLATE, which is a similar member across the end of the car. A deck plate is used to cap the deck posts of an upper deck.

(Of a Cast Iron Car Wheel.) The central portion connecting the hub and tread, sometimes single plate, sometimes double plate. The plate is stiffened by brackets.

Plate Facing. An inside cornice fascia.

Plate Rod (Freight Cars). A horizontal metal rod passing across the car through the two side plates to tie them together.

Plate Washer. Usually a wrought iron cut washer, in distinction from a cast washer, but also used to designate many forms of large washers or plates serving as double or triple washers. See WASHER.

Plate Wheel. A car wheel of which the center portion is formed of a disk or plate instead of spokes. See WHEEL.

Platform (Passenger and Caboose Cars). Figs. 507, Page 412, etc. A floor at the end of a car, supported by projecting timbers below the car body, to facilitate ingress and egress. A narrow platform is sometimes added to freight cars for convenience of train men, but a platform proper is used only on passenger equipment cars and cabooses. The term platform is commonly applied to the frame which supports the platform proper in passenger equipment cars, together with its buffing devices. The term is also commonly used for buffing devices and their framing for non-vestibule cars, which have no platform proper.

Platform Car. A flat car.

Platform Chain. A chain connecting the inner platform

railings, posts and rails, closing the passageway between the platforms of two cars coupled together. It is used only on the rear end of the last car, and the front end of the first car when the first car is a passenger car.

Platform Cover Plate. 26, Fig. 404. A steel cover plate over the platform sills.

Platform End Bracket. An ornamental casting attached under the platform roof on each side of the vestibule face plate on narrow vestibule cars.

Platform End Sill. 16, Fig. 364; 21, Fig. 404. The transverse end piece of the platform framing.

Platform End Timber or **Buffer Beam.** A cross timber at the outer end of a car platform. A platform end sill.

Platform Floor. The layer of boards over the platform sills.

Platform Gate. A gate used to close the side entrance to a platform, in general use only for private cars, suburban cars and street cars. See PLATFORM TAIL GATE.

Platform Hood. A cover or canopy formed by extending a car roof over the platform. Sometimes called CANOPY. It is made of wood, sheet iron or agasote.

Platform Hood Bow. A bent member which forms the outer edge of a platform hood and to which the platform hood carlines are fastened.

Platform Hood Bracket. A bracket or knee iron to connect the hood to the corner post.

Platform Hood Carlines. Transverse members which support the roof of a platform hood.

Platform Hood Ceiling. See PLATFORM HOOD SIDE PIECE.

Platform Hood Post. An upright iron bar or rod sometimes attached to the platform or platform railing, to support a platform hood.

Platform Hood Side Piece. The side piece to which the ceiling is attached.

Platform Lever. A lever for uncoupling cars from the platform.

Platform Lever Pin. The pin on which the platform lever pivots.

Platform Plate or **Buffer.** A steel angle plate bolted to the buffer stems and overlapping the platform end sill. When in contact with the like plate of another car, it makes a continuous floor between them. Being pivoted at the platform end sill, it adjusts itself to all curves of the road. The platform plate also acts as a buffer, and is sometimes so called. See VESTIBULE.

Platform Railing. 7, Fig. 364; Figs. 576-580. An inclosure consisting of iron or brass posts and rails on the end of an open platform to prevent persons from falling off and also to act as a hand hold.

Platform Roof. That portion of a car roof which projects over the platform. See PLATFORM HOOD.

Platform Roof Carline. A carline supporting the platform roof. See CARLINE.

Platform Roof End Carline. The carline at the extreme end of the platform roof. See CARLINE.

Platform Safety Chains. See SAFETY CHAINS, PLATFORM.

Platform Short Sills. Short longitudinal pieces of timber, not extending under the car proper, which are framed into and bolted to the end sills and platform end timbers of a passenger car to sustain the floor of the platform. The longer timbers which extend under the body of the car proper are called platform sills.

Platform Sill. A sill extending beyond the end of a car to support the platform.

Platform Steps. The stirs at each corner of a passenger equipment or caboose car which afford the means of ingress and egress. Forms of steps have been introduced, but are not in general use, which are folding or extensible, being dropped down into position when the car is stationary, and removed or elevated when the train starts. In modern passenger cars the platform steps usually consist of three and sometimes four separate step below the platform. Wooden steps are sometimes called box steps.

Platform Tail Gate. Figs. 575 and 581. A gate used to close the passageway at the rear of the last car of a train which is ordinarily used for passage from one car to the other.

Platform Tail Lamp. Figs. 2050, etc. A signal lamp which stands on the rear platform of a train.

Platform Tie Rods. Horizontal rods passing through the platform end timber and end sill or body bolster, for the purpose of holding them and the other portions of the frame of the car securely together.

Platform Timber. See PLATFORM SILL.

Platform Trap Door. Figs. 549-566. A door which covers the space occupied by the steps, and thus extends the platform out to the side of the car. It is used on wide vestibuled cars, private cars equipped with open platforms, and suburban, elevated and subway train cars, which commonly make stops at station platforms which are level with the car platform.

Platform Trap Door Bumper. Fig. 603. A stop for a trap door to prevent its striking the vestibule wall when opened.

Platform Trap Door Lift. Figs. 624, 1835. A metal device attached to trap doors, with a recess for inserting the fingers to pull the door open.

Platform Trap Door Fixtures. Fig. 608, etc; Figs. 1843, etc.

Plow. See SNOW PLOW and BALLAST PLOW.

Plug. See REFRIGERATOR CAR PLUG.

Plug Connector. Fig. 1431. The term applied to the jumper and receptacle used in connection with electro-pneumatic signal and brake equipments, and which provides flexible electric connections between cars for the electric operation of these equipments.

(Pipe Fittings.) A short, solid metal cylinder, with a screw on the outside and a square or hexagonal end to take hold of with a wrench, screwed into the end of a pipe or hole in a plate, to close the opening.

Plumbago. Graphite; one of the forms of pure carbon from which pencils, etc., are manufactured.

Plush. A kind of heavy cloth with a velvet nap on one side. Plush is used in car building as a covering for upholstered seats.

Pneumatic Jack. A jack operated by compressed air. See JACK.

Pocket (Drawbar Attachment). A yoke.

(Sleeping Car.) A receptacle for the clothing and small baggage of occupants of sleeping berths. Known as the head board pocket for the lower berth and upper berth pocket.

Any object having a cavity or opening which forms a receptacle to hold anything in its place. See PUSH POLE POCKET.

Pole Changer (Electric Lighting). Figs. 2443, etc. An automatic device for preserving the polarity of an axle generator. It is made generally in one of three types; rotating, mechanical or electrical type. The rotating type cmploys the principle of shifting the

brushes of the generator automatically when the direction of rotation changes through an angle equal to the pole pitch; that is, the angle between two poles of the generator. If it is a two-pole machine, the brushes must be shifted 180 degs.; if a four-pole machine 90 degs. The latter is the general arrangement. Th rotating type employs no switches or contacts that might interfere with the continuity of the armature circuit, and it permits the brushes taking a "lead," advantages not possessed by the other types which necessarily employ fixed brushes. The mechanical type consists of a reversing switch operated mechanically by the rotation of the armature shaft in one direction or the other. When the armature rotates in one direction the switch is automatically closed to make proper connections under these conditions and vice versa. The electrical type consists of a reversing switch, generally operated by solenoids, the entire mechanism being placed inside of the car, with the other electrical apparatus. This reversing switch is automatically thrown one way or the other, depending upon the direction of the rotation of the generator armature.

Poling Car. See CAR.

Pop Safety Valve. A valve set with a spring so as to open suddenly with a wide opening at a fixed pressure.

Port. An opening in a valve for the passage of steam or or air.

Positive. An arbitrary term used in electrical engineering to denote a pole or connection away from which current flows toward a negative pole or conductor. See NEGATIVE.

Post. A piece of timber or metal set upright and intended to support something else, as the posts of a house. See QUEEN POST, SIDE POST, etc.

Post Cap. See POST POCKET.

Post Office Car. See POSTAL CAR.

Post Pocket. 17, Figs. 287, 288; Fig. 481. A casting attached to the top of the side or end sill or the bottom of the side or end plate of a car to receive and hold a post or a post and a brace, in distinction from a stake pocket which is bolted to the outside of the side sill. Such pockets are commonly used with box and stock cars. The post pockets used below the plates are sometimes called post caps. See POCKET.

Postal Car. Figs. 129-137, 221, 372-374-377, 1877-1884. A passenger equipment car for carrying mail. Some postal cars are fitted with pigeon holes, etc., for the distribution of mail, and others are for storage only. See CAR and POSTAL CARS, U. S. GOV'T SPECIFICATIONS.

Postal Car Details and Floor Plans. Figs. 1859-1884.

Postal Cars. United States Government Specifications. In 1912 the United States Government, after a series of conferences with a committee of mechanical engineers appointed by the railroads, issued the specifications given below for postal cars and fixtures. These specifications cover 60 ft., 50 ft., 40 ft. and 30 ft. postal or mail cars; 30 ft., 25 ft., 20 ft., 15 ft., 12 ft., 10 ft. and 8 ft. mail apartments; and 15 ft., 12 ft., 10 ft., 8 ft. and 6 ft. alley apartments. The floor plans shown in Figs. 1880-1884 give the representative sizes of cars and apartments, the others being similar.

The following specification, dated March 28, 1912, and corrected to March 17, 1915, is for the construction of steel full postal cars.

GENERAL.

1. TYPE.—Postal cars may be built according to any of the following types of construction:

I. Heavy center-sill construction, the center sills acting as the main carrying member.

II. Side-carrying construction, the sides of the car acting as the main carrying members, having their support at the bolsters.

III. Underframe construction in which the load is carried by all the longitudinal members of the lower frame. The superstructure framing shall be of steel.

IV. Combination construction in which the side frames carry a part of the load, transferring same to the center sills at points remote from the center plate for the purpose of utilizing uniform center-sill area.

Steel castings may be used as parts of the underframe in any of the above types.

2. MATERIALS.—(*a*) All rolled-steel plates and shapes used in the car framing shall be made by the open-hearth process.

(*b*) The physical and chemical properties of all material used in the car framing shall be in accordance with the latest standard specifications of the American Society for Testing Materials, as follows: The standard specification for structural steel for cars; the standard specification for wrought iron, for iron bars and plates, and the standard specifications for steel castings.

3. WORKMANSHIP.—All workmanship throughout the car shall be first class. The jointing of the car framing shall be made so that the structure as a whole shall be built to dimensions specified, and all joints exposed to the weather shall be made tight against leakage.

4. LIVE LOADS.—(*a*) The car body shall be designed to carry the specified live load in addition to its own dead weight under service conditions. Where no live load is specified by the railroad company, the maximum capacity of car, as determined by journal loads given in section 36, shall be used as a basis for calculations.

(*b*) For distributing cars the following shall be assumed as the minimum live-load capacity: 40-foot cars, 10,000 pounds; 50-foot cars, 15,000 pounds; 60-foot cars, 20,000 pounds. Where postal cars are used for storage cars or under unusual load conditions, live-load capacity shall be from 40,000 to 50,000 pounds, depending upon the character of the mail to be handled.

5. BUFFING.—The maximum end shock due to buffing shall be assumed as a static load of 400,000 pounds applied horizontally at the resultant line of the forces acting at the center line of the buffing mechanism and at the center line of draft gear, respectively, and shall be assumed to be resisted by all continuous longitudinal underframe members below floor level, provided such members are sufficiently tied together to act in unison. Calculations for resistance to buffing shocks shall be based only on underframe members below floor level. These underframe members may be considered supported against buckling vertically by the superstructure between center plates at cross bearers to the extent that the strength of superstructure, cross bearers, and attachments is available for this purpose.

NOTE.—For electric cars operated on lines where electricity is the only motive power and the total weight of trains does not exceed 600,000 pounds, the static load may be assumed to be 200,000 pounds. This does not apply to cars run in electric trains on railroads using both steam and electric power.

6. DETAILS.—(*a*) All connections, except those specified for end construction in section 18, shall be designed by the maximum load to which the member connected shall be subject; and secondary stresses in any members caused by eccentric loads shall be combined with the direct stresses in such members. The maximum fiber stresses in any

member subject to both direct and secondary stresses may be taken at 20 per cent greater than those given in section 20; but the direct stresses considered alone must not exceed the allowable stresses given in said section.

(*b*) The distance between centers of rivet holes shall be not less than three diameters of the rivet and not more than 24 times the thickness of the thinnest outside member. The minimum distance between the center of the rivet hole and a sheared edge shall be not less than 1½ times the diameter of the rivet.

(*c*) Below the floor line, framing connections of floor beams, posts, etc., may be of rolled steel, pressed plate, or cast steel, and above the floor line such connections may also be of malleable iron. Connections for I beams, channels, or tees may also be made by coping the flanges and bending the web to form a knee, and for angles by coping one leg and bending the other.

(*d*) The use of fillers in the underframe and superstructure shall be avoided wherever possible.

(*e*) All holes for rivets or bolts in the underframe, superstructure, or outside finish shall be drilled or punched and reamed to size and fairness. No drifting of holes will be allowed. In deducting rivet or bolt holes to obtain the net area of any section they shall be taken at one-sixteenth inch larger than the diameter of the rivet or bolt. The effective area of a rivet shall be taken as its area before driving.

(*f*) All rivets, when driven, must completely fill the holes and have full concentric heads or countersunk when required.

7. Center Sills.—The center sills may be built up or composed of rolled or pressed shapes, either with or without cover plates, and cast-steel draft sills or end construction may be used in connection with any of the above types, with suitable riveted connections at splices. Built-up center sills may be either of uniform depth or of the fish-belly shape, and may be composed of rolled shapes, web plates, flange angles, and cover plates. If preferred, the web plates may be flanged and angles omitted. When flange angles are used they shall be connected to the webs with a sufficient number of rivets to transfer the total shear at any point in a distance equal to the depth of the sill at that point. When cover plates are used they must extend at least two rows of rivets at each end beyond their theoretical length.

8. Bolsters and Cross Bearers.—The body bolsters and cross bearers may be of either cast-steel or built-up construction, with ample connections at center and side sills to transmit the calculated vertical shear.

9. Floor Beams.—Transverse floor beams may be of rolled or pressed shapes, with suitable connections at center and side sills.

10. Floor Supports.—Longitudinal floor supports shall be supported at each transverse floor member.

11. End Sills.—The end sills may be either of rolled or pressed shapes, built-up construction or cast steel, with ample connections at center and side sills. They must be designed for the maximum vertical loads to which they may be subject and also for the assumed horizontal loads transferred from vertical end members as specified in section 18.

12. Side Frame—General.—In calculating the stresses in the side frame, its effective depth when designed as a truss or girder may be taken either as the distance between centers of gravity of the side plate and side sill or as the distance between centers of gravity of belt rail and side sill. At the side-door openings the bending moment caused by the vertical shear at door posts shall be considered as being resisted by the section above and below door openings, and the sum of the direct stresses and those due to bending at such sections shall not exceed the stresses specified in section 20. A sufficient proportion of any reinforcing members added to these sections shall be extended far enough beyond the door posts at each side that their reaction can be taken care of by the side frame without exceeding the limit specified for stresses.

13. Posts.—The sum of the section moduli taken at any horizontal section between floor line and top line of windows, of all posts and braces on each side of car located between end posts, shall be not less than 0.30 multiplied by the distance in feet between the centers of end panels, a panel length being considered as the distance between lines of rivets in adjacent vertical posts.

14. Sheathing.—Outside sheathing plates of steel or iron shall be not less than ⅛ inch in thickness. Additional outer finish may be used.

15. Roof—General.—The roof may be of either the clear-story or turtleback type. In the clear-story type, the deck plates shall be in the form of a continuous plate girder or equivalent construction extending from upper-deck eaves to deck sill, and either built-up of pressed or rolled shapes or pressed in one piece from steel plates. The carlines may be of either rolled or pressed steel shapes extending in one length across car from side plate to side plate or may extend only across upper deck. In the latter case, the lower-deck carlines may be formed by cantilever extensions of the side posts or by independent members of pressed or rolled shapes. In the turtleback type the carlines may be of either pressed or rolled shapes, extending in one length across car between side plate and side plate or may consist of cantilever extensions of the posts.

16. Carlines.—The projected area of the portion of roof in square feet supported by carlines divided by the sum of the section moduli of the carlines must not be more than 100.

17. Roof Sheets.—Roof sheets, if of steel or iron, shall be of a minimum thickness of 0.05 inch and either riveted or welded at their edges.

END CONSTRUCTION.

18. Vertical End Members.—(*a*) The sum of the section moduli of all vertical end members at each end shall be not less than 65, and the section moduli of the main members, either forming or adjacent to the door-posts, shall be not less than 75 per cent of this amount. Any excess of section moduli over 65 may be distributed at the discretion of the railroad for whose service the cars are built.

(*b*) The horizontal reactions of all vertical end members at top shall be calculated from an assumed external horizontal force, applied 18 inches above floor line, to all vertical members in proportion to their respective section moduli, such force being of sufficient amount to cause bending of all vertical members acting together, and top connections of vertical end members shall be designed for these reactions. The bottom connections of the vertical end members shall be sufficient to develop the full horizontal shearing value of such members.

(*c*) Except where vertical end members shall bear directly against or be attached directly to longitudinal members at either top or bottom, the assumed reactions shall be considered as loads applied to whatever construction is used at end sill or end plate, and both these last-named members shall have section moduli, respectively, sufficient to prevent their failure horizontally before that of the vertical end members.

Note.—For electric cars operated on lines where electricity is the only motive power and the total weight of trains does not exceed 600,000 pounds, the sum of the section moduli of the vertical end members shall be not

less than 40, and the section moduli of the main members, either forming or adjacent to the doorposts, shall be not less than 75 per cent of this amount. This does not apply to cars run in electric trains on railroads using both steam and electric power.

NOTE 2.—In mail cars having vestibules at one or both ends, similar in form to vestibules of passenger cars, the requirements of the preceding paragraph that "the sum of the section moduli of all vertical end members at each end shall not be less than 65" may be considered as applying to the vertical body end members and the main vertical members of the vestibule taken together. The requirement that "the section moduli of the main members, either forming or adjacent to the door posts, shall not be less than 75 per cent of this amount (65)" may be considered as complied with if the sum of the section moduli of the main vertical body end members and the main vestibule vertical members is not less than 75 per cent of 65.

19. END PLATE.—The end plate may be a rolled or pressed section or of built-up construction and shall extend across end of car from side plate to side plate, with ample connections at ends, or shall be of other satisfactory construction to withstand the assumed loads given above.

20. STRESSES.—All parts of the car framing shall be so proportioned that the sum of the maximum unit stresses to which any member is subject shall not exceed the following amounts in pounds per square inch, except as modified in sections 6 and 18. These stresses, unless otherwise stated below, are for steel having an ultimate tensile strength of from 50,000 to 65,000 pounds per square inch. Where other materials are used, they shall bear the same proportion to the ultimate strength of the material used.

Bolsters of rolled steel.—Stress shall not exceed 12,500 pounds per square inch.

Sills and framing of rolled steel.—Stress shall not exceed 16,000 pounds per square inch.

When cast steel is used, the allowable stresses may be the same as for rolled steel, except tension stresses, which must be at least 20 per cent less than those allowed for rolled steel as specified above.

For members in compression the stresses shall be determined by the following formula:

$$\text{Steel } 16{,}000 - 70\frac{L}{R}$$

In the above formula L equals length in inches.
R equals least radius of gyration in inches.

Rivets (rivet steel).

	Pounds per square inch.
Shear, other than buffing	10,000
Bearing, other than buffing	20,000
Shear, buffing	12,000
Bearing, buffing	24,000

21. *Floor.*—(*a*) Subfloor of postal cars to be of iron or steel, flat or corrugated plate, upper or wearing surface to be of matched wooden flooring, maple or rift-sawed yellow pine or fir, laid longitudinally, or composition, preference in order named. If composition is used, the wearing surface between doors and the standing surface in front of letter tables and paper racks shall be of wood, cork or other suitable material. Proper insulation, including air space, shall be provided. Floor strips for wood upper course shall be secured by bolts or rivets. Composition flooring may be secured by corrugated, keystone or equivalent style of plate or by wire fastening securely anchored.

(*b*) Where composition floor is used, wearing surface between doors and standing surface in front of letter tables and paper racks, as stated in above paragraph, is defined as follows:

Wearing surface between doors is the full width of the door opening between side doors. Standing surface in front of paper racks shall extend from the center of car to point directly under rod No. 4 on each side. In front of the letter tables, standing surface shall extend at least 2 inches back of a point directly under the front line of table.

Where a single-course main floor is used, the same shall be 1¼ inches thick. In cars for service in extremely cold sections or elsewhere, when desired by owners, two courses of not less than ¾-inch wood flooring, with one course of building paper between, is preferable. Where two courses of main flooring are used, the lower course shall be laid either diagonally or transversely and the upper course longitudinally.

22. *Interior Finish.*—Inside, side and end linings and head lining of postal cars to be of flat or corrugated steel plate, composition board, or wood, properly secured to the car framing.

23. *Insulation.*—(*a*) The car shall be insulated throughout, including floors, sides, ends and roof (except pier panels), with material of such a nature that it can be securely fastened so as to withstand the vibration incident to railway service. The insulating material must be such that it will not support combustion, will not absorb moisture beyond its own weight, and when wet will not become corrosive.

(*b*) Side and end wall and roof insulating material shall be securely fastened. Where the nature of the material permits, it shall be cemented and also mechanically clipped, if necessary, for proper support. Floor insulation shall extend the entire distance between side walls either in one full width or in sections fitted between floor supports and be secured in place.

(*c*) The construction of side and end walls and roof of car shall be such as to avoid or reduce to a minimum continuous metal connection from outside to the inside of the car.

(*d*) To insure maximum of insulating and sound-deadening efficiency, the construction at the junction of side and end walls and floors shall be such as to prevent the circulation of air through the side and end walls or through the floor or into the car.

(*e*) The thermal efficiency of the materials in side and end walls, in roof and in floor must be such that a test duplicate section through walls, roof or floor (duplicate with the exception of framing members, such as posts, braces, carlines or stringers, which are to be omitted) will not transmit, when subjected to the test hereinafter described, more than the following amount of heat per square foot of surface in 24 hours for each degree Fahrenheit difference in temperature between the inside and outside walls of the section.

	B. t. u.
For side walls, end walls, and roof	8
For floor	7

The method of testing shall be as follows:

A calorimeter, as illustrated and described in Railway Mail Service drawing sheet 18, shall be used in all tests. It shall be carefully constructed and of the materials indicated and before used must be standardized for its thermal loss factor. The sections to be tested shall truly represent the materials as used and disposed in the car.

The heat must be supplied by direct electric current of constant voltage, measured by standardized instruments. The difference between inside and outside temperatures

must be held as nearly 70 degrees Fahrenheit as possible. Readings of temperature and current shall not be recorded until 48 hours after heat is turned on and test begins, in order to insure thorough heat saturation of calorimeter and test sections. The duration of actual test shall be eight (8) hours, during which time temperature and electric readings shall be made and recorded each hour or more frequently if considered necessary. The average of all readings thus recorded shall be taken as the final result. All differences regarding results which may arise between the Post Office Department and the railroad companies affected shall be referred to the United States Bureau of Standards for decision.

24. Doors, Windows and Skylights.—(*a*) Postal cars shall be equipped with side doors not less than 6 feet in height from floor, end doors, side windows and skylights as shown on the standard plans of the Railway Mail Service. Storm or double windows shall be provided where required. Doors and windows may be of wood, combination wood and metal, or metal, preference in order named, and when glazed, the glass shall be double strength. Windows shall be made of two sash sections. The upper section shall preferably be divided into approximately two equal portions—the lower half to be fitted with glass and the upper half screened—so suspended that glass or screened section may be used as desired. Where side framing makes this impracticable, equivalent screen application will be allowed. Where storm windows are applied, they shall be hinged or made easily removable to allow cleaning. Doors and windows shall have suitable weather stripping. Trimmings and locks shall be the railway company's standard. Hasp and staple for outside of side doors shall be in accordance with Railway Mail Service details, modified to suit shape of doorpost.

(*b*) Skylights shall have 5 square feet of glass admitting light, glazed with not less than ¼ inch rough wire glass or ⅛-inch rough plain glass; fixtures and suitable shades shall be provided. For curtain shades below skylights, 10-ounce duck or good quality of buff or light yellow holland shall be used; spring roller fixtures shall be provided, or if canvas is used, it may be strung on wires so as to be easily adjusted according to service requirements.

25. Lighting.—(*a*) Lighting of postal cars primarily to be with electricity or gas, where feasible; mantles to be used on gaslights where practicable; provision shall be made for emergency lighting as hereinafter specified. Fixtures, wiring, battery boxes and their equipment, gas piping, and all other accessories in connection with the lighting system shall be railway company's standard practice. Each electrically lighted car equipped for axle generator or head-end system of lighting shall be equipped with storage battery of sufficient capacity to furnish for 12 hours the intensity of illumination specified hereinafter. Each car using gas or straight storage electricity as the primary system of lighting shall be equipped with storage capacity sufficient to furnish light for 36 hours at the intensity of the illumination specified hereinafter.

Lights are to be located by the railway companies or car builders to produce results called for under the specifications. The Railway Mail Service will not suggest or recommend location of lights. This applies to new or changed installation where the specifications apply.

(*b*) *Location of light units.*—Body of car. The light units for illuminating the bag-rack and storage portions of the car shall be located on the center line of the car. Direct lighting units in the bag-rack section shall be located at such uniform height that the shadow of the paper boxes is not cast on any bag-rack label, nor higher than approximately 3 inches above the back rod of rack. In no case shall any light unit except oil lamps, the lowest point of which may be 6 feet 9 inches from the floor) be mounted at a height of less than 7 feet measured from the floor to the lowest point of the light unit. Spacing between adjacent units in the bag-rack portion of the car shall not exceed 8 feet 6 inches in case of any direct system of lighting, nor 14 feet in case of any indirect system.

(*c*) *Letter cases.*—Light units for illumination of the letter case shall be mounted at a uniform height from the floor but not lower than the units in the bag-rack section, and as far from front of the face of the letter case as possible without the body of the distributor throwing any shadow on his work. In standard construction the above distance is 20 inches. Where the car construction does not permit the above distance, a lesser distance, but not less than 16 inches, may be employed. Separation between adjacent letter-case units shall be such as to provide an illumination intensity at all points within the requirements hereinafter specified.

(*d*) If an indirect lighting system be employed, the provisions of the above paragraph will be waived. In such case, the only requirements imposed for location of units at letter cases are those involved in providing for sufficient vertical and horizontal illumination intensities to meet the provisions of these specifications as hereinafter stated, all units in the car burning. For the purpose of these specifications, an indirect system is here defined as any system in which at least 85 per cent of the horizontal illumination on the 46-inch plane of utilization is received, either directly or indirectly, by reflection of the light from the deck of the car.

(*e*) *Special features of light units.*—In the case of incandescent electric or gas lamps, the design of light unit, except letter-case units, shall be such that no portion of the bare lamp filament or the bare mantle is visible to the eye when the unit is observed at an angle of 70 degrees or greater from the nadir. (In general, light units are preferred which emit no light or only a small amount of light between the angles of 50 and 100 degrees from the nadir.)

(*f*) The control of the lights in the postal apartment shall be in that apartment and independent of any other lights in the car and the letter-case units shall be controlled independently of any other light units in the postal apartment. Knife and snap switches only shall be placed in mail apartment; all other mechanism to be placed in adjoining apartment.

(*g*) *Initial illumination values.*—All horizontal illumination values shall be taken on plane 46 inches above floor line. Vertical illumination values shall be taken on the vertical plane on the face of letter case as specified below. New lighting installations shall be such as to give initial illumination values within the following limits:

Location.	Minimum, F. C.	Maximum. F. C.
Bag-rack portion:		
Center of car, horizontal	4.70	10.00
Mouth of bags, illumination measured 18 inches from side of car, horizontal	2.50	10.00
Letter cases:		
Over table, horizontal	4.70	16.00
Face of case, vertical	2.08	16.00
Storage portion, not behind obstructions, horizontal, measured 30 inches from side or end of car	2.50	10.00

(*h*) Illumination requirements at letter cases as above specified shall be entirely fulfilled by letter-case units, other units in the car not burning, but letter-case units may be considered as contributing to the specified illumination values for the body of the car.

(*i*) If globes or reflectors of opal glass, rough crystal glass, prismatic glass, or aluminumized metal, and those giving similar results (excluding heavy density opal with glazed reflecting surface, mirrored glass, porcelain enam-

eled metal, and those giving similar results) be employed, the minimum values specified in the above table may be reduced 20 per cent and the maximum values increased 20 per cent.

(*j*) Above illumination values are based on an allowance of 40 per cent for depreciation in service. Less efficient maintenance must be compensated for by increased initial installation.

(*k*) If an indirect lighting system be employed, the minimum and maximum values in the above table may be respectively decreased and increased 40 per cent in the bag-rack and storage portions of the car and 25 per cent at the letter case locations specified in above table.

(*l*) *Emergency lighting.*—An emergency lighting system consisting of candle lamps will be required on all cars lighted primarily by electricity or gas. A more adequate system of emergency lighting as defined hereinafter, may be required. (See floor plans for location of candle lamp holders.) A candle lamp should be furnished for each holder. Boxes to contain candle lamps when not in service should be located at some convenient and acceptable point in the car. Suggestion is made that such boxes be located in connection with electric light control boxes when available, either above or below, as may be practicable, or the candle lamp box may be located in the storage end of the car above the brakewheel, clearing the latter. In 30, 25, 20 and 15 foot apartments, locate box over letter case on partition.

(*m*) *Electric switches.*—In apartment cars locker containing knife and snap switches controlling current and lights should be located on end of paper boxes when same will not project into doorway lower than 5 feet 8 inches above floor line. Where this would occur, locker should be located as high as possible on the bulkhead next to hopper, on hopper side.

(*n*) *Service illumination values.*—While the car is in active service the lighting installation shall be maintained at all times to give illumination values not less than the following minimum values:

Location	Minimum, F. C
Bag-rack portion:	
Center of car, horizontal	2.80
Mouth of bags, illumination measured 18 inches from side of car, horizontal	1.50
Letter cases:	
Over table, horizontal	2.80
Face of case, vertical	1.25
Storage portion, not behind obstructions, horizontal, measured 30 inches from sides or ends of car	1.50

(*o*) Illumination requirements at letter cases as above specified shall be entirely fulfilled by letter-case units, other units in the car not burning; but letter-case units may be considered as contributing to the specified illumination values for the body of the car.

(*p*) If globes or reflectors of opal glass, rough crystal glass, prismatic glass, aluminumized metal, and those giving similar results (excluding heavy density opal with glazed reflecting surface, mirrored glass, porcelain enameled metal, and those giving similar results) be employed, the minimum values specified in the above table may be reduced 20 per cent.

(*q*) If an indirect lighting system be employed the minimum value in the above table may be decreased 40 per cent in the bag rack and storage portions of the car, and 25 per cent at the letter-case locations specified in the above table.

(*r*) *Light failure.*—A light failure is defined as the condition where for a period exceeding 30 minutes the primary lighting system fails to give sufficient illumination to permit distribution of mail matter to be continued. It will be considered that whenever the lamp voltage falls below 80 per cent of the normal operating lamp voltage such a condition of light failure has been reached.

(*s*) *Car movement.*—A car movement is defined as the use of a postal car by a crew of postal clerks over the length of their run in one direction. Where a car covers more than the run of one crew, each separate run shall be considered a car movement.

(*t*) *Percentage of failure.*—The percentage of failure of the lighting system is defined as the ratio of the total number of failures to the total number of car movements of each primary system of lighting (gas and electrically lighted cars to be considered separately) on each railway system. The determination of percentage of failure shall be based on the operating performance of each car for the preceding 12 months' period. Only such failures as are promptly reported by the Railway Mail Service to the operating railroad shall be considered in computing the percentage of failure.

(*u*) *Emergency lighting.*—If the percentage of failure of the primary system of electric or gas lighting does not exceed 1 per cent, candle lamps will be accepted as a suitable emergency light.

If the percentage of failure of the primary system of gas or electric lighting exceeds 1 per cent and is not greater than 4 per cent, an emergency system of suitable oil lamps, gas or electric lights, maintained by independent storage capacity, may be required. Such emergency system must provide illumination values not less than 50 per cent of the minimum operating illumination values specified above for the primary system, with the exception of letter cases and center line of car through bag-rack portion, where the illumination shall not be less than 60 per cent.

If the percentage of failure of the primary system of electric or gas lighting exceeds 4 per cent, a new installation or a second complete primary system of lighting will be required on cars so failing.

(*v*) The illumination values herein specified shall be determined by the usual and approved methods. Any differences regarding the same which may arise between the Post Office Department and the railway companies affected shall be referred to the Bureau of Standards for decision.

26. HEATING.—(*a*) Requirements of the department embody three main points: First, sufficient heat to keep the postal car or apartment comfortably warm; second, proper distribution of heat, particularly throughout that part of the car occupied by letter cases and bag-racks (care should be taken not to have excess of heat around letter cases), and third, an arrangement of pipes to avoid interference with distributing facilities.

(*b*) To obtain the results outlined above, the department will require postal cars and apartments to be equipped with sufficient amount of radiation to make the floor of the car comfortable and to obtain a temperature of 65 degrees between the side doors at a point 5 feet above the floor line and to maintain such temperature under the most adverse weather conditions to which the car is subjected when in service. Sufficient radiation should be provided in the end of the car containing hopper and washstand to maintain a temperature of at least 48 degrees in that location.

(*c*) Heating of postal cars primarily to be with steam or hot water. Pipes are to have suitable protection guards of wire or perforated metal. Pipes located behind bag-rack sections shall not occupy space exceeding 20 inches in height and 4½ inches from wall of car to outside of guard. All heating-pipe screens, whether of wire netting or perforated metal, should stop 2 or 2½ inches above the floor so as to permit of cleaning. All inlet and trap valves must be accessible when bag racks are hung with sacks or storage stalls are full of mail.

(*d*) Where perforated metal is used for heating-pipe

covering behind bag racks, perforations should extend along the top as well as the side of the guard to permit radiation of heat. Preference is expressed for wire netting for this purpose.

Where feed pipes to these wall radiators extend along the face of door pockets, and the screen over these pipes covers the opening at the back of the pocket, a section of the screen should be detachable so as to make opening accessible for the removal of dirt and snow.

(*e*) Where bulkhead radiators are used as part of the heating system, the inside line of same shall be not less than 21 inches from center of car, so that a clear aisle space of 42 inches will be provided where two radiators are installed oppositely. All radiators must be screened. Bulkhead radiators should be substantially supported and corresponding stanchions omitted.

(*f*) Where wall radiators are installed in storage end of cars, wire netting or perforated-metal covering should be reinforced every 18 inches and provision made to hold the screen at least 1 inch from the pipe. Considerable weight will rest against screen, and it should be substantially constructed.

(*g*) Where service conditions require, an auxiliary coal-burning stove shall be furnished, complete with coal box and firing tools, smokejack properly screened, and protection guards. The stove and coal box to be securely attached to floor. Stoves furnished must be of a safety pattern or design, properly guarded by metal casing so as to prevent overheating of closely surrounding objects and damage which might result therefrom. Protection guards should be built to height of stove and wire netting used above that point to permit better radiation of heat. Stove guards should extend toward center of car as far as the front line of stove. Front support of guard should be iron pipe.

(*h*) All exposed edges of wire netting or screen shall be bound.

(*i*) The train-pipe steam line to be applied and equipped with end valves, steam hose and couplings, as per M. C. B. requirements and the railway company's standard. All valves must be located so as to be readily accessible.

27. Deck of Car.—(*a*) Ventilation of postal cars of clere-story design to be accomplished preferably by means of self-acting ventilators, having intake and exhaust working in conjunction. Four such ventilators per side for 70 and 60 foot cars; three per side in 50 and 40 foot cars, and two per side in mail apartments, placed to obtain maximum results. Other deck sash to have clear glass and to be placed in fixed position without screens. Trimmings of deck sash to be railway company's standard.

(*b*) Postal cars not having clere-story roofs are to have a sufficient equipment of self-acting ventilators in the roof.

(*c*) Where exhaust ventilators only are used, intake of air should be provided substantially equal to the capacity of the exhaust. If this is accomplished by means of swinging deck sash, they should be limited to the fewest number necessary. Such deck sash should be screened.

(*d*) As much clear glass surface as possible should be provided in deck of car for the purpose of admitting light, and deck piers should not be wider than necessary.

28. Vestibules.—Postal cars are to be equipped with the railway company's standard short vestibule, preferably with outside buffer springs, and with diaphragms when needed for communicating between cars.

29. Couplers and Draft Gears.—The details of the coupler and draft gear to be in accordance with Master Car Builders' and United States safety-appliance requirements and the practice of the railroad for which the cars are built.

30. Buffing Mechanism.—The details of the buffing mechanism to be in accordance with the practice of the railroad for which the cars are built.

31. Brake and Signal Equipment.—(*a*) Postal cars shall be equipped with automatic air brakes and signal equipment in accordance with railway company's practice. Hand brakes in accordance with United States safety-appliance standards. Brakes shall be applied to all wheels, and, on four-wheel trucks, preferably inside hung or clasp type.

(*b*) Brake wheels should be installed inside postal cars and apartments only so far as necessary to comply with Interstate Commerce regulations. One brake wheel in each full mail car is sufficient, located in clear storage end of car. One brake wheel in combination cars, to be located in baggage end, is acceptable where there is a creep or other door connecting the apartments.

(*c*) Suitable cord or attachments shall be furnished for convenient operation of the conductor's valve and train-signal system, which may be hung to safety rod, provided supports are placed at short intervals to prevent cord hanging loosely.

32. Steps, Handholds, Signal Brackets.—The details of the steps, handholds and signal brackets to be in accordance with United States safety-appliance and M. C. B. requirements and the practice of the railroad for which the cars are built. Side steps to be full width of door opening where possible. Handholds to be applied to each side door post. See R. M. S. drawings for detail step construction.

33. Stanchions and Screens.—Stanchions in storage ends and at ends of pouch racks, screen frames, and screens to be located as per standard Railway Mail Service plans.

34. Safety Rods and Bars.—Safety rods to be applied in an equivalent manner to that called for in Railway Mail Service interior specifications. Each side door not equipped with catcher arm should be provided with safety bar.

35. Interior Equipment.—The following equipment shall be furnished. Railway Mail Service drawings should be followed where these details are shown; otherwise details to be as per railway company's standard.

Broom	Mirror
Catcher arms	Paper-boxes
Chair or stout stool	Paper rakes
Cinder guards	Portable bins
Coffee heater when necessary	Register cages
Cots when necessary	Sack and pouch racks
Disinfectants	Shelf and letter drop
Distributing tables	Slip case
Deck-sash opener	Stepladder
Dustbrush	Torch for lighting gas
Dumping tray	Toilet-paper holder
Fire buckets	Wardrobe
Fire extinguishers	Water cooler
Folding washbasin	Water tank
Hopper	Wrecking tools
Letter cases	Wire screens for letter case
Lock rods	

36. Trucks.—(*a*) Trucks may have either built-up metal or cast-steel frames, and may be either four-wheel or six-wheel type, within the limits of the journal loads given below.

(*b*) For cars equipped with one cast-iron brake shoe per wheel the effective maximum emergency brake-shoe pressure must not exceed 18,000 pounds per shoe. In this case the maximum weight per journal of loaded car for Master Car Builders' standard axles shall not exceed 10,000 pounds for 4¼ by 8 inch journal, 14,000 pounds for 5 by 9 inch journal, 17,000 pounds for 5½ by 10 inch journal, or 20,000 pounds for 6 by 11 inch journal. Where

two brake shoes per wheel are employed the standard Master Car Builders' journal loads may be used.

(*c*) Wheels shall be either all steel or steel tired. All other truck details, including body and truck center plates and side bearings, shall be in accordance with Master Car Builders' requirements and the practice of the railway for whose service the cars are built.

37. PAINTING.—The painting of car body and trucks shall be in accordance with railway company's specifications for steel cars. Light-color enamel paint shall be used for interior finish above side plate; below that line the car shall be painted a medium shade of darker color, preferably light buff or light brown, with dull finish. The lettering and numbering of postal cars shall conform to Railway Mail Service requirements and the railway company's standards. The inside length and width, the car number, and title of the company owning shall be painted at a convenient place inside the car. End doors and end-door posts must not be sanded.

SPECIFICATIONS FOR FIXTURES FOR POSTAL CARS, REVISED TO MARCH 17, 1915.

1. DISTRIBUTING TABLES UNDER LETTER CASES.—(*a*) Contour and location are shown on Railway Mail Service floor plans for mail cars. Letter case tables in 60, 50, and 40 foot full postal cars and 30, 25, 20 and 15 foot apartment cars should be 18 inches wide in clear between front of letter cases and inside of molding at widest part. For width of table in apartments less than 15 feet in length, see Railway Mail Service floor plans.

(*b*) Tables shall be of cherry, birch, or maple, preference in order named, and when finished shall be 1½ inches thick. Top of table shall be 28 inches from floor. Wooden drawers with hasp for locking shall be installed as indicated on Railway Mail Service floor plans.

(*c*) 10 inch by 10 inch canceling pads of high-grade elastic rubber, ½ inch thick, shall be installed in letter tables at points indicated on Railway Mail Service floor plans, top surface of pads to be flush with top of tables.

(*d*) A flat wooden strip, 2½ inches wide, 1 inch thick, quarter round at outer top edge, shall be placed at front edge of letter tables, to project 1 inch above surface of table. Sections shall be cut out at front, flush with surface of table, to provide for the removal of sweepings, ends of strip at opening to be rounded. See Railway Mail Service floor plans.

(*e*) For details, see Railway Mail Service drawings.

2. LETTER CASES.—(*a*) Location of letter cases, with number and sizes of boxes to be provided, is shown on Railway Mail Service floor plans.

(*b*) Cases shall be constructed of aluminum or other metal, or wood when over-all dimensions permit. Vertical partitions shall be not less than 1/32 inch thick (if of aluminum, not less than 1/16 inch), devoid of shoulders, and present a rounded front not more than 3/16 nor less than 3/32 inch thick. The Tilley revolving label holder, a metal holder of equivalent design, or square label holder made of cherry or mahogany, shall be applied in front of horizontal partitions and above top row of boxes of all cases. No label holders are required at bottom of cases. If wood holders are used, corners should be beveled 1/16 inch, forming ⅜ inch flat surface, for application of paste labels. The label holders shall be installed so that each face may be turned to the front at will and be held in position by flat springs applied in such manner as to prevent formation of shoulders. Any number of label holders up to seven may be operated by one spring. Top of label holder shall be level with bottom of box at outer edge.

(*c*) Cases shall be made 12 rows high, the back of bottom row of boxes to rest on letter table. The seven lower rows and top row of boxes shall each be 4 inches high. The eighth, ninth, tenth and eleventh rows shall be 3¼ inches high. Short letter boxes shall be 6¾ inches and long letter boxes 9¼ inches deep, front to back (exclusive of label holders) sloping from the front 1½ inches. Short letter boxes shall be 4¼ inches and long letter boxes 5 inches wide. The bottoms shall be of perforated steel not less than 1/32 inch thick stamped to pattern shown on Railway Mail Service drawings, sheet 4, except lower row of boxes shall have bottoms with perforations at back only, with corresponding openings through letter tables to permit dust to fall through. Bottoms shall be turned at front to meet the ½ inch square label holders in such manner as to prevent formation of shoulders as indicated on drawings. There shall be a strip 1 inch wide underneath cases, immediately in front of holes through tables, fitted snugly between partitions to prevent accumulation of dust under case. Space between bottom of case and top of table shall be closed in by a vertical strip placed flush with face line of case.

(*d*) Figures in preceding paragraph covering height and width of boxes indicate dimensions in the clear at front.

(*e*) Portable screens of suitable wire, not to exceed 1-inch mesh, framed to insure rigidity, shall be applied to front of letter cases, as indicated on Railway Mail Service floor plans. Screens shall be suspended from hooks at top line and arranged to lock below bottom line of cases.

(*f*) Back of letter cases shall be covered with sheet metal or 1/16-inch wire. If the latter is used, mesh shall not exceed ¼ inch. Triangular space back of wing letter cases in full cars should be left open to accommodate wrecking tools, and fire extinguishers, if desirable.

(*g*) If metal other than aluminum is used, cases shall be given a heavy coating of dull aluminum paint.

(*h*) Supports and attachments for portable letter cases shall be proportionate to the weight of the section. Where necessary, additional strap hook to hang from safety bar should be provided on outer edge.

(*i*) For details, see Railway Mail Service drawings.

3. RACKS FOR SACKS AND POUCHES.—(*a*) Only such type of rack as has been approved by the department shall be installed in any car.

(b) Top frame of rack section to consist of four ¾-inch pipes, placed parallel with side of car. The rod nearest wall of car is designated as No. 1; the next, or middle top rod, as No. 2; the outside top rod, nearest center of car, as No. 3. Rods 1 and 2, and 2 and 3, shall be placed in line 13 inches center to center. Rod No. 4, same size; shall be 2¼ inches below and 1¼ inches forward of rod No. 3 (measuring center to center). This rod is used to support paper-distributing tables, dumping tray, and bridges. Racks shall be made in standard sections, 5 feet long, end to end, outside measurement, clearance at each end to be ¼ inch when installed, and shall furnish not less than 4 feet 10¼ inches clear hanging space between end members. Rack sections of same construction of less length than the above standard shall be installed when required, as shown on Railway Mail Service floor plans.

(*c*) Racks shall be of such construction as will permit of top frame being raised or lowered at will, that the space may be used for storage purposes.

(*d*) Two parallel rods of ¾-inch pipe, equidistant from center line of car, shall be installed to support paper-distributing tables and bridges. Rods shall be placed 4 inches apart, center to center, shall be 30½ inches from floor to center of rods, and be supported at ends and joints by single standards. Rods shall be made in sections to correspond in length with sections of racks and installed

in such manner as to be removable in pairs. (See Railway Mail Service floor plan D and F for exceptions.)

(*e*) Sections of rack as hereinbefore described shall be installed on each side of parallel center rods, 22¾ inches from nearest rod to rod No. 4 of said sections (measuring center to center). The intervening space not occupied by distributing tables and dumping tray shall be filled with bridge sections. Such section shall be of ¾-inch pipe, and be 22½ inches long and 13 inches wide, with sides elevated 4 inches above ends. Measurements to be made center to center. Rod No. 1 shall be placed 38½ inches from floor to center. This rod will be 2 inches from side wall to center, in cars 9 feet in width, inside measurement, and in wider cars racks shall be similarly located from center line of car, the additional space between wall and rod No. 1 to be taken up by blocking-out brackets. Rod No. 2 shall be 37½ and rod No. 3, 36½ inches from floor to center.

(*f*) Five aluminum, malleable iron, or brass label holders uniformly spaced, shall be placed on rods No. 1 and No. 2, and one in center on each side of bridges. Label holder shall be 7 inches long, 1¼ inches wide, and have machine-milled slots 1/16 inch deep and 15/16 inch wide, enlarged at ends, into which folded paper labels can be inserted. Face opening of slot shall be 11/16 inch wide. Label holders shall have smooth finish, devoid of cutting edges and sharp points, and be attached to rods at an angle of 60 degrees from horizontal axis through lugs 1 inch from ends at such height as to give 5/16 inch clearance between rod and label holder, permitting free movement of hooks. Label holders should be riveted to rod or attached with machine screws, countersunk, heads to be soldered or covered with metal cement to present smooth surface and prevent loosening. (There shall be no label holders on rod No. 3.)

(*g*) Revolving-shank hooks shall be placed on the rods as follows: Rod No. 1 to have 20 hooks, all pointing toward rod No. 2. Rod No. 2 to have 40 hooks, pointing alternately toward rods No. 1 and No. 3. Rod No. 3 to have 20 hooks pointing toward rod No. 2. On rod No. 1 one hook should be placed at each end of each label holder, and two under middle parts, between lugs. On rod No. 2, two hooks pointing alternately toward rods No. 1 and No. 3, should be placed under each end of each label holder, and four hooks, similarly applied under middle part, between lugs.

(*h*) Rods and hooks, when painted, should permit free movement.

(*i*) Hinged wire screens to be provided at end of bag racks, adjoining door openings. Hooks should be provided for securing screen to wall when not in use, and springs or bolts under paper boxes to prevent rattling when in service position.

(*j*) For details, see Railway Mail Service drawings.

4. Paper Distributing Tables and Dumping Tray.—Wood required. For details, see Railway Mail Service floor plans and drawings.

5. Letter Package and Paper Boxes in All Mail Cars, Except 8, 10 and 12 Foot Apartments and 6, 8, 10, 12 and 15 Foot Alley Apartments.—(*a*) Letter package boxes may be of wood or metal construction sufficiently heavy to prevent deformation. Paper boxes shall be of wood with wood or steel roof and back.

(*b*) Paper boxes shall be 9 and 12 inches wide, respectively, center to center, as shown on Railway Mail Service floor plans. Shall be not less than 25 inches front to back in the clear, bottom sloping 6 inches toward front. Bottom line at front to be 5 feet 3 inches from floor. Boxes should conform at top to contour of deck. If necessary to reinforce bottom to prevent warping, transverse wood strips, about 1 inch thick by 2 inches wide, under every vertical partition should be used, strip, bottom and partition to be screwed together.

(*c*) In cars having round roof, paper boxes shall conform to details of measurement and shall have not less than the capacity indicated in paragraph (*b*).

(*d*) Paper boxes shall have wooden sliding fronts not less than 8 nor more than 10 inches high, or approximately one-third the height of front of box with 4½-inch combined label holder and lift at top. Fronts shall have wire or grill latticework centers.

(*e*) Brass or steel friction springs, to hold sliding fronts in a raised position, shall be placed in slide grooves in vertical partitions.

(*f*) Double or twin hooks shall be placed under each vertical partition, with points toward side of car, 1 inch back from face line of boxes.

(*g*) Paper boxes should be numbered consecutively, beginning with box nearest side door next to hopper. (See Railway Mail Service drawings, sheet 7.)

(*h*) Letter package boxes in apartment cars, and paper boxes in 8, 10 and 12 foot apartments and 6, 8, 10, 12 and 15 foot alley apartments, shall be installed as indicated on Railway Mail Service floor plans. These boxes shall follow same general construction as overhead paper boxes described in preceding paragraphs.

(*i*) For details, see Railway Mail Service drawings.

6. Small Cases for Slips.—Small wooden pigeonhole cases for slips and schemes and a small wood box for labels from pouches shall be installed as indicated on Railway Mail Service floor plans.

7. Portable Bins for Letter Packages.—Portable bins, of substantial light wood construction, approximately 15½ inches wide, 19½ inches front to back, 14¾ inches high at back, and 10¾ inches high in front, shall be furnished, as follows:

Four for 60-foot cars; two for 50 and 40 foot cars.

8. Cage for Registered Mail.—A strong wire netting cage shall be installed in all mail cars and apartments.

9. Hoppers.—Flushing or dry hopper, former preferred, shall be installed at location in car indicated on Railway Mail Service floor plans. When dry hopper is used, it shall have double lid, large opening top and bottom, with nearly straight sides, and chute leading through and extending below floor; bottom to be free from obstruction and provided with deflector.

10. Lavatory.—Lavatory located as indicated on Railway Mail Service floor plans shall be of the folding type, designed to occupy not to exceed 6½ inches front to back when folded; to have basin not less than 12 inches in diameter, 4½ inches deep, and not less than ½-inch splash rim at top. Top of basin, when lowered, to be 30 inches from floor. A steam jet shall be introduced into basin or water system to heat water.

11. Water Tanks and Drinking-Water Containers.—(*a*) Drinking-water container shall be constructed to keep water and ice separate and free from foreign substances when filling, with provisions for draining each compartment at bottom, unless container is constructed in such manner as to permit of easy removal for cleaning. Suitable waste pipe for drippings with large outlet through floor to prevent freezing shall be provided. Only such type of container as has been approved by the department shall be installed in any car. For full cars water cooler having not less than 6 to 8 gallons' capacity should be used. Smaller tanks (not less than 4 gallons in capacity) will be acceptable for apartment cars.

(*b*) Tanks, insulated when service conditions require to

prevent freezing, to contain water for lavatory and hopper, cylindrical or shaped to conform to deck of car, shall be located in deck above hopper, with provision for filling through roof or from sill or both, and shall be securely attached. Minimum capacity of overhead water tanks as follows:

40, 50 and 60 foot full cars, 40 gallons.

30-foot apartments, 25 gallons.

15, 20 and 25 foot apartments, 20 gallons.

8, 10 and 12 foot apartments, 15 gallons.

When dry hoppers are used the above capacity may be reduced 50 per cent.

12. WARDROBE—MIRROR.—(*a*) Wardrobe of substantial construction shall be installed as indicated on Railway Mail Service floor plans. It shall extend from floor to deck of car, be provided with latch and hasp for locking, shelf 5½ feet from floor, and have a row of substantial wardrobe hooks 6 inches apart extending around sides and under shelf. In wardrobes 12 inches wide or less hooks should be placed on end and one side only. Ventilation should be provided through holes or grille plates at bottom and top of door.

(*b*) A mirror, approximately 12 by 15 inches, should be located at most available point above lavatory.

13. WRECKING TOOLS—FIRE EXTINGUISHERS.—Shall be provided in accordance with existing laws and regulations. Extinguishers may be attached to ends of overhead paper boxes adjacent to side doorways. Wrecking tools may be attached vertically to side wall back of wing letter case in full cars or as shown in Railway Mail Service floor plans.

14. GAS PLATE, STEAM COOKER OR EQUIVALENT.—Shall be installed when required for use of postal clerks in making coffee and warming lunches, located preferably on bulkhead, as indicated on Railway Mail Service floor plans, approximately 5 feet from floor. Gas plate should be installed in gas-lighted cars.

15. COTS—STEPLADDERS—STOOL—CHAIR. — (*a*) Portable cots and stepladder should be furnished in cars where service conditions require their use. Hooks for hanging stepladder to be provided on side of clothes closet where practicable.

(*b*) A chair, or stout stool, 18 inches high, should be placed in all mail cars and apartments.

16. DEODORANTS AND DISINFECTANTS—TOILET PAPER.—Toilet paper required in all cases; deodorants and disinfectants where conditions warrant.

17. DOOR FIXTURES.—Suitable outside door fixtures shall be applied on side doors in such manner that door may be opened to full width between posts, and be locked shut with mail or other lock, as a means of safety.

A catch shall be provided to hold sliding doors in an open or closed position as desired.

End doors shall be provided with a locking bar.

Other fixtures, standard.

18. RAKES FOR PAPER BOXES.—Two steel rakes, having crossheads 6½ inches long with 5 teeth 2½ inches long and handles 24 inches long, shall be furnished for each full railway postoffice car, and one such rake for each apartment car.

19. CATCHER ARMS—SAFETY BARS—CINDER GUARDS—"NO ADMISSION" NOTICES.—(*a*) Two catcher arms shall be furnished for each car, sockets applied to all side-door posts. Safety bars, to be secured in position by locking device, shall be installed at non-catcher doors in catcher-arm sockets.

(*b*) Four cinder guards shall be furnished for each full and two for each apartment car, holding brackets to be applied to all side-door posts and at ends of overhead paper boxes. Wire protection over glass or cinder guards should be curved in front of same and hinged or made removable to permit of cleaning glass.

(*c*) Two "No Admission" notices, properly framed, must be placed in full cars, and one such notice in apartment cars. These notices should be placed on end of paper boxes or on suitable wall location near side doors.

Printed "No Admission" notices, without frames, are furnished by the Post Office Department.

20. SAFETY RODS — WINDOW-PROTECTION RODS.—(*a*) Two rods of 1-inch iron pipe shall be suspended 7 feet 3 inches from floor to center of rod and 19 inches from center of car. Rods to extend full length of car, curved to clear lights, and shall be suspended from deck ceiling by hangers not more than 8 feet apart, which shall be securely attached to reinforcement or filling blocks between ceiling and roof at each hanger. Safety rods shall be securely side braced to deck sills at each hanger. A ⅝-inch hand rod, securely attached to side plate, shall be installed above each side door, extending full width of same.

(*b*) Five-eighth-inch rods of hardwood, hickory preferred, spaced 3 inches apart in detachable frame, shall be provided as protection for windows on inside. Windows adjacent to side doorways shall be protected by ½-inch iron rods outside, if window is located less than 2 feet from door opening.

21. LETTER DROPS.—Letter drops shall be installed as indicated on Railway Mail Service floor plans, and shall conform in detail of construction to Railway Mail Service drawings.

22. MOVABLE STANCHIONS.—Shall be made of 1½-inch gas pipe or steel tubing of the same outside diameter. Floor sockets to be located as shown on Railway Mail Service floor plans. Pole next to wall should be 12 and inside pole 29 inches from wall to centers. Where stoves are omitted, one additional set of stanchion sockets in lieu of bulkhead should be provided, except in 40-foot full and 30 and 25 foot apartment cars, where two additional sets of stanchion sockets should be provided, unless wardrobe is of sufficiently substantial construction to allow piling of mail against it. When stoves are omitted, an additional set of poles should be provided in 40-foot full cars, 25-foot, 15-foot, 12-foot, 10-foot and 8-foot apartments. Springs shall be placed in top brackets to prevent stanchions from rattling. Stanchions shall be provided with label holders when service conditions require.

Floor plans and drawings referred to herein bear date of November 30, 1914, redrawn or revised, or December 10, 1914.

Postal Car Specifications and Floor Plans. (M. C. B. Recommended Practice.)

In 1915 the United States Railway Mail Service full postal car specifications and floor plans were adopted. Copies of these plans and specifications may be had upon application to the General Superintendent, Railway Mail Service, Washington, D. C. See POSTAL CARS, U. S. GOVERNMENT SPECIFICATIONS.

Pouch Catcher. See MAIL CATCHER.

Pouch Hook (Postal Cars). A hook used for suspending mail bags while assorting the mails.

Pouch Rack (Postal Car). A rack built of standards and horizontal rods to which the pouch hooks are attached and which support the pouches or bags while mail is being distributed into them.

Poultry Car. Figs. 99, 100. A form of stock car for carrying live poultry. See CAR and STOCK CAR.

Pressure Bar (Buffing Apparatus). A stiff iron bar of

a cross-shaped (+) cross section, which connects the drawbar to the buffer spring, so that the draft spring reinforces the buffing spring and the buffing spring takes up part of the pull on the drawbar, thus relieving the draft spring. The pressure bar also forces out the buffer stem and plate when the drawbar is pulled out, thus maintaining a continuous platform between the cars.

Pressure Gage (Pintsch Gas Lighting). A gage usually placed in a saloon. It registers atmospheres or pounds and atmospheres, for convenience in computing the volume of gas in the tank.

Pressure Head (Brake Cylinder). The head that covers the end of the brake cylinder into which air pressure is admitted when the brakes are applied.

Pressure Regulator. Fig. 2125, etc. A valve designed to regulate the delivery pressure of steam in a steam heating system. It depends entirely upon the elasticity of springs, the pressure of which can be gaged or regulated by screw studs that bear upon one end of the springs.

(Pintsch Gas Lighting Apparatus.) The valve by which the pressure of the compressed gas is reduced for consumption. The pressure regulator is one complete fixture, adjusted by the maker. Names of the principal interior parts are diaphragm, diaphragm connecting rod, diaphragm lever, regulating valve and dust arrester.

Pressure Retaining Valve. Figs. 1362-1364, 1374-1376, 1446, 1461. A device by means of which a certain part of the brake cylinder pressure may be retained to aid in retarding the acceleration of a train in descending long grades while the brake pipe pressure is increased after one application to recharge the auxiliary reservoirs. It is controlled by a small handle, the position of which causes it to operate or not, as desired. There are four different types, the ordinary, Fig. 1282, the vestibule, Fig. 1284, the double pressure, Fig. 1283, and the driver brake. The first two types may be made to retain 0 or 15 lbs.; the third to retain 0, 15 or 30 lbs. or 0, 25 and 50 lbs.; the fourth to retain 0, 15 lbs., or all cylinder pressure. In descending grades the handle is turned to the proper position to retain the desired pressure, while on the level the handle is turned to allow the air to escape to the atmosphere. Also called retaining valve.

Pressure and Vapor Heating System. Fig. 2158, etc. A combination of the pressure and vapor heating systems by which it is possible to operate with an open drip and the lowest temperature in the pipes, or by various pressures with the closed drip, up to that on the train line.

Priming (Painting). The first coat in car painting. See also PAINTING.

Private Car. A car for private use, usually containing eating and sleeping facilities. Private cars used by railway officials are ordinarily termed business cars. Freight cars owned by companies other than the railways are termed private line cars or sometimes simply private cars. See CAR.

Produce Car. A modified form of refrigerator car, provided with ventilators and ice boxes, for the transportation of fruit, vegetables and perishable produce.

Profile Carline. A carline extending from one plate to the other, bent to conform to the shape of the clerestory.

Propelling Chain (Steam Shovel). A heavy chain passing over a sprocket on an axle of the truck and a sprocket geared to the winding drum. By revolving the winding drum sprocket the shovel is made to move forward or back on the track by its own power.

Propelling Gear (Steam Shovel). The gears which turn from the main winding drum when the propelling chain is to be operated.

Propelling Lever (Hand Car). The main lever, to which power is applied.

Protection Cap. A LAMP JACK.

Protection Strip. A strip used on a freight car side door to protect is from wear when being opened and closed. Such strips are also used to stiffen the door and to prevent the entrance of sparks. See SPARK STRIP.

Pull. "A catch or lip upon a drawer, door or window, by which it is pulled open."—Knight. See DOOR PULL.

Pull Hook or **Deck Sash Opener.** A rod with a small hook at one end for opening deck sashes. Also called a ventilator staff.

Pull Iron. A roping staple. A U-bolt passing through the side sill for the purpose of attaching ropes in switching. See also PUSH POLE POCKET.

Pull Ring. A metal ring with a screw attached, by which it is fastened to any object, as a sash, drawer, etc., to take hold of in opening it.

Pull Rod Carry Iron. A carry iron for an uncoupling rod.

Pulley. "A wheel with a grooved, flat or slightly convex rim, adapted to receive a cord or band which runs over it. Its function is to transmit power or change the direction of motion."—Knight. A sheave is a pulley wheel in a block, but sheave and pulley are used as almost synonymous terms. See SHEAVE and BERTH CHAIN PULLEY.

Pullman Car. Figs. 168, 170, 171, 405-413. A name strictly applicable only to cars operated by the Pullman Company, but in common usage frequently applied to sleeping, parlor, or drawing-room cars built after the same designs as those adopted by the Pullman Company.

Pump (Wash Rooms). See BASIN PUMP.

Pump Governor. See AIR COMPRESSOR GOVERNOR.

Purline or **Purlin.** 37, Figs. 287, 288. A longitudinal piece of timber over the carlines, extending from one end of the car roof to the other, to which the roof boards are fastened. Sometimes called a roof strip, but the latter more correctly applies to strips sometimes used above the purlins.

Purlin Bracket. Fig. 481. An iron casting or forging used to connect a purlin to the end plate.

Push Button. Fig. 1385. Used in connection with the whistle of the train signal apparatus.

Push Button Faucet. A faucet controlled by a push button.

Push Car or Lorry Car. A four-wheeled car used to carry materials and tools and moved or pushed by hand. See also FERRY PUSH CAR.

Push Pole. A pole or wrought iron tube which is used as a strut to span diagonally the distance between the corners of a locomotive and a car, standing on two parallel tracks to push the car without switching the locomotive onto the same track that the car occupies.

Push Pole Pocket. 52, Figs. 287, 288; 10, Fig. 291; 9, Fig. 335; Fig. 482. A plate placed on the corners of freight cars, with a cavity for inserting poles or bars in switching, to enable the car to be moved from the side by an engine on a parallel track. A ROPING STAPLE serves the same purpose when it is desired to use a rope or cable.

Push Rod (Brake Cylinder). Figs. 478, 1317, etc. A bar which transmits the braking force from the piston of the brake cylinder to the brake levers. It has a crosshead formed on one end, by which it is attached to the cylinder lever. It is guided by a hollow piston rod. As it has not a rigid connection to the piston, but can slide freely in the hollow piston rod, when the brakes are applied by hand, it does not become necessary to overcome the friction of the piston in the cylinder.

Pushover Seat. See WALKOVER SEAT.

Putty. A mixture of linseed oil with whiting, which latter is chalk finely pulverized.

Q

Quadrant. A piece of metal curved in the form of the arc of a circle.

(Steam Shovel.) A casting for holding the operating levers.

Quadrant Levers (Steam Shovel). The handles mounted on the quadrant which controls the various movements of the shovel.

Quadruplet (of Elliptic Springs). Four springs side by side acting as one.

Quartette (Elliptic Spring). Also called QUADRUPLET, which see.

Queen Post (of a Truss). 34, Fig. 364. One of a pair of vertical posts against which the truss rod bears. When one post only is used, it is called a KING POST. Such posts are used for the truss rods under car bodies and occasionally trucks.

Queen Post Stay. A bar attached to a queen post to stay it laterally.

Quick Action Automatic Air Brake. Fig. 1346, etc. The triple valve is so modified that when a relatively quick reduction in brake pipe pressure is made, it also opens a direct communication from the brake pipe through the triple valve to the brake cylinder. This not only increases the brake cylinder pressure in proportion to the amount of air flowing into it from the brake pipe locally on each car, but by venting air from the brake pipe locally on each car, hastens and increases the effect of the reduction made at the brake valve. The net result is to shorten the time from the movement of the brake valve handle until a full brake application is obtained on the entire train, and to increase the total braking power obtainable by such an operation (emergency application) about 20 per cent over the maximum obtainable during ordinary operations (service application), or when using the plain automatic brake.

Quick Action Triple Valve (Air Brake). See TRIPLE VALVE.

Quick Service Valve. Fig. 1474. A valve used with the emergency straight air brake system to accelerate the application and release of brakes. It is located between the train line and the emergency valve.

Quill Drive (Motor Cars). Fig. 2690. A flexible connection between motors and driving wheels, providing a spring suspension for the motors and spring transmission of the motor torque.

Quintuplet (of Elliptic Springs). Five springs side by side acting as one.

R

Rabbet. "A rectangular groove made longitudinally along the edge of one piece to receive the edge of another. It is common in paneling, and in door frames for the door to shut into."—Knight.

Rack. "A frame for receiving various articles."—Webster. See BASKET RACK, etc.

"In machinery, a rectilineal sliding piece, with teeth cut on its edge for working with a wheel."—Brande. A RATCHET.

Rack Catch (for Head Board of a Sleeping Car Berth). A small cupboard catch to hold the headboard pocket closed.

Radial Draft Gear. Fig. 740. A special form of draft gear and coupler yoke.

Radiator (Heating Apparatus). The pipes passing through a car, through which the hot water or steam circulates.

Radiator Stand. A support for a radiator.

Rafter. A timber to support a roof.

Rail. "The horizontal part in any piece of framing or paneling."—Webster

Railing. See PLATFORM RAILING.

Raised Roof. An upper deck or clear story.

Rake (Postal Car). Fig. 1864. Used for handling the papers on postal cars.

Ranges and Cook Stoves. Fig. 1714, etc. A range is a fixed and more elaborate cook stove attached to the wall, and, in houses, usually built in with brick so as to need no stovepipe to connect with the chimney.

Ratchet. A serrated edge like that of a saw, sometimes straight and sometimes on a wheel, into which a pawl engages, for producing or (more commonly) restraining motion. See BRAKE RATCHET WHEEL, WINDING SHAFT RATCHET WHEEL. An undulating ratchet is one having no sharp edges, so that the ratchet catch will slide over them without removal on the application of force, as in deck sash pivots.

Ratchet Burner (Oil Lamp). One in which the wick is moved up and down by a pointed wheel engaging in it, like mineral oil burners.

Ratchet Jack. A jack operated on the ratchet principle. See JACK.

Ratchet Wheel. A wheel with teeth like a saw cut into the outer edge to engage with a PAWL which prevents the wheel from being turned in one direction while allowing it to turn in the opposite direction. See BRAKE RATCHET WHEEL, WINDING SHAFT RATCHET WHEEL.

Receiver (Pintsch System). A cylindrical steel tank, with riveted and soldered seams, adapted to receive and retain gas at high pressures and hung under a car.

Receiver Filling Valve (Pintsch Gas Lighting). A valve of peculiar construction for the admission of the compressed gas to the receiver, so that it can be transmitted to the regulator for consumption.

Reclining Chair. Figs. 1652, 1690, 1691. A chair the back of which can be inclined, and which is provided with leg and foot rests.

Recording Table. The table on which is placed the recording apparatus of a dynamometer car.

Reducer. See BUSHING and REDUCING PIPE COUPLING.

Reducing Pipe Coupling. A coupling for connecting two pipes of different diameters.

Reducing Tee (Pipe Fittings). A pipe fitting having three openings, one of which is smaller or larger than the other two. See TEE.

Reducing Valve (Train Air Signal Apparatus). A valve for reducing the pressure of air admitted to the train

signal pipes below that maintained in the brake pipes and main reservoir. In the train air signal apparatus a pressure of from 40 to 45 lbs. is used.

(Air Brake.) See FEED VALVE.

(High-Speed Brake.) See REDUCING VALVE, AUTOMATIC.

(Car Heater.) Figs. 2045, 2066. Used for reducing the steam pressure for the steam heating apparatus.

Reducing Valve, Automatic (High-Speed Brake). Figs. 1369-1373. A valve attached to the brake cylinder to automatically bleed the pressure down to 60 lbs. after an emergency application, when the pressure in the cylinder rises to 85 lbs. or more. The triangular port gives a graduated reduction. It also prevents the brake cylinder pressure from exceeding 60 lbs. pressure in a service application. The triangular port then gives a wide opening.

Reflector. Fig. 2518, etc. A device placed behind or above a lamp to throw the light in any desired direction.

Refrigeration Details. Fig. 833, etc.

Refrigerator (of a Refrigerator Car). The chamber, constituting the main body of the car, in which the paying load is placed.

(Fig. 1722.) A box or chest for keeping articles cold by means of ice. Used in dining, buffet and private cars.

Refrigerator Car. Figs. 108-115, 883-912, 351-362. See CAR, VENTILATED CAR and ICE CAR. A box carrying commodities that need icing in transit, equipped with two or more ice bunkers or baskets and suitable means for draining off melted ice or briny water. Has side doors and doors in the roof for admitting ice and salt. The temperature usually desired in refrigerator cars is about 40 degrees F., or 8 degrees above freezing. Refrigerator cars are often converted to heater cars during cold weather when it is desired to transport perishable products. See HEATER CAR.

Refrigerator Car Doors. Figs. 813, 835, 840. Doors for this class of cars must fit tight and must be of a heavy insulated construction in keeping with the rest of the car.

Refrigerator Car Floors and Ice Tanks (M. C. B. Recommended Practice).

In 1911 a uniform height of refrigerator cars from rail to top of floor was adopted as follows:

Inasmuch as the heights of freight-house platforms of the largest roads and packing houses vary in height from 42 to 44 inches above the rail, and as the American Railway Engineering and Maintenance of Way Association has not adopted any standard height of freight house platforms, that this Association adopt a minimum of 48 inches as the Recommended Practice of height of refrigerator car floors, and that the Maintenance of Way Association be requested to adopt a maximum height of 44 inches, which will make ample allowance between the bottom of the refrigerator car doors and top of platforms to avoid any trouble opening doors at freight houses.

ICE TANKS.

In 1911 a Recommended Practice was adopted that: For fresh-meat cars, ice tanks of 5,000 pounds ice capacity be the minimum. For fruit and dairy cars, ice tanks of 3,000 pounds minimum, or 6,000 pounds per car.

Refrigerator Car Plug. Fig. 883. A plug which closes the entrance to the ice bunkers of a refrigerator car.

Refrigerator Cars, Salt-Water Drippings. See SALT-WATER DRIPPINGS, COLLECTION OF.

Refrigerator Express Car. Fig. 108. An express car fitted with insulation and refrigeration apparatus. See CAR.

Register. Fig. 2275. An aperture for the passage of air, provided with suitable valves, doors and sliding or revolving plates, by which the aperture is opened or closed. See VENTILATOR REGISTER.

Register Cage (Postal Car). Fig. 1871. A compartment or cage for registered mail.

Register Case (Postal Car). Fig. 1872. For the distribution of registered mail.

Regulating Valve. See VAPOR REGULATING VALVE.

For acetylene gas lighting see Fig. 2239.

(Pintsch Gas Pressure Regulator.) See PRESSURE REGULATOR.

Regulator (Electric Car Lighting). The device for controlling the generator output and maintaining constant voltage on the lamp circuits. It is a form of automatic rheostat.

(Pintsch System of Gas Lighting.) See PRESSURE REGULATOR.

Regulator Straps (Pintsch System). An iron strap used to secure the regulator to the under side of the car.

Reinforcing Wooden Freight Cars. See CARS, WOODEN FREIGHT, REINFORCING OF.

Relay. See LAMP REGULATOR RELAY.

Release Cock. More properly Release Valve.

Release Spring (Passenger Equipment Trucks). 91, Figs. 991, 1010. A spring attached to a truck frame and acting on the brake beams so as to prevent the brake shoes dragging on the wheels when the train is running and the brakes are released.

(Air Brakes.) A spiral spring which acts to move the brake piston inward, and thus release the brakes from the wheels after the compressed air is allowed to escape from the cylinders.

Release Spring Clip. The clip which holds the release spring.

Release Valve (Air Brake). Fig. 1465. A cock attached to the auxiliary reservoir for permitting the air pressure to be reduced therein, when the locomotive is detached or when the apparatus is out of order, so as to release or "bleed" the brakes.

Release Valve Rod. Fig. 477. A rod extending from the release valve on the auxiliary reservoir to the side of the car to operate the release valve.

Release Valve Rod Guide. A small iron eye attached below the sills as a guide for the RELEASE VALVE ROD.

Relief Valve. See GRAVITY RELIEF VALVE.

Replacer. See CAR REPLACER.

Reservoir (Air Brake). MAIN RESERVOIRS of large capacity are placed under all motor cars having air compressors. Auxiliary reservoirs are placed under all cars equipped with automatic air brakes. In freight service a cast iron auxiliary reservoir is connected directly with the brake cylinder and triple valve. See AIR BRAKE.

See LAMP FOUNT.

(Pintsch Gas Lighting Apparatus.) See RECEIVER.

(Car Heating.) See VAPOR RESERVOIR.

Reservoir Drain Cock (Air Brake). Fig. 1391. A cock for emptying the reservoir of any water condensed from the compressed air.

Reservoir Pipe (Air Brake). Also called air pipe and discharge pipe. The pipe conveying the air from the air compressor to the main reservoir.

Reservoir Support (Air Brake). Fig. 478. A bracket by which a reservoir is attached to a car.

Resistance Coils. See Electric Heaters.

Retaining Ring (for Wheel Tires). A ring securing the tire to the wheel. See Tire Fastening.

Retaining Valve. See Pressure Retaining Valve.

Retarding Spring (Triple Valve). 33, Fig. 1360.

Return Bend (Pipe Fittings). A short U-shaped tube for uniting the ends of two pipes.

Reversible Car Seat. A name used to designate the form of car seat in which the back turns over to reverse the seat. A turn over seat. See Car Seat.

Revolving Chair. See Parlor Car Chair.

Rheostat. Fig. 2706. A resistance used in connection with the controller for limiting the current taken by the motors, during acceleration. Usually consists of a number of iron grids or strips of iron ribbon properly connected and packed in a substantial frame, the whole being mounted on the under side of the car flooring.

Rib (of a Cast Iron Wheel). A bracket. See Wheel Rib.

Ridge. See Roof Ridge.

Ridge Cap. A flanged metal strip to cover the ridge joint on a metal car roof.

Ridge Pole. 38, Figs. 287, 288. A longitudinal member in the center of a roof, supported by the carlines or rafters on which the roof boards rest. In some cases the rafters are framed into the ridge pole, and in some cases the ridge pole is grooved to receive the roof sheets.

Ridge Pole Bracket. Fig. 481. A forging or casting used to connect the ridge pole and the end plate.

Ridge Timber. A timber which caps the intersection of two inclined floors meeting in the center of the car as in side dump or ore cars. If the inclined floors were the two sides of a gable roof the ridge timber would then become a ridge pole.

Rigid Bolster Truck. Figs. 962-967, 972, etc. A car truck with a bolster which has no lateral or swing motion. See also Bolster and Truck Bolster.

Rim (of a Car Wheel). That portion of a car wheel outside of the plate.

Rim Latch. A latch which is attached to the inside of a door and is not let into it.

Rim Lock. A lock having an exterior metallic case which projects from the face of the door, differing thus from a mortise lock.

Riser. A piece of marble or metal set on edge around about a wash bowl to prevent water from running against the walls. See also Step Riser.

Rivet. A round piece of metal with a head on one end, used to hold two or more pieces of material together by passing it through them and turning over or upsetting the headless end.

Rivet Steel and Rivets for Passenger and Freight Equipment Cars, Specifications for. (M. C. B. Recommended Practice.)

In 1915 the following specifications were adopted:

1. *Process.*—The steel shall be made by the open-hearth process.

2. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	Optional per cent.
Manganese	Optional "
Phosphorus, not over......	0.05 "
Sulphur, " "	0.05 "

3. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, to determine the percentage of carbon, manganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 2.

4. *Check Analysis.*—A check analysis shall be made from the finished bars representing each melt or finished rivets, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section 2.

5. *Number of Samples for Chemical Analysis.*—One bar from every 200 bars or less of each different size of section shall be taken, and a piece 2 ft. long shall be cut off and given the purchaser or his representative, or 10 rivets from every 100 kegs. These samples shall be used for check analysis by the purchaser.

6. *Tension Tests.*—The bars shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in....45 000-60 000
Elongation in 8 in., per cent....1 500 000/tensile strength.

7. *Bend Tests.*—The test specimen shall bend cold through 180 deg. flat on itself without cracking on the outside of the bent portion.

8. *Test Specimen.*—Tension and bend-test specimens shall be of the full-size section of bars as rolled.

9. *Number of Tests.* (*a*) All bars of one size shall be piled separately. One bar from each 200 or less shall be selected at random and tested as specified.

(*b*) If any test specimen from the bar originally selected to represent a lot of material contains surface defects not visible before testing, but visible after testing, or if a tension-test specimen breaks outside the middle third of the gage length, one retest from a bar will be allowed.

10. *Permissible Variations.*—Bars shall conform to the limits as given in Table No. 1.

TABLE I.

Nominal Diameter of Rods, In.	Large Size End, In.	Small Size End, In.	Total Variation, In.
¼	0.2550	0.2450	0.010
5/16	0.3180	0.3070	0.011
⅜	0.3810	0.3690	0.012
7/16	0.4440	0.4310	0.013
½	0.5070	0.4930	0.014
⅝	0.6330	0.6170	0.016
¾	0.7585	0.7415	0.017
⅞	0.8840	0.8660	0.018
1	1.0095	0.9905	0.019
1⅛	1.1350	1.1150	0.020
1¼	1.2605	1.2395	0.021

11. *Finish.*—The finished bars shall be free from injurious defects and have a workmanlike finish.

12. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

13. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops weak spots or imperfections, or fails to pass any one of the tests herein required, will be rejected, and shall be replaced by the manufacturer at his own expense.

14. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

15. *Chemical Composition.*—The finished rivets shall conform to the requirements specified in Section 2.

16. *Bend Tests.*—The rivet shank shall bend cold through 180 deg. flat on itself, as shown in Fig. 1, without cracking on the outside of the bent portion.

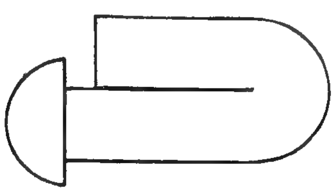


FIG. 1.

17. *Flattening Test.*—Rivet heads shall be flattened down cold to a thickness of one-third, and when hot to a thickness of one-fourth, of the original diameter of the shank at the working heat when driving without splitting.

18. *Number of Tests.*—One of each of the above tests shall be made for each 100 kegs for each different size of rivets.

19. *Size of Heads.*—Standard rivet heads shall conform to Table No. 2.

TABLE II.

Size, Diameter, In.	Head. Height, In.	Head. Diameter, In.	Countersunk. Depth, In.	Countersunk. Diameter, In.
1/2	3/8	7/8	1/4	25/32
5/8	29/64	1 1/16	5/16	1
3/4	17/32	1 1/4	3/8	1 3/16
7/8	39/64	1 7/16	7/16	1 3/8
1	11/16	1 5/8	1/2	1 9/16
1 1/8	49/64	1 13/16	9/16	1 3/4
1 1/4	27/32	2	5/8	1 15/16

Rocker (Tip Car). A crescent-shaped casting bolted to the rocker timbers of the car body on which the body rests and rolls when the body is tipped.

Rocker Bar (Heaters). A horizontal bar which supports the grate, and on which the latter is attached by a pivot in the center so that it can be turned horizontally and thus shake down the ashes.

Rocker Bearing Timber Hangers (Tip Car). Vertical timbers or iron bars framed and bolted to the end piece, to which the rocker bearing timbers are fastened.

Rocker Car Seat. A seat having the bottom adjustable so as to give it an inclination toward the seat back in all cases, on whichever side the seat back may be placed. All modern car seats have mechanism by which this inclination is automatically given to the seat when the back is reversed or swung back.

Rocker Casting (Car Seats). A casting forming a part of the cushion carrier or stand, which is moved back and forth by the seat back arms, and moves the cushion forward, as well as giving it some inclination toward the back.

Rocker Side Bearing. Figs. 1107-1109. A device somewhat similar to the roller side bearing. Instead of rollers, rockers are used, which tend to offer a gradually increasing resistance to the lateral motion of the bolster and tend to return it to its normal position at all times.

Rolled Axle. An axle made of rolled iron or steel. See AXLE.

Rolled Steel Wheel. A CAR WHEEL made of rolled steel.

Roller Bearings. Figs. 1074, 1075.

Roller Center Plate. Figs. 1080, 1082, 1083. A center plate fitted with rollers to reduce the friction in turning.

Roller Side Bearing Truck. A lateral motion diamond truck the frame of which is very like a swing motion truck with a rigid spring plank. Lateral motion is given to the truck bolster by placing it upon cylindrical rollers resting upon the spring caps. The spring cap and bolster bearing plate are concaved, so that the motion of the rollers is restrained and the truck bolster given stability.

Roller Side Bearings. Figs. 1081, 1086, 1089, etc. A side bearing fitted with rollers to reduce the friction in curving.

Roof. See CAR ROOF.

Roof Brace (of a Center Lamp or Chandelier). Diagonal stays passing from the lamp to the roof. Vertical supporting stays are known as lamp arms, with or without a large center stay.

Roof Corner Casting (Passenger Equipment Cars). A cast iron molding for the corners of platform roofs.

Roof Door. See ICING DOOR.

Roof Framing. Fig. 377. See BODY FRAMING and FRAME.

Roof Grab Iron. See ROOF HAND HOLD.

Roof Hand Hold (Box and Stock Cars). An iron bar fastened to the roof to be grasped when ascending the ladder at the end of the car. Also called ROOF GRAB IRON. See SAFETY APPLIANCES.

Roof Light. A deck sash.

Roof Panel (End). The panel over the door of a passenger car.

Roof Ridge (Freight Cars). The intersection of the two plane surfaces forming a pitching roof.

Roof Sheet Splice Tee. A commercial Tee, riveted to two roof sheets so as to form a splice between them and form a continuous surface.

Roof Sheets. Metallic sheets for covering car roofs. The joints are made in various ways, most of which are illustrated. See CAR ROOF.

Roof Support. Fig. 475. A CARLINE PURLINE OR RIDGE POLE.

Roof Ventilator. A ventilator in the roof of a car.

Roofing. Fig. 478. See SIDING, FLOORING ROOFING AND LINING.

Roping Staple. A U-bolt secured to the side sill near the the end of a car into which the hook of a switching rope may be caught, so that a switching locomotive may pull cars on side tracks while it is on the main track, or vice versa.

Rose. A rosette or ornament.

Rotary Snow Plow. Figs. 217, 218. See SNOW PLOW.

Rotary Strainer. See CENTRIFUGAL DIRT COLLECTOR.

Rotary Valve (Motorman's Brake Valve). The main valve which rotates when the handle is turned.

Rotundity Gage for Solid Steel Wheels. See WHEELS, SOLID STEEL, ROTUNDITY GAGE FOR.

Round (of a ladder). The horizontal bars on which the foot rests. They are called rounds, whether of wood or iron, and whether round or square.

Round Iron, Limit Gages for. See LIMIT GAGES FOR ROUND IRON.

Rubber Tread (for Step). An india rubber covering fastened to a step, or threshold plate, of a car to prevent persons from slipping when ascending or descending the steps.

Rules for Examination of Car Inspectors. See CAR INSPECTORS, RULES FOR EXAMINATION OF.

Rules of Interchange. See INTERCHANGE OF TRAFFIC, RULES FOR.

Rules for Loading Materials (M. C. B. Standard). Figs. 2861, etc. In 1893 a Recommended Practice was adopted for loading logs and poles on cars and for racking cars for loading bark, and in 1896 extended rules governing the loading of lumber and timber on open cars were adopted, replacing the former practice, with the exception of racking cars for loading bark. At the same time rules governing the loading of long structural material, rails, plates, girders, etc., were adopted.

In 1897 some modification of these rules was adopted, with slight changes in the illustrations also. In 1898 still further slight changes were made in the text and in some of the drawings, and a new section was added containig rules for loading large logs, pipe and stone on open cars. In 1900 a further modification was made in both text and illustrations.

Further revision, 1904; also, 1905; also, 1906.

In 1908 a further revision was made, and the rules advanced to Standard. Modified in 1910, 1911, 1912, 1913, 1914 and 1915.

A separate pamphlet is issued by the Association containing these rules. Copies may be obtained from the Secretary, Master Car Builders' Association, Old Colony Building, Chicago.

Running Board. 40, Figs. 287, 288; 16, Fig. 340; 25, Figs. 351, 352; 17, Fig. 364. A plane surface, made usually of boards, for trainmen to walk or run on. It is placed on the roof of box or stock cars and at the side of tank cars. Gondola and flat cars usually have none.

Running Board Bracket. 41, Figs. 287, 288; Fig. 480. Support fastened to the roof of a box or stock car to carry the RUNNING BOARD EXTENSION, also a running board saddle.

Running Board Extension. The part of the running board which extends beyond the end of the car body so as to bring the ends of the running boards on adjoining cars nearer together to facilitate the passage of trainmen from one car to another. See RUNNING BOARD.

Running Board Extension Bracket. See RUNNING BOARD BRACKET.

Runnmg Board Saddle. 41, Figs. 287, 288. A wooden block or an iron casting or forging, shaped on the lower side to fit the angle of a car roof and flat on the upper side, acting as a support for the running board.

Russia Iron. A form of sheet iron manufactured in Russia the exact process for making which has heretofore been kept secret, but which consists essentially in forming a chemical compound of iron upon its surface at the same time that it is highly polished, so that it is not likely to rust. Modern substitutes for this iron are also known as planished iron

S

Saddle. A block or plate which acts as a bearing or support for a rod beam, etc.

Safety Appliances. Figs. 952, 953, 955, 956, 960, 961.

Safety Appliances (M. C. B. Standard).

See M. C. B. Proc. Page 783.

In 1911 the United States Safety Appliance Standards, as contained in the order of the Interstate Commerce Commission, dated March 13, 1911, were adopted as standard.

BOX AND OTHER HOUSE CARS.

HAND BRAKES.

Number. Each box or other house car shall be equipped with an efficient hand brake which shall operate in harmony with the power brake thereon.

The hand brake may be of any efficient design, but must provide the same degree of safety as the design shown on Plate A.

Dimensions. The brake shaft shall not be less than one and one-fourth (1¼) inches in diameter, of wrought iron or steel without weld.

The brake wheel may be flat or dished, not less than fifteen (15), preferably sixteen (16), inches in diameter, of malleable iron, wrought iron or steel.

Location. The hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car, to the left of and not less than seventeen (17) nor more than twenty-two (22) inches from center.

Manner of application. There shall be not less than four (4) inches clearance around rim of brake wheel.

Outside edge of brake wheel shall be not less than four (4) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill.

Top brake-shaft support shall be fastened with not less than one-half (½) inch bolt or rivets. (See Plate A.)

A brake-shaft step shall support the lower end of brake shaft. A brake-shaft step which will permit the brake chain to drop under the brake shaft shall not be used. U-shaped form of brake-shaft step is preferred. (See Plate A.)

Brake shaft shall be arranged with a square fit at its upper end to secure the hand-brake wheel; said square fit shall be not less than seven-eighths (⅞) of an inch square. Square-fit taper; nominally two (2) in twelve (12) inches. (See Plate A.)

Brake chain shall be of not less than three-eighths (⅜), preferably seven-sixteenths (7-16) inch, wrought iron or steel, with a link on the brake-rod end of not less than seven-sixteenths (7-16), preferably one-half (½) inch, wrought iron or steel, and shall be secured to brake-shaft drum by not less than one-half (½) inch hexagon or square-headed bolt. Nut on said bolt shall be secured by riveting end of bolt over nut. (See Plate A.)

Lower end of brake shaft shall be provided with a trunnion of not less than three-fourths (¾), preferably one (1), inch in diameter, extending through brake-shaft step and held in operating position by a suitable cotter or ring. (See Plate A.)

Brake-shaft drum shall be not less than one and one-half (1½) inches in diameter. (See Plate A.)

Brake ratchet wheel shall be secured to brake shaft by a key or square fit; said square fit shall be not less than one and five-sixteenths (1 5-16) inches square. When ratchet wheel with square fit is used, provisions shall be made to prevent ratchet wheel from rising on shaft to disengage brake pawl. (See Plate A.)

Brake ratchet wheel shall be not less than five and one-fourth (5¼), preferably five bolt or rivet, and there shall be a rigid metal connection between brake shaft and pivot of pawl.

Brake wheel shall be held in position on brake shaft by a nut on a threaded extended end of brake shaft; said threaded portion shall be not less than three-fourths (¾) of an inch in diameter; said nut shall be secured by riveting over or by the use of a lock-nut or suitable cotter.

Brake wheel shall be arranged with a square fit for brake shaft in hub of said wheel; taper of said fit, nominally two (2) in twelve (12) inches. (See Plate A.)

BRAKE STEP.

If brake step is used, it shall be not less than twenty-eight (28) inches in length.

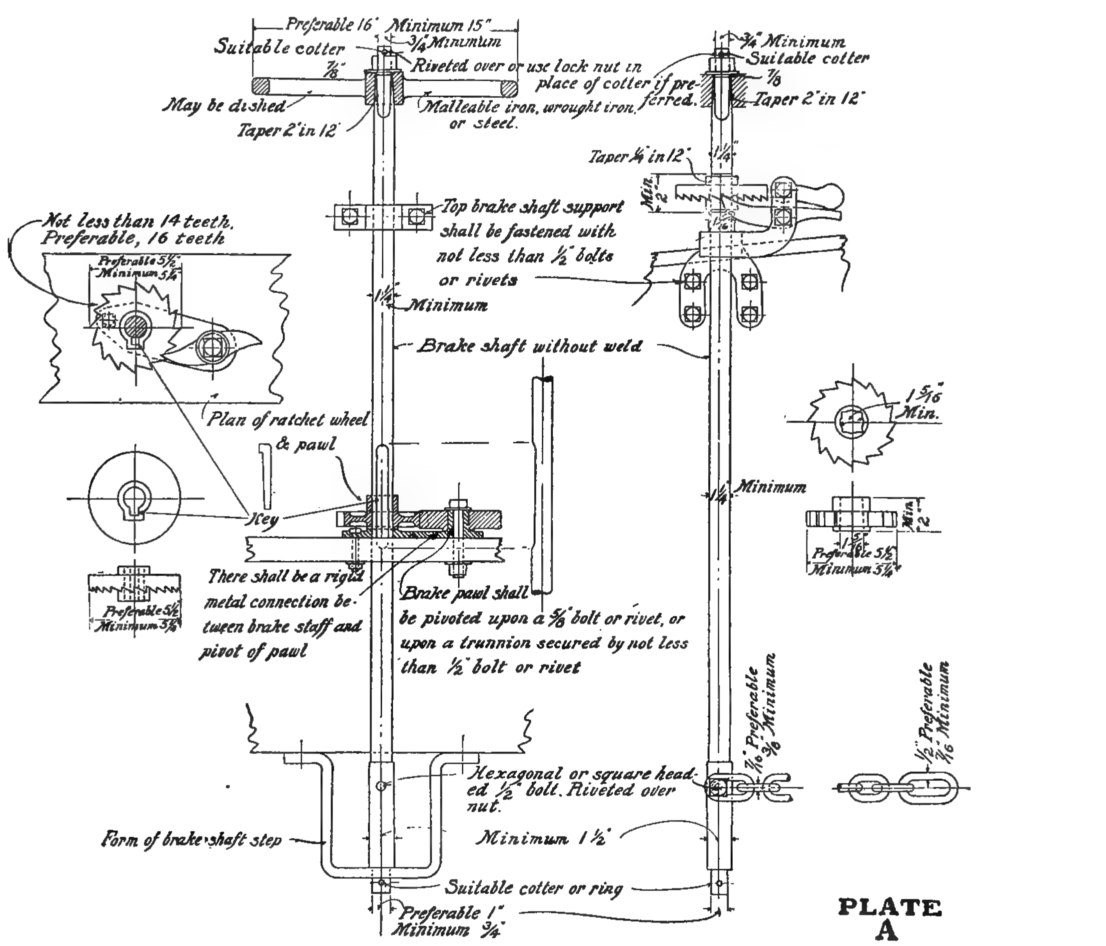


PLATE A

and one-half (½), inches in diameter and shall have not less than fourteen (14), preferably sixteen (16), teeth. (See Plate A.)

If brake-ratchet wheel is more than thirty-six (36) inches from brake wheel, a brake-shaft support shall be provided to support this extended upper portion of brake shaft; said brake-shaft support shall be fastened with not less than one-half (½) inch bolts or rivets.

The brake pawl shall be pivoted upon a bolt or rivet not less than five-eighths (⅝) of an inch in diameter, or upon a trunnion secured by not less than one-half (½) inch

Outside edge shall be not less than eight (8) inches from face of car and not less than four (4) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against buffer block or end sill.

Manner of application.

Brake step shall be supported by not less than two metal braces having a minimum cross-sectional area three-eighths (⅜) by one and one-half (1½) inches or equivalent, which shall be securely fastened to body of car with not less than one-half (½) inch bolts or rivets.

RUNNING BOARDS.

Number. One (1) longitudinal running board.

On outside-metal-roof cars two (2) latitudinal extensions.

Dimensions. Longitudinal running board shall be not less than eighteen (18), preferably twenty (20), inches in width.

Latitudinal extensions shall be not less than twenty-four (24) inches in width.

Location. Full length of car, center of roof.

On outside-metal-roof cars there shall be two (2) latitudinal extensions from longitudinal running board to edge of roof above ladder locations, except on refrigerator cars where such latitudinal extensions cannot be applied on account of ice hatches.

Manner of application. Running boards shall be continuous from end to end and not cut or hinged at any point: *Provided,* That the length and width of running boards may be made up of a number of pieces securely fastened to saddle blocks with screws or bolts.

The ends of longitudinal running board shall be not less than six (6) nor more than ten (10) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill; and if more than four (4) inches from edge of roof of car, shall be securely supported their full width by substantial metal braces.

Running boards shall be made of wood and securely fastened to car.

SILL STEPS.

Number. Four (4).

Dimensions. Minimum cross-sectional area one-half (½) by one and one-half (1½) inches, or equivalent, of wrought iron or steel.

Minimum length of tread, ten (10), preferably twelve (12) inches.

Minimum clear depth, eight (8) inches.

Location. One (1) near each end on each side of car, so that there shall be not more than eighteen (18) inches from end of car to center of tread of sill step.

Outside edge of tread of step shall be not more than four (4) inches inside of face of side of car, preferably flush with side of car.

Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Manner of application. Sill steps exceeding twenty-one (21) inches in depth shall have an additional tread.

Sill steps shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

LADDERS.

Number. Four (4).

Dimensions. Minimum clear length of tread: Side ladders, sixteen (16) inches; end ladders, fourteen (14) inches.

Maximum spacing between ladder treads, nineteen (19) inches.

Top ladder tread shall be located not less than twelve (12) nor more than eighteen (18) inches from roof at eaves.

Spacing at ladder treads shall be uniform, within a limit of two (2) inches from top ladder tread to top tread of sill step.

Hardwood treads, minimum dimensions one and one-half (1½) by two (2) inches.

Iron or steel treads, minimum diameter, five-eighths (⅝) of an inch.

Minimum clearance of treads, two (2), preferably two and one-half (2½), inches.

Location. One (1) on each side, not more than eight (8) inches from right end of car; one (1) on each end, not more than eight (8) inches from left side of car; measured from inside edge of ladder stile or clearance of ladder treads to corner of car.

Manner of application. Metal ladders without stiles near corners of cars shall have foot guards or upward projections not less than two (2) inches in height near inside end of bottom treads.

Stiles of wooden ladders will serve as foot guards.

Ladders shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets. Three-eighths (⅜) inch bolts may be used for wooden treads which are gained into stiles.

END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel, brake step, running board or uncoupling lever shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

ROOF HANDHOLDS.

Number. One (1) over each ladder.

One (1) right-angle handhold may take the place of two (2) adjacent specified roof handholds, provided the dimensions and locations coincide, and that an extra leg is securely fastened to car at point of angle.

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. On roof of car: One (1) in line with, and running parallel to, treads of each ladder, not less than eight (8), nor more than fifteen (15), inches from edge of roof, *except* on refrigerator cars where ice hatches prevent, when location shall be not less than four (4) inches from edge of roof.

Manner of application. Roof handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

SIDE HANDHOLDS.

Number. Four (4).

[*Tread of side ladder is a side handhold.*]

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. Horizontal: One (1) near each end on each side of car.

Side handholds shall be not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, *except* as provided above, where tread of ladder is a handhold. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

Manner of application. Side handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

HORIZONTAL END HANDHOLDS.

Number. Eight (8) or more. (Four (4) on each end of car.)

[*Tread of end ladder is an end handhold.*]

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

A handhold fourteen (14) inches in length may be used where it is impossible to use one sixteen (16) inches in length on end sills.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) near each side on each end of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, *except* as provided above, when tread of end ladder is an end handhold. Clearance of outer end of handhold shall be not more than eight (8) inches from side of car.

One (1) near each side of each end of car on face of end sill or sheathing over end sill, projecting outward or downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

On each end of cars with platform end sills six (6) or more inches in width, measured from end post or siding and extending entirely across end of car, there shall be one additional end handhold not less than twenty-four (24) inches in length, located near center of car, not less than thirty (30) nor more than sixty (60) inches above platform end sill.

Manner of application. Horizontal end handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

VERTICAL END HANDHOLDS.

Number. Two (2) on full-width platform end-sill cars, as heretofore described.

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, eighteen (18), preferably twenty-four (24), inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) on each end of car opposite ladder, not more than eight (8) inches from side of car; clearance of bottom end of handhold shall be not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler.

Manner of application. Vertical end handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

UNCOUPLING LEVERS.

Number. Two (2).

Dimensions. Uncoupling levers may be either single or double, and of any efficient design.

Handles of uncoupling levers, *except* those shown on Plate B or of similar designs, shall be not more than six (6) inches from sides of car.

Uncoupling levers of designs shown on Plate B and of similar designs shall conform to the following prescribed limits:

Handles shall be not more than twelve (12), preferably nine (9), inches from sides of cars. Center lift arms shall be not less than seven (7) inches long.

Center of eye at end of center lift arm shall be not more than three and one-half (3½) inches beyond center of eye of uncoupling pin of coupler when horn of coupler is against the buffer block or end sill. (See Plate B.)

Ends of handles shall extend not less than four (4) inches below bottom of end sill, or shall be so constructed as to give a minimum clearance of two (2) inches around handle. Minimum drop of handles shall be twelve (12) inches; maximum fifteen (15) inches over all. (See Plate B.)

Handles of uncoupling levers of the "rocking" or "push-down" type shall be not less than eighteen (18) inches from top of rail when lock block has released knuckle, and a suitable stop shall be provided to prevent inside arm from flying up in case of breakage.

Location. One (1) on each end of car.

When single lever is used it shall be placed on left side of end of car.

HOPPER CARS AND HIGH-SIDE GONDOLAS WITH FIXED ENDS.

[*Cars with sides more than thirty-six (36) inches above the floor are high-side cars.*]

HAND BRAKES.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of, and not more than twenty-two (22) inches from, center.

Manner of application. Same as specified for "Box and other house cars."

SIDE HANDHOLDS.

Same as specified for "Box and other house cars."

HORIZONTAL END HANDHOLDS.

Same as specified for "Box and other house cars."

VERTICAL END HANDHOLDS.

Same as specified for "Box and other house cars."

UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

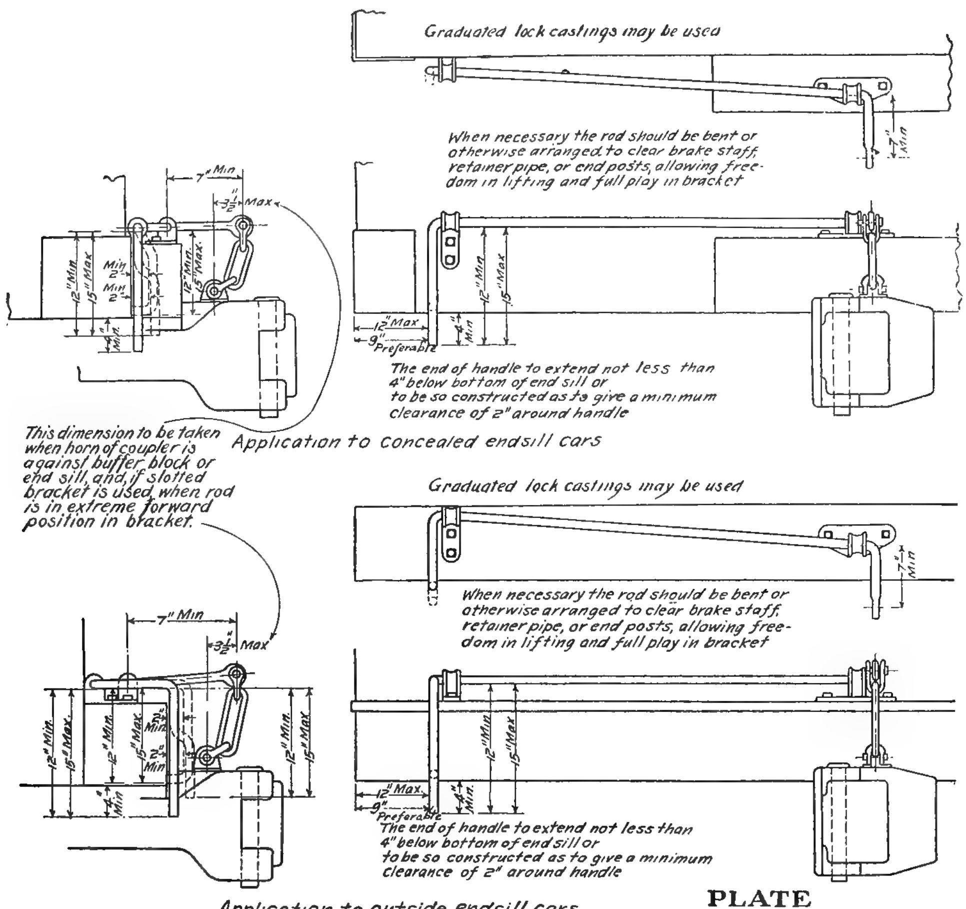


PLATE B

BRAKE STEP.

Same as specified for "Box and other house cars."

SILL STEPS.

Same as specified for "Box and other house cars."

LADDERS.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars," *except* that top ladder tread shall be located not more than four (4) inches from top of car.

Location. Same as specified for "Box and other house cars."

Manner of application. Same as specified for "Box and other house cars."

END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel, brake step or uncoupling lever shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

DROP-END HIGH-SIDE GONDOLA CARS.

HAND BRAKES.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

SILL STEPS.

Same as specified for "Box and other house cars."

LADDERS.

Number. Two (2).

Dimensions. Same as specified for "Box and other house cars," *except* that top ladder tread shall be located not more than four (4) inches from top of car.

Location. One (1) on each side, not more than eight (8) inches from right end of car, measured from inside edge of ladder stile or clearance of ladder treads to corner of car.

Manner of application. Same as specified for "Box and other house cars."

SIDE HANDHOLDS.

Same as specified for "Box and other house cars."

HORIZONTAL END HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

FIXED-END LOW-SIDE GONDOLA AND LOW-SIDE HOPPER CARS.

[*Cars with sides thirty-six (36) inches or less above the floor are low-side cars.*]

HAND BRAKES.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car, to the left of and not more than twenty-two (22) inches from center.

Manner of application. Same as specified for "Box and other house cars."

BRAKE STEP.

Same as specified for "Box and other house cars."

SILL STEPS.

Same as specified for "Box and other house cars."

SIDE HANDHOLDS.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each end on each side of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, if car construction will permit, but handhold shall not project above top of side. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

Manner of application. Same as specified for "Box and other house cars."

HORIZONTAL END HANDHOLDS.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) near each side on each end of car not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, if car construction will permit. Clearance of outer end of handhold shall be not more than eight (8) inches from side of car.

One (1) near each side of each end of car on face of end sill, projecting outward or downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no

other part of end of car or fixtures on same, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

DROP END LOW-SIDE GONDOLA CARS.

HAND BRAKES.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

SILL STEPS.

Same as specified for "Box and other house cars."

SIDE HANDHOLDS.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each end on each side of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, if car construction will permit, but handhold shall not project above top of side. Clearance of outer end of handhold shall be not more than (8) inches from end of car.

Manner of application. Same as speciefid for "Box and other house cars."

END HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE.

No part of car above end sills, within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against buffer block or end sill, and no other part of end of car or fixtures on same, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

FLAT CARS.

[*Cars with sides twelve* (12) *inches or less above the floor may be equipped the same as flat cars.*]

HAND BRAKES.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on the end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

SIDE HANDHOLDS.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) on face of each side sill near each end. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

TANK CARS WITH SIDE PLATFORMS.

HAND BRAKES.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

SILL STEPS.

Same as specified for "Box and other house cars."

SIDE HANDHOLDS.

Number. Four (4) or more.

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) on face of each side sill near each end. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

If side safety railings are attached to tank bands, four (4) additional vertical handholds shall be applied, one (1) over each sill step and securely fastened to tank or tank bands.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

TANK-HEAD HANDHOLDS.

Number. Two (2). [*Not required if safety railing runs around ends of tank.*]

Dimensions. Minimum diameter, five-eighths (5/8) of an inch, wrought iron or steel. Minimum clearance, two (2), preferably two and one-half (2½), inches. Clear length of handholds shall extend to within six (6) inches of outer diameter of tank at point of application.

Location. Horizontal: One (1) across each head of tank, not less than thirty (30) nor more than sixty (60) inches above platform.

Manner of application. Tank-head handholds shall be securely fastened.

SAFETY RAILINGS.

Number. One (1) continuous safety railing running around sides and ends of tank, securely fastened to tank or tank bands at ends and sides of tank; or two (2) running full length of tank at sides of car supported by posts.

Dimensions. Not less than three-fourths (3/4) of an inch, iron.

Location. Running full length of tank, either at side supported by posts or securely fastened to tank or tank bands, not less than thirty (30) nor more than sixty (60) inches above platform.

Manner of application. Safety railings shall be securely fastened to tank body, tank bands or posts.

UNCOUPLING LEVERS

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car *except* buffer block, brake shaft, brake-shaft brackets, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

TANK CARS WITHOUT SIDE SILLS AND TANK CARS WITH SHORT SIDE SILLS AND END PLATFORMS.

HAND BRAKES.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

RUNNING BOARDS.

Number. One (1) continuous running board around sides and ends; or two (2) running full length of tank, one (1) on each side.

Dimensions. Minimum width on sides, ten (10) inches. Minimum width on ends, six (6) inches.

Location. Continuous around sides and ends of cars. On tank cars having end platforms extending to bolsters, running boards shall extend from center to center of bolsters, one (1) on each side.

Manner of application. If side running boards are applied below center of tank, outside edge of running boards shall extend not less than seven (7) inches beyond bulge of tank.

The running boards at ends of car shall be not less than six (6) inches from a point vertically above the inside face of knuckle when closed with coupler horn against the buffer block, end sill or backstop.

Running boards shall be securely fastened to tank or tank bands.

SILL STEPS.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) near each end on each side under side handhold.

Outside edge of tread of step shall be not more than four (4) inches inside of face of side of car, preferably flush with side of car.

Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Manner of application. Same as specified for "Box and other house cars."

LADDERS.

[*If running boards are so located as to make ladders necessary.*]

Number. Two (2) on cars with continuous running boards.

Four (4) on cars with side running boards.

Dimensions. Minimum clear length of tread, ten (10) inches.

Maximum spacing of treads, nineteen (19) inches.

Hardwood treads, minimum dimensions one and one-half (1½) by two (2) inches.

Wrought-iron or steel treads, minimum diameter five-eighths (⅝) of an inch.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. On cars with continuous running boards, one (1) at right end of each side.

On cars with side running boards, one (1) at each end of each running board.

Manner of application. Ladders shall be securely fastened with not less than one-half (½) inch bolts or rivets.

SIDE HANDHOLDS.

Number. Four (4) or more.

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) on face of each side sill near each end on tank cars with short side sills, or one (1) attached to top of running board projecting outward above sill steps or ladders on tank cars without side sills. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

If side safety railings are attached to tank or tank bands, four (4) additional vertical handholds shall be applied, one (1) over each sill step and securely fastened to tank or tank bands.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and under house cars."

TANK-HEAD HANDHOLDS.

Number. Two (2). [*Not required if safety railing runs around ends of tank.*]

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. Horizontal: One (1) across each head of tank, not less than thirty (30) nor more than sixty (60) inches above platform on running board. Clear length of handholds shall extend to within six (6) inches of outer diameter of tank at point of application.

Manner of application. Tank-head handholds shall be securely fastened.

SAFETY RAILINGS.

Number. One (1) running around sides and ends of tank, or two (2) running full length of tank.

Dimensions. Minimum diameter, seven-eighths (⅞) of an inch, wrought iron or steel.

Minimum clearance, two and one-half (2½) inches.

Location. Running full length of tank, not less than thirty (30) nor more than sixty (60) inches above platform or running board.

Manner of application. Safety railings shall be securely fastened to tank or tank bands and secured against end-shifting.

UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake-shaft brackets, brake wheel, running boards or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

TANK CARS WITHOUT END SILLS.

HAND BRAKES.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion. The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

BRAKE STEP.

Same as specified for "Box and other house cars."

RUNNING BOARDS.

Number. One (1).

Dimensions. Minimum width on sides, ten (10) inches.

Minimum width on ends, six (6) inches.

Location. Continuous around sides and ends of tank.

Manner of application. If running boards are applied below center of tank, outside edge of running boards shall extend not less than seven (7) inches beyond bulge of tank.

Running boards at ends of car shall be not less than six (6) inches from a point vertically above the inside face of knuckle when closed with coupler horn against the buffer block, end sill or backstop.

Running board shall be securely fastened to tank or tank bands.

SILL STEPS.

Number. Four (4). [*If tank has high running boards, making ladders necessary, sill steps must meet ladder requirements.*]

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) near each end on each side, flush with outside edge of running board, as near end of car as practicable.

Tread not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Manner of application. Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced.

Sill steps shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with one-half (½) inch rivets.

SIDE HANDHOLDS.

Number. Four (4) or more.

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each end on each side of car over sill step, on running board, projecting downward not more than two (2) inches from outside edge of running board.

Where such side handholds are more than eighteen (18) inches from end of car, an additional handhold must be placed near each end on each side not more than thirty (30) inches above center line of coupler.

Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

If safety railings are on tank, four (4) additional vertical handholds shall be applied, one (1) over each sill step on tank.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side on each end of car on running board, projecting downward not more than two (2) inches from edge of running board, or on end of tank not more than thirty (30) inches above center line of coupler.

Manner of application. Same as specified for "Box and other house cars."

SAFETY RAILINGS.

Number. One (1).

Dimensions. Minimum diameter, seven-eighths (⅞) of an inch, wrought iron or steel.

Minimum clearance, two and one-half (2½) inches.

Location. Safety railings shall be continuous around sides and ends of car, not less than thirty (30) nor more than sixty (60) inches above running board.

Manner of application. Safety railings shall be securely fastened to tank or tank bands, and secured against end-shifting.

UNCOUPLING LEVERS.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars," *except* that minimum length of uncoupling lever shall be forty-two (42) inches, measured from center line of end of car to handle of lever.

Location. Same as specified for "Box and other house cars," *except* that uncoupling lever shall be not more than thirty (30) inches above center line of coupler.

END-LADDER CLEARANCE.

No part of car above buffer block within thirty (30) inches from side of car, *except* brake shaft, brake-shaft brackets, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or backstop, and no other part of end of car or fixtures on same, above buffer block, other than exceptions herein noted, shall extend beyond the face of buffer block.

CABOOSE CARS WITH PLATFORMS.

HAND BRAKES.

Number. Each caboose car shall be equipped with an efficient hand brake which shall operate in harmony with the power brake thereon.

The hand brake may be of any efficient design, but must provide the same degree of safety as the design shown on Plate A.

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft on caboose cars with platforms shall be located on platform to the left of center.

Manner of application. Same as specified for "Box and other house cars."

RUNNING BOARDS.

Number. One (1) longitudinal running board.

Dimensions. Same as specified for "Box and other house cars."

Location. Full length of car, center of roof. [*On caboose cars with cupolas, longitudinal running boards shall extend from cupola to ends of roof.*]

Outside metal-roof cars shall have latitudinal extensions leading to ladder locations.

Manner of application. Same as specified for "Box and other house cars."

LADDERS.

Number. Two (2).

Dimensions. None specified.

Location. One (1) on each end.

Manner of application. Same as specified for "Box and other house cars."

ROOF HANDHOLDS.

Number. One (1) over each ladder.

Where stiles of ladders extend twelve (12) inches or more above roof, no other roof handholds are required.

Dimensions. Same as specified for "Box and other house cars."

Location. On roof of caboose, in line with and running parallel to treads of ladder, not less than eight (8) nor more than fifteen (15) inches from edge of roof.

Manner of application. Same as specified for "Box and other house cars."

CUPOLA HANDHOLDS.

Number. One (1) or more.

Dimensions. Minimum diameter, five-eighths (5/8) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) continuous handhold extending around top of cupola, not more than three (3) inches from edge of cupola roof.

Four (4) right-angle handholds, one (1) at each corner, not less than sixteen (16) inches in clear length from point of angle, may take the place of the one (1) continuous handhold specified, if locations coincide.

Manner of application. Cupola handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside and riveted over, or with not less than one-half (½) inch rivets.

SIDE HANDHOLDS.

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (5/8) of an inch, wrought iron or steel.

Minimum clear length, thirty-six (36) inches.

Minimum clearance, two (2), preferably two and one-half (2½) inches.

Location. One (1) near each end on each side of car, curving downward toward center of car from a point not less than thirty (30) inches above platform to a point not more than eight (8) inches from bottom of car. Top end of handhold shall be not more than eight (8) inches from outside face of end sheathing.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side on each end of car on face of platform end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from end of platform end sill.

Manner of application. Same as specified for "Box and other house cars."

END PLATFORM HANDHOLDS.

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (5/8) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½) inches.

Location. One (1) right-angle handhold on each side of each end, extending horizontally from door post to corner of car at approximate height of platform rail, then downward to within twelve (12) inches of bottom of car.

Manner of application. Handholds shall be securely fastened with bolts, screws or rivets.

CABOOSE-PLATFORM STEPS.

Safe and suitable box steps leading to caboose platform shall be provided at each corner of caboose.

Lower tread of step shall be not more than twenty-four (24) inches above top of rail.

UNCOUPING LEVERS.

Same as specified for "Box and other house cars."

CABOOSE CARS WITHOUT PLATFORMS.

HAND BRAKES.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft on caboose cars without platforms shall be so located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

BRAKE STEP.

Same as specified for "Box and other house cars."

RUNNING BOARDS.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Full length of car, center of roof. [*On caboose cars with cupolas, longitudinal running boards shall extend from cupola to ends of roof.*]

Outside metal-roof cars shall have latitudinal extensions leading to ladder locations.

Manner of application. Same as specified for "Box and other house cars."

SILL STEPS.

Same as specified for "Box and other house cars."

SIDE-DOOR STEPS.

Number. Two (2) [*if caboose has side doors.*]

Dimensions. Minimum length, five (5) feet.

Minimum width, six (6) inches.

Minimum thickness of tread, one and one-half (1½) inches.

Minimum height of backstop, three (3) inches.

Maximum height from top of rail to top of tread, twenty-four (24) inches.

Location. One (1) under each side door.

Manner of application. Side-door steps shall be supported by two (2) iron brackets having a minimum cross-sectional area seven-eighths (⅞) by three (3) inches or equivalent, each of which shall be securely fastened to car by not less than two (2) three-fourth (¾) inch bolts.

LADDERS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Same as specified for "Box and other house cars," *except* when caboose has side doors, then side ladders shall be located not more than eight (8) inches from doors.

Manner of application. Same as specified for "Box and other house cars."

END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel, brake step, running board or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

ROOF HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) over each ladder, on roof in line with and running parallel to treads of ladder, not less than eight (8) nor more than fifteen (15) inches from edge of roof.

Where stiles of ladders extend twelve (12) inches or more above roof, no other roof handholds are required.

Manner of application. Roof handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

CUPOLA HANDHOLDS.

Number. One (1) or more.

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) continuous cupola handhold extending around top of cupola, not more than three (3) inches from edge of cupola roof.

Four (4) right-angle handholds, one (1) at each corner, not less than sixteen (16) inches in clear length from point of angle, may take the place of the one (1) continuous handhold specified, if locations coincide.

Manner of application. Cupola handhold shall be securely fastened with not less than one-half (½) inch bolts with nuts outside and riveted over, or with not less than one-half (½) inch rivets.

SIDE HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each end on each side of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

Manner of application. Same as specified for "Box and other house cars."

SIDE-DOOR HANDHOLDS.

Number. Four (4): Two (2) curved, two (2) straight.

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) curved handhold, from a point at side of each door opposite ladder, not less than thirty-six (36) inches above bottom of car, curving away from door downward to a point not more than six (6) inches above bottom of car.

One (1) vertical handhold at ladder side of each door, from a point not less than thirty-six (36) inches above bottom of car to a point not more than six (6) inches above level of bottom of door.

Manner of application. Side-door handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

HORIZONTAL END HANDHOLDS.

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Same as specified for "Box and other house cars," *except* that one (1) additional end handhold shall be on each end of cars with platform end sills as heretofore described, unless car has door in center of end. Said handhold shall be not less than twenty-four (24) inches in length, located near center of car, not less than thirty (30) nor more than sixty (60) inches above platform end sill.

Manner of application. Same as specified for "Box and other house cars."

VERTICAL END HANDHOLDS.

Same as specified for "Box and other house cars."

UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

PASSENGER-TRAIN CARS WITH WIDE VESTIBULES.

HAND BRAKES.

Number. Each passenger-train car shall be equipped with an efficient hand brake, which shall

operate in harmony with the power brake thereon.

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

SIDE HANDHOLDS.

Number. Eight (8).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, metal.

Minimum clear length, sixteen (16) inches.

Minimum clearance, one and one-fourth (1¼), preferably one and one-half (1½) inches.

Location. Vertical: One (1) on each vestibule door post.

Manner of application. Side handholds shall be securely fastened with bolts, rivets or screws.

END HANDHOLDS.

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half (2½) inches.

Handholds shall be flush with or project not more than one (1) inch beyond vestibule face.

Location. Horizontal: One (1) near each side on each end, projecting downward from face of vestibule end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. End handholds shall be securely fastened with bolts or rivets.

When marker sockets or brackets are located so that they can not be conveniently reached from platforms, suitable steps and handholds shall be provided for men to reach such sockets or brackets.

UNCOUPLING LEVERS.

Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

Minimum length of ground uncoupling attachment, forty-two (42) inches, measured from center line of end of car to handle of attachment.

On passenger-train cars used in freight or mixed train service, the uncoupling attachments shall be so applied that the coupler can be operated from left side of car.

PASSENGER-TRAIN CARS WITH OPEN END PLATFORMS.

HAND BRAKES.

Number. Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon.

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

END HANDHOLDS.

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Handholds shall be flush with or project not more than one (1) inch beyond face of end sill.

Location. Horizontal: One (1) near each side of each end on face of platform end sill, projecting downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from end of end sill.

Manner of application. End handholds shall be securely fastened with bolts or rivets.

END PLATFORM HANDHOLDS.

Number. Four (4). [*Cars equipped with safety gates do not require end platform handholds.*]

Dimensions. Minimum clearance, two (2), preferably two and one-half (2½), inches, metal.

Location. Horizontal from or near door post to a point not more than twelve (12) inches from corner of car, then approximately vertical to a point not more than six (6) inches from top of platform. Horizontal portion shall be not less than twenty-four (24) inches in length nor more than forty (40) inches above platform.

Manner of application. End-platform handholds shall be securely fastened with bolts, rivets or screws.

UNCOUPLING LEVERS.

Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

Minimum length of ground uncoupling attachment, forty-two (42) inches, measured from center of end of car to handle of attachment.

On passenger-train cars used in freight or mixed train service, the uncoupling attachments shall be so applied that the coupler can be operated from left side of car.

PASSENGER-TRAIN CARS WITHOUT END PLATFORMS.

HAND BRAKES.

Number. Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon.

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

SILL STEPS.

Number. Four (4).

Dimensions. Minimum length of tread, ten (10), preferably twelve (12) inches.

Minimum cross-section area, one-half (½) by one and one-half (1½) inches or equivalent, wrought iron or steel.

Minimum clear depth, eight (8) inches.

Location. One (1) near each end on each side, not more than twenty-four (24) inches from corner of car to center of tread of sill step.

Outside edge of tread of step shall be not more than two (2) inches inside of face of side of car.

Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Manner of application. Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced.

Sill steps shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

SIDE HANDHOLDS.

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16), preferably twenty-four (24), inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. Horizontal or vertical: One (1) near each end on each side of car over sill step.

If horizontal, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler.

If vertical, lower end not less than eighteen (18) nor more than twenty-four (24) inches above center line of coupler.

Manner of application. Side handholds shall be securely fastened with bolts, rivets or screws.

END HANDHOLDS.

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2) preferably two and one-half (2½), inches.

Location. Horizontal: One (1) near each side on each end, projecting downward from face of end sill or sheathing. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Handholds shall be flush with or project not more than one (1) inch beyond face of end sill.

End handholds shall be securely fastened with bolts or rivets.

Manner of application. When marker sockets or brackets are located so that they can not be conveniently reached from platform, suitable steps and handholds shall be provided for men to reach such sockets or brackets.

END HANDRAILS.

Number. Four (4). [*On cars with projecting end-sills.*]

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) on each side of each end, extending horizontally from door post or vestibule frame to a point not more than six (6) inches from corner of car, then approximately vertical to a point not more than six (6) inches from top of platform end sill; horizontal portion shall be not less than thirty (30) nor more than sixty (60) inches above platform end sill.

Manner of application. End handrails shall be securely fastened with bolts, rivets or screws.

SIDE-DOOR STEPS.

Number. One (1) under each door.

Dimensions. Minimum length of tread, ten (10), preferably twelve (12), inches.

Minimum cross-sectional area, one-half (½) by one and one-half (1½) inches or equivalent, wrought iron or steel.

Minimum clear depth, eight (8) inches.

Location. Outside edge of tread of step not more than two (2) inches inside of face of side of car.

Tread not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Manner of application. Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced.

Side-door steps shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

A vertical handhold not less than twenty-four (24) inches in clear length shall be applied above each side-door step on door post.

UNCOUPLING LEVERS.

Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

Minimum length of ground uncoupling attachment, forty-two (42) inches, measured from center line of end of car to handle of attachment.

On passenger-train cars used in freight or mixed train service, the uncoupling attachment shall be so applied that the coupler can be operated from the left side of car.

Cars of construction not covered specifically in the foregoing sections, relative to handholds, sill steps, ladders, hand brakes and running boards, may be considered as of special construction, but shall have, as nearly as possible, the same complement of handholds, sill steps, ladders, hand brakes and running boards as are required for cars of the nearest approximate type.

"Right" or "left" refers to side of person when facing end or side of car from ground.

To provide for the usual inaccuracies of manufacturing and for wear, where sizes of metal are specified, a total variation of five (5) per cent. below size given is permitted.

Safety Beam (Six-Wheel Trucks). See Axle Guard.

Safety Berth Latch. A device by which it is made impossible for an upper berth to shut automatically in case of accidental overturning of the cars. These devices enable the Berth Safety Rope to be dispensed with.

Safety Chain. See also CHECK CHAIN.

Safety Chain Eye. An iron eye with a broad base bolted to the under side of the side sills of a passenger equipment car to receive the hook on the end of a truck safety or check chain.

Safety Chains, Platform (M. C. B. Recommended Practice). In 1893 a Recommended Practice was adopted for location and details of platform safety chains for passenger equipment cars. In 1896 this was modified as follows: Platform Safety Chains for passenger equipment cars to be located 14½ inches each side of center; to be suitably attached to under side of platform timbers, and to be of such length that when extended horizontally the chain with hook shall measure 12¾ inches from face of end timber to bearing point of hook, and the chain with eye shall measure 2¾ inches from face of end timber to bearing point of eye. The hook shall not be more than 1¼ inches thick transversely, and the eye shall not be less than 1½ inches wide, or less than 4 inches long in its opening. When facing end of car the chain fitted with hook shall be on the left-hand side, and the chain fitted with eye on the right-hand side.

Safety Chains for Steel and Wooden Freight Cars (M. C. B. Recommended Practice). Fig. 2908. In 1894 a Recommended Practice was adopted for Safety Chains for Freight Cars, when such chains are used. The use of safety chains on freight cars was not recommended, but when they are used on cars for special service a location is recommended as shown.

In 1904 a Recommended Practice for safety chains for Steel Freight Cars was adopted.

In 1905, as a result of letter ballot, the two designs of temporary safety chains for chaining together cars carrying double loads, shown on the drawing were adopted as a Recommended Practice.

Safety or Check Chain Eyebolt. An eyebolt for securing a safety or check chain to a truck or to the car body.

Safety or Check Chain Hook. A hook on the end of a CHECK CHAIN with which to attach it to an eyebolt on the car body.

Safety Guard (for Spring Plank.) An iron strap attached to the truck transoms and passing under the spring plank to hold up the latter in case of accidental breaking of the link hangers. More property SPRING PLANK SAFETY HANGER.

Safety Hanger. A metal loop or eye surrounding a rod or bar to prevent its falling in case of breakage.

Safety Plate (Baker Heater). An iron plate which covers the hole in the partition between the fire pot and the base of the smoke flue. Its office is to prevent the ignited coals from falling out if the heater be overturned.

Safety Rod (Postal Cars). A rod suspended from overhead, over the pouch racks, within easy reach, to serve as a handhold or grabiron in case of derailment, etc.

Safety Rope (Sleeping Car Berths). More properly BERTH SAFETY ROPE. See also SAFETY BERTH LATCH.

Safety Strap. See SAFETY HANGER.

Safety Tread. Figs. 559, 565-568. Rubber or metal coverings for step treads which prevent the foot from slipping.

Safety Valve (Car Heating). Figs. 2154, etc. Used to provide against an accumulation of excess pressure.

(High Speed Brake.) An improved type of relief valve applied to the brake cylinders of such cars in a train as are not equipped with a high speed reducing valve, to relieve the brakes from excessive pressure.

(Passenger Triple Valve.) 33, Fig. 1367; Fig. 1377.

(Tank Cars.) 12, Fig. 340. To prevent excess pressure. See TANK CARS, SPECIFICATIONS FOR.

Saloon. A retiring room, furnished with a dry closet or a water closet. The saloon is commonly also provided with washing facilities. Other terms are lavatory, closet, toilet. See LAVATORY.

One of the smaller subdivisions or staterooms of a sleeping or parlor car.

Salt-Water Drippings, Collection of (M. C. B. Recommended Practice).

In 1898 the subject of rust on trucks and track from salt-water drippings from refrigerator cars was discussed, and a Recommended Practice for the collection of such drippings was adopted.

In 1910 this practice was modified as follows:

1. All salt-water drippings should be retained in the ice tanks and drained off only at icing stations.
2. The total capacity of drain openings should not exceed the capacity of traps, and the capacity of both drains and traps should be sufficient to release all drippings within the time limit of icing the train.
3. The mechanism adopted for handling drain valves should be simple and positive, and so designed as to insure closing the valves before hatch plugs can be returned to their places.
4. Salt drippings should be conducted from ice tanks through the drain valves above described and thence to the outside of cars through the regular traps and drain pipes.

Sand Blast. A process of cutting glass by blowing sand upon it with a strong blast of air.

The same principle is used in larger machines for cleaning the rust and old paint from steel cars.

Sand Plank. A common name for spring plank.

Sandwich Plates. See FLITCH PLATES.

Sash. Fig. 1885, etc. The frame of a window or blind, in which the glass or slats are set, but commonly used, especially in compound words, as a substitute for window, which means the window and sash complete. The various members used in framing a sash are the same as a DOOR FRAME. See DECK SASH, etc.

Sash Balance. Fig. 1902, etc. A spring or weight, with or without a cord, so connected to a sash as to counterbalance its weight and make it easy to raise or lower.

Sash Bars. See SASH LATCH.

Sash Fastener. A sash lock.

Sash Holder. See SASH LOCK.

Sash Latch. Similar to a sliding door latch. See LATCH.

Sash Lift. Figs. 1897, 1906, 1910, etc. A metal finger hold attached to the bottom rail of a window sash for raising and lowering it. They are sometimes let in flush, but are usually attached on the outside. Sometimes, but rarely, the sash lift is a mere knob, and so called. A WINDOW BLIND LIFT is a somewhat similar device. See BAR SASH LIFT.

Sash Lock. Fig. 1896, etc. A spring bolt attached to a window sash, or (rarely) a window blind, provided with thumb lever (sash lock trigger), to withdraw the bolt with by one hand, while the sash is lifted by the other. Both hands must thus be used. To accomplish this end less awkwardly SASH BALANCES have been adopted.

Sash Lock Plate. A sash lock stop.

Sash Lock Rack. Fig. 1897, etc. A rack or stop bar used as a SASH LOCK STOP.

Sash Lock Spring. See SASH LOCK.

Sash Lock Stop. Fig. 1926, etc. There are two kinds of stops, upper stops for holding the window open, and lower stops to hold it shut. Sash lock bushings, plates, or racks, are substitutes and equivalents for sash lock stops. Sash lock racks are often called stop bars.

Sash Opener. A contrivance, as a lever or rod, for opening a window, used chiefly for the deck sash which are out of reach.

Sash Parting Strip. See PARTING STRIP.

Sash Pivot. A metal pin or pivot attached to a sash on which the latter turns. See DECK SASH PIVOT.

Sash Pull. See DECK SASH PULL.

Sash Rail. A horizontal bar in the frame of a window or blind.

Sash Spring. A metal spring attached to the edge of the stile of a window sash to prevent it from rattling.

Schedule of Prices and Credits. See INTERCHANGE OF TRAFFIC.

Scheme Rod (Postal Cars). A rod supported upon the scheme rod bracket, and carrying the scheme or schedule of the proper distribution of mail matter for the various post offices; used in distributing mail.

Scoop Car. Fig. 214. A car of special construction and equipment for removing rock or earth slides from railway tracks.

Screen (Window). A wire netting stretched on a frame to admit air but exclude cinders.

Screw. "A cylinder surrounded by a spiral ridge or groove, every part of which forms an equal angle with the axis of the cylinder, so that if developed on a plane surface it would be an inclined plane. It is considered as one of the mechanical powers."—Knight. When used alone the term commonly means a wood screw, having a slotted head and gimlet point, for driving in with a screw driver. Machine screws are similar, except that they have no gimlet point and have a metal screw thread. They are used for uniting metallic parts. All ordinary forms of bolts have screw threads cut on them, but are not commonly called screws. A special form of wood screw is a lag screw, which is a large sized screw with a head like a bolt, so that it may be inserted with a wrench instead of a screw driver. See SCREW THREAD.

Screw Coupling (British.) The means by which passenger train vehicles are coupled together. On the Continent of Europe it is used for both passenger and freight cars. It comprises a right and left-handed screw provided with a hinged weighted handle, which always hangs downward, so that it has no tendency to unscrew and slacken the coupling, and two nuts with gudgeons taking in the eyes of U-shaped coupling links or shackles. The screw coupling may be either loose, or one shackle may be attached to the drawbar.

Screw Gages. Instruments for measuring the diameter or size of screws. They are of two kinds: external, for measuring male screws, and internal, for measuring female screws. See also SCREW PITCH GAGE, SCREW THREAD GAGE.

Screw Jack. A jack, the power of which depends upon a screw, turned by a lever. See JACK.

Screw Pitch Gage. "A gage for determining the number of threads to the inch on screws and taps. It consists of a number of toothed plates turning on a common pivot, so that the serrated edge of each may be applied to the screw until one is found which corresponds therewith. The figures stamped on the plate indicate the number of threads to the inch."—Knight. In the ordinary single thread screw the pitch is indicated by the number of threads to an inch.

Screw Thread Gage. A steel plate with notches in the edge of the precise form of screw threads, used for giving the proper form to the edges of screw cutting tools. See SCREW THREAD.

Screw Threads, Bolt Heads and Nuts (M. C. B. Standard). The Sellers or Franklin Institute system of screw threads, bolt heads and nuts is the standard of the Association, and repeated action of the Association has depreciated the use of any other system and encouraged the careful maintenance of these standards.

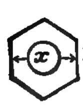
A set of gages for standard screw threads and a standard inch scale, 2 feet long, are held in the office of the Secretary for reference.

Mr. Sellers, who proposed this system of screw threads, described it in an essay read before the Franklin Institute of Philadelphia, April 21, 1864, as follows:

"The proportions for the proposed thread and its comparative relation to the sharp and rounded threads, will be readily understood from the accompanying diagram in which Figs. 11 and 12—the latter on an exaggerated scale—represent a sharp thread, Figs. 13 and 14 a rounded top and bottom to the English proportion, and Figs. 15 and 16 the flat top and bottom, all of the same pitch.

PROPORTIONS FOR SELLERS' STANDARD NUTS AND BOLTS.


Rough Nut = one and one-half diameter of bolt + ½.

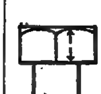

Finished Nut = one and one-half diameter of bolt + ⅛.

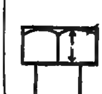

Rough Nut = diameter of bolt.


Finished Nut = diameter of bolt — ⅛.


Rough Head = one and one-half diameter of bolt + ½.

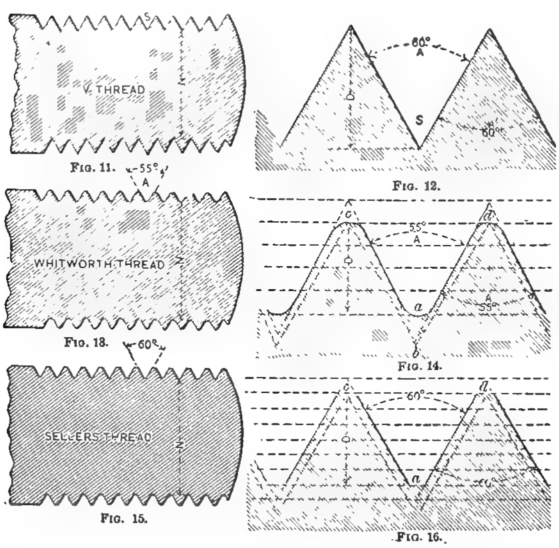

Finished Head = one and one-half diameter of bolt + ⅛.


Rough Head = one-half distance between parallel sides of head.


Finished Head = diameter of bolt — ⅛.

NOTE.—In 1899 the following dimensions for square bolt heads were adopted as Recommended Practice: The side of the head shall be one and one-half times the diameter of the bolt, and the thickness of the head shall be one-half the side of the head. In 1900 these dimensions were adopted as Standard.

The angle of the proposed thread is fixed at 60°, the same as the sharp thread, it being more readily obtained than 55°; and more in acordance with



the general practice in this country. Divide the pitch, or, which is the same thing, the side of the thread, into eight equal parts, take off one part from the top and fill in one part in the bottom of the thread, then the flat top and bottom will equal one-eighth of the pitch; the wearing surface will be three-quarters of the pitch, and the diameter of screw at bottom of the thread will be expressed by the formula:

$$\textit{Diameter} - \frac{1,299}{\textit{number of threads per inch.}}$$

The accompanying tables are reprinted from Mr. Sellers' essay: they give the proportions of his standard screw threads, nuts and bolt heads.

Scrubber (Acetylene Gas Lighting). A device for cleaning the gas.

Sealed Jet (Car Heating). A piece of apparatus in which live steam is brought directly into contact with the circulating water and heats it, at the same time forcing the circulation.

Seat. "That flat portion of a chair or sofa to support the person."—Knight. Figs. 1510, 1512-1564. See CAR SEAT.

In Mechanics: "The part on which another thing rests, as a valve seat."—Knight.

Seat Arm Cap. A piece of metal shaped to the form of the seat arm and screwed to the top to take the wear and as an ornament.

Seat Arm Pivot. Fig. 1627. A metal pivot by which a seat arm of a reversible seat is attached to a seat end or the side of a car. In some cases the pivot is made in one piece with the seat arm plate, which is attached to the seat end. The two combined then become a seat arm pivot plate. A seat arm pivot is sometimes called a seat arm rivet.

Seat Arm Plate. A plate fastened to a seat end with a hole in the corner, which receives and holds a seat arm pivot. In some cases the pivot is made in one piece with the plate. The part formed by combining the two is then called a seat arm pivot plate. Sometimes a seat arm pivot plate or washer and a bolt is used.

Seat Arm or Seat Arm Rest. Fig. 1630. An arm by which the back of a seat is attached to the seat end or to the side of the car. Such arms are usually attached by a pivot, so that the seat back can be reversed. Sometimes called striker arm, seat back arm, and also seat back reversing arms.

This term is also used to designate the portion of a seat end which supports the arm of a person sitting in the seat, and sometimes, incorrectly, to designate a SEAT ARM CAP.

Seat Arm Rest Bracket. A bracket to be screwed to the wall to carry a wood arm rest.

Seat Arm Rivets. Fig. 1617.

PROPORTIONS FOR SELLERS' STANDARD SCREW THREADS, NUTS AND BOLTS.

SCREW THREADS.				HEXAGON NUTS.				HEXAGON BOLT HEADS.			
Diameter of screw.	Threads per inch.	Diameter at root of thread.	Width of flat.	Short diameter rough.	Short diameter finish.	Thickness rough.	Thickness finish.	Short diameter rough.	Short diameter finish.	Thickness rough.	Thickness finish.
¼	20	.185	0062	½	7/16	¼	3/16	⅜	5/16	3/16	⅛
5/16	18	.240	0074	19/32	17/32	5/16	¼	15/32	13/32	15/64	11/64
⅜	16	.294	.0078	11/16	⅝	⅜	5/16	9/16	½	9/32	7/32
7/16	14	.344	0089	25/32	23/32	7/16	⅜	21/32	19/32	21/64	17/64
½	13	400	0096	⅞	13/16	½	7/16	¾	11/16	⅜	5/16
9/16	12	454	.0104	31/32	29/32	9/16	½	27/32	25/32	27/64	23/64
⅝	11	507	0113	1 1/16	1	⅝	9/16	15/16	⅞	15/32	13/32
¾	10	620	0125	1¼	1 3/16	¾	11/16	1⅛	1 1/16	9/16	½
⅞	9	731	0138	1 7/16	1⅜	⅞	13/16	1 5/16	1¼	21/32	19/32
1	8	.837	0156	1⅝	1 9/16	1	15/16	1½	1 7/16	¾	11/16
1⅛	7	940	0178	1 13/16	1¾	1⅛	1 1/16	1 11/16	1⅝	27/32	25/32
1¼	7	1 065	.0178	2	1 15/16	1¼	1 3/16	1⅞	1 13/16	15/16	⅞
1⅜	6	1.160	.0208	2 3/16	2⅛	1⅜	1 5/16	2 1/16	2	1 1/32	31/32
1½	6	1.284	.0208	2⅜	2 5/16	1½	1 7/16	2¼	2 3/16	1⅛	1 1/16
1⅝	5½	1.389	.0227	2 9/16	2½	1⅝	1 9/16	2 7/16	2⅜	1 7/32	1 5/32
1¾	5	1.491	.0250	2¾	2 11/16	1¾	1 11/16	2⅝	2 9/16	1 5/16	1¼
1⅞	5	1.616	.0250	2 15/16	2⅞	1⅞	1 13/16	2 13/16	2¾	1 13/32	1 11/32
2	4½	1.712	.0277	3⅛	3 1/16	2	1 15/16	3	2 15/16	1½	1 7/16

Seat Arm Stop. Figs. 1623-1626. A metal lug or bracket attached to a seat end, and sometimes to the side of the car; on which the seat arm rests. Seat stops are either attached to a long plate (curved or straight seat stop), or as in round seat stops, and have a flange entirely surrounding them, by which they are attached to the seat arm or side of the car. They are also called seat stops.

Seat Arm Thimble. Fig. 1619.

Seat Arm Washer. A small washer for the head of a screw, by which a seat arm is fastened to a seat end. Now little used.

Seat Back. That part of a car seat which forms a support for the back. It has an arm, called the seat back arm, attached to it, by which it is attached to the seat ends with a seat arm pivot, so that it can be swung over so as to face the other way. In some styles the seat back arm is pivoted below the seat cushion and the seat back swings over the cushion so that both sides are used alternately. In sleeping cars the back does not swing but a part of it pulls out to form the lower berth. See SEAT. On some suburban cars, and commonly on street cars, longitudinal seats are used, with the backs against the side of the car.

Seat Back Arm Lock. See SEAT LOCK.

Seat Back Arm Pivot. Fig. 1620. The swinging joint or seat back pivot in the seat arm. See SEAT ARM PIVOT.

Seat Back Band. A seat back molding.

Seat Back Corner. Fig. 1632. A metallic cornice piece to screw to the backs of seats and protect the upholstery from wear.

Seat Back Curved Stop. A seat back stop of a curved form.

Seat Back Molding. A wood, or more usually, metal band or molding fastened around the edge of a seat back to give it a finish and protect it from wear.

Seat Back Paneling. The panels forming the partition between the seat backs in a sleeping car.

Seat Back Pivot Plate. The plate bearing a seat arm pivot fastened to the seat back.

Seat Back Reversing Arms. A seat back arm of a car seat.

Seat Back Round Stop. A round seat stop.

Seat Back Slats. Narrow strips of wood used to form a seat back; used chiefly for seats which are not upholstered.

Seat Back Spring. A weak spring placed in the upholstering in the back of a seat. Usually called simply back spring.

Seat Bracket (Hand Car). A wrought iron knee which supports the seat.

Seat Cover Guard Rail. A strip of wood tacked to the flap of the seat cover to keep it straight.

Seat Cushion. The upholstered part of a car seat. There is ordinarily a separate cushion for the seat and for the back. In sleeping cars the two cushions are used to form the lower berth. Two kinds of cushions are used on cars; a squab cushion, which is a loose pad and is now little used, and box cushion, which is a cushion built upon a cushion frame, with springs, etc.

Seat Division (Longitudinal Seats). A bar of wood or metal to separate the space occupied by a passenger from that adjoining it.

Seat End. A frame of wood or metal at the end of a car seat which supports the arm of the occupant and to which the seat back arm is attached. Seat ends are designated as long or short according to whether they extend entirely to the floor or are supported upon a seat stand. They are also designated as aisle seat ends, or wall seat ends, and, for corner seats, as left-hand or right-hand seat ends.

Seat End Arm. The portion of a seat end which supports the arm of a person sitting in the seat. An arm rest.

Seat End Cross Rail. The end rail between posts of a wood seat end.

Seat Front Rail. A rail fastened to the ends of the seat bearing cross bar and running along at the top of the seat front and under the front seat rail.

Seat Head End. The upper part of the seat end projecting out beyond the head rest.

Seat Hinge (Sleeping Cars). Fig. 1629. A strap hinge used to connect a seat with the seat back. See also SOFA HINGE.

Seat Joint Bolt. A bolt for fastening a seat rail to aisle seat ends. It is also used at the wall ends.

Seat Leg (Longitudinal Seats). A wooden post which supports a front seat rail.

Seat Leg Plate. A metal plate with which the front of a seat end or leg is covered to protect it from injury.

Seat Lever (Water Closet). A lever projecting backward from the seat lid, to which the connecting rod is attached.

Seat Lid (Water Closet.) A cover for the seat.

Seat Lock. Figs. 1618, 1621. A lock for holding the back of a seat so that its position cannot be reversed. Such locks are attached either to the seat end, seat back arm or seat back stop. A form for iron seat ends with a small escutcheon, not provided with screw holes, is sometimes distinctively called a barrel lock, although the term is almost equally applicable to any form of seat lock. Seat locks operate by pushing the key inward, turning it a little and then pulling on the key.

Seat Lock Bolt. Fig. 1621. The beveled bolt by which locking is effected.

Seat Pull (Sleeping Cars). Fig. 1634. A flush handle for pulling out the seat in making up the berth so as to drop the back and seat to the same level.

Seat Rail. One of a pair of rails, front and back, resting on and attached to the seat ends, and which support a cushion frame or seat bottom.

Seat Rail Bracket or Socket. Fig. 1628. A support for a wooden seat rail.

Seat Slat. A narrow strip of wood which forms part of a seat bottom, or seat back.

Seat Spring. Fig. 1647. A spiral or other metal spring used to give a seat elasticity. Spiral springs are the most common, the elliptic and spiral-elliptic having become nearly obsolete in new seats. A special form of seat springs called back springs, of little resistance, is used for seat backs. British seat springs are called sofa springs, and the back springs back squab sofa springs.

Seat Stand. A support on which an aisle seat end rests.

Seat Stop. See SEAT ARM STOP.

Seat Webbing. Fig. 1647. A form of coarse canvas used in upholstering car seats.

Second Catch (of Car Door Fastener). A double hook or eye placed in the hasp of a car door lock in such manner that the door can, if desired, be locked, leaving a small opening for ventilation.

Second-Class Car. A plainly finished passenger car for carrying passengers who pay a lower rate of fare than first-class passengers. See FIRST-CLASS CAR.

Section (of a Sleeping Car). Two double berths, an upper and a lower, making up into two seats facing each other by day.

Sectional Seat Cushion. One with spiral springs separately attached to narrow slats so that the seat can be made up or repaired in sections.

Self-Clearing or Self-Cleaning Car. A car having a floor forming one or more hoppers, with doors at the bottom which, when opened, permit the load to discharge by gravity. Most hopper cars are self-clearing. See also CAR.

Self-Closing Faucet or Cock. A faucet having a horizontal bar handle provided with a spring by which it is closed when released.

Self-Propelled Car. Figs. 183-194. See MOTOR CAR. A car propelled by a motor which is carried entirely by the car itself and does not require power from any outside source.

Sellers System of Screw Threads. A system of screw threads designed by William Sellers of Philadelphia. Often called Franklin Institute or United States Standard Thread. See SCREW THREAD.

Series. A method of connecting two or more pieces of electrical apparatus to a common circuit. The connections are made so that the negative side of one piece of apparatus is connected to the positive of the next and the full current passes successively through each piece of apparatus in the circuit.

Series-Parallel Control. The common method of controlling the speed of direct-current railway motors by connecting them first in series in pairs with external resistance in the circuit. To increase the speed the resistance is cut out by steps, and when entirely cut out the motors are then connected in parallel between the trolley and ground in circuit. The maximum speed is attained when the resistance is entirely cut out and all the motors are receiving full trolley voltage.

Series Parallel Controller. See SERIES PARALLEL CONTROL.

Set (of Elliptic Springs). The amount of compression of which the spring is capable. The distance between the spring bands when unloaded. The arch is half the set, plus the thickness of the spring band.

Sextuple (Elliptic Springs). Six elliptic springs coupled together, side by side, to act as one.

Shackle Bar. A coupling link.

Shade. See LAMP SHADE, WINDOW SHADE.

Shade Cap (Oil Lamp.) A vertical tube extending the shade upward and constituting in effect an extension of the chimney. A similar part for a lamp globe is called a globe chimney.

Shade Roller (Window Shades). Figs. 1973, etc. A device serving the purpose which its name implies; the only forms now in general use are the automatic and hold the shade in any position desired.

Shaft. "That part of a machine to which motion is communicated by torsion."—Webster. See BRAKE SHAFT, WINDING SHAFT, etc.

Shank (of a Coupler). That part of a coupler or drawbar between the draw head and tail. The body of the coupler.

Shear Beams (Snow Plow Framing). The timbers forming the inclined plane and parting ridge of a plow. They are placed in positions so that they resemble the knives of a pair of shears, hence the name.

Shears (of a Pile Driver). The tongs which grasp the HAMMER.

Sheathing. 28, Figs. 287, 288; 6, Figs, 351, 352; 26, Fig. 364; 34, Fig. 404; Figs. 478, 1592. The side and end covering of a car. Tongued and grooved lumber is used on wooden cars and steel plates on all-steel cars. Lining is in addition to the ordinary outside sheathing. See SIDING, FLOORING, ROOFING and LINING, and LUMBER SPECIFICATIONS.

Sheathing Furring. Wooden strips or blocks to which to nail sheathing.

Sheave. A wheel, roller or pulley, over which a cord or rope runs, or on which any object, as a door or window, rolls. Sheave is often used to designate a block or pulley, but more properly it designates simply the grooved wheel in the block. See PULLEY.

Sheave Hook (Derrick Cars). The hook carried at the lower end of a hoisting block, to which the load is attached.

Sheave Pin or Pintle. The axle of a sheave.

Sheet. The plates used in inclosing all types of steel cars are termed sheets, as end sheet, side sheet, roof sheet, floor sheet, etc.

Sheet Iron. Iron rolled into thin sheets.

Shelled Out (Car Wheels). A term applied to wheels which become rough from circular pieces shelling out of the tread. See INTERCHANGE OF TRAFFIC.

Shim. A thin piece of wood or metal used as a lining or filling piece.

Shipper Shaft (Steam Shovel). The shaft connected to the boom engine and geared to the ratchet beam.

Shoe. A plate, block or piece of any material on or against which an object moves, usually to prevent the latter from being worn. See also BRAKE SHOE.

Short Sill or Floor Timber. An auxiliary longitudinal timber sometimes used in a car floor, but not extending its whole length.

Shot (Chilled Car Wheels). See COLD SHOT.

Shovel. See STEAM SHOVEL

Side Bearing Arch or Bridge (Six-Wheel Truck). 62, Fig. 1010. An iron bar, truss or wooden beam attached to the bolsters to support the truck side bearing.

Side-Bearing Clearance, Truck (M. C. B. Recommended Practice.)

In 1914, by letter ballot, side-bearing clearance for new cars was adopted as Recommended Practice, as follows:

	Minimum.	Maximum.
Per Side Bearing	1/8 inch	5/16 inch
Total (one truck)	1/4 inch	5/8 inch

Side Bearing Truck. Figs. 980, 988. A truck in which the weight of the car is transmitted at the sides instead of the center. The term balanced side bearing truck is also used to indicate that the car body is so balanced on the truck that the weight is equally distributed to all the wheels at all times.

Side Bearings. Figs. 1081, 1083, 1084, 1086, etc. Bearings which are attached to the bolsters, body and truck, near their ends to prevent too much rolling or rocking of the car body on the center plate and to allow the truck to turn freely when the weight of the car is not evenly distributed on the center and the body is tilted over. Usually a plate or block of iron or steel is attached to the body bolster and a corresponding plate, block, roller or ball bearing on the truck bolster. The first is called the body side bearing in distinction from the second which is called the truck side bearing.

They are also distinguished as upper and lower side bearings. See ANTI-FRICTION, BALL BEARING, GRAVITY, ROCKER and ROLLER SIDE BEARINGS.

Side Bearings, Spread of (M. C. B. Recommended Practice).

In 1915 the following was adopted:

"That the side bearing spacing, center to center of side bearings, be within the limits of 48 in. to 58 in., both inclusive, on the M. C. B. design of bolster."

Side Brace. 16, Figs. 287, 288, 12 and 13; Fig. 364. Commonly designated as simply BODY BRACE or BRACE, except when the end braces are to be distinguished from them.

Side Brace Rod. See BRACE ROD.

Side Casting. A CHEEK OR DRAFT CASTING.

Side Chute Plank. The planking of an inclined floor which discharges its load transversely to the car, either toward or from the middle of the car.

Side Deck Lamp. A bracket lamp fastened above the windows and to the deck sill, or to the lower deck ceiling and the deck post.

Side Door. 33, Figs. 287, 288; Designated thus to distinguish from end doors on both freight and passenger equipment. See DOOR, and BOX CAR DOOR.

Side Door Bottom Guide. 35, Figs. 287, 288; Fig. 482. An iron bracket attached to the side of freight cars with sliding doors to guide the door while it is being opened and shut and also to prevent its swinging away from the car at the bottom.

Side Door Fixtures. See DOOR FIXTURES, BOX CAR.

Side Door Hanger. See DOOR HANGER.

Side Door Protection Strip. Fig. 477. See PROTECTION STRIP.

Side Door Stiffener. Fig. 477. See STIFFENER.

Side Door Top Track. See DOOR TRACK.

Side Dump Car. Figs. 42-55, 60-69, 314-318, 324, 325, 329, 331-334. A car so constructed that its contents may be discharged to either side or both sides of the track through doors in the car sides, or drop doors in the floor, by means of an inclined floor and side doors, or by tipping the car body sidewise. See also DUMP CAR and HOPPER CAR.

Side Eave. A term sometimes used to designate a steel plate running along the eaves or edge of the roof of a steel passenger equipment car.

Side Fascia. 43, Figs. 287, 288; 11, Fig 364. See FASCIA.

Side Frame. The frame which forms the side of a car body or truck. It includes the posts, braces, plate, belt rail, etc., for the car body and the side member of a truck frame. See TRUCK SIDES, CAST STEEL, SPECIFICATIONS FOR; TRUCK SIDE FRAME.

Side Furring. See FURRING.

Side Lamp. A lamp attached to the side of a passenger car in distinction from a center lamp, which hangs from the roof. They are usually made with brackets, by which they can be conveniently fastened.

Side Lamp Braces. Diagonal bars attached to a side lamp and to the side of a car to steady the lamp.

Side Lamp Holder. A metal ring or bowl-shaped receptacle usually attached to a bracket to hold a lamp.

Side Nailing Strip. 53, Fig. 287, 288. A piece of wood bolted outside the side sills of steel underframe cars to which the ends of the floor planks and the bottom ends of the sheathing are nailed. See NAILING STRIP.

Side Piece (Platform Hood). A thin block cut to the curve of the hood.

Side Plank Tie Rod. A vertical rod passing through the side sill and side planking of a wooden gondola car and tying them together.

Side Plate. 25, Figs. 287, 288; 15, Fig. 364; 41, Fig. 404. More properly, simply plate. The longitudinal member connecting the tops of the side posts of the car body. So called as distinguished from the end plate.

Side Plate Stiffening Angle (Steel Cars). An angle iron riveted to the side plate, and serving the same purpose as the stakes. Often called stake.

Side Plate Tie Rod. A rod extending across the top of the car and tying the side plates together.

Side Post. 20, Figs. 287, 288; Fig. 274; 13, Figs. 351, 352; 19, 20, Fig. 404; Fig. 475. Vertical member used in the side framing of freight and passenger cars.

Side Post Strap Bolt. A strap bolt joining the post to the side sill.

Side Rail. A longitudinal timber extending along the top of the side frame of a coal or ore car. It rests upon posts and braces and connects with end rails, which go across the end of the car. It corresponds to the plate of a box car, but does not carry any rafters or carlines, as does a plate.

Side Seat. A longitudinal car seat, the back of which is against the side of a car.

Side Sheet. 20, Fig. 291; 4, Fig. 314. A plate used in closing in the sides of a steel car.

Side Sill. 1, Figs. 287, 288; 2, Fig. 314; 2, Fig. 335; 3, Fig. 340; 2, Fig. 351, 352; 4, Fig. 364; 5, Fig. 404. The outside longitudinal members of the underframe. In some designs of steel cars the side sills are done away with entirely and the entire side of the car is designed as a deep plate girder to carry most of the load to the bolster.

Side Sill Flitch Plank. One of the planks which enclose the flitch plate and make up a composite or built-up side sill.

Side Sill Step. See SIDE SILL STEP and SAFETY APPLIANCES.

Side Slope. That part of the floor which slopes from the side of a hopper to the hopper door. See HOPPER SLOPE SHEET.

Side Stake. 21, Fig. 291. See STAKE.

Side Stake Pocket. See STAKE POCKET.

Side Stem. Figs. 547, 551; 54, Figs. 552-555. A bar attached to the side of a three-stem coupler to transmit part of the force to springs separate from the regular draft springs. See THREE-STEM EQUIPMENT.

Side Straps (Gondola Cars). The straps to which the end planks and sometimes also the side planks, are bolted. They are also called side plank tie straps.

Side Strut for Hopper Floor (Hopper Cars). An inclined strut or support for the hopper floor between the bolster and the end of the car, fastened to the corner of the end sill.

Siding. A side track. See below and also SHEATHING and LUMBER SPECIFICATIONS.

Siding, Flooring, Roofing and Lining (M. C. B. Standard). Fig. 2904.

In 1901 the following specifications were adopted as standard:

Flooring.

Flooring shall be of three kinds: Square-edged, dressed all over; ship-lapped, dressed all over; or

tongued and grooved, dressed all over, in accordance with section shown on the drawing.

In 1908 the dimensions of dressed flooring were increased ¼ inch.

In 1908 a drawing was added showing details of flooring 2⅜ inches thick for use on cars for rough freight.

In 1909 drawing was revised to show flooring of 2⅜-inch finished section.

In 1912 the drawing was revised to show the under shoulder on the tongue edge set back 1-32 inch.

Siding, Roofing and Lining.

Siding, roofing and lining shall be of the section shown on the drawing.

In 1908 drawing was revised to show separate sections for roofing and lining.

In 1912 the drawing was revised to show the under shoulder on the tongue edge set back 1-32 inch.

Signal. See Back-Up Air Signal, and Train Air Signal Apparatus.

Signal Branch Pipe. A pipe leading from the train air signal pipe to the car discharge valve.

Signal Cord. Fig. 2010. Where the train air signal system is used a separate signal cord is used in each car and is attached to the car discharge valve; a pull on the cord releases the air in the signal pipe and blows the signal in the cab.

Signal Cord Bushing. Fig. 2004. A thimble lining a hole through a partition for a signal cord to pass through, in distinction from a signal cord guide, which is attached to the side or roof of the car or to the signal cord hanger and serves solely the purpose which its name implies. For passing the signal cord through inclined surfaces beveled bushings are used, which are frequently provided with one or more pulleys to avoid friction.

Signal Cord Coupling. Fig. 2009. The hook attached to the end of a signal cord to enable it to be connected or disconnected at pleasure with another signal cord.

Signal Cord End Hook. A common metal hook with a screw shank by which it is attached to the end of the car. The hook is used to fasten the end of a bell cord to the last car and thus hold it in its place and prevent it from being drawn out of its guides.

Signal Cord Guide. Figs. 2005-2008. A metal eye or ring attached to the roof or ceiling of a car, or to the end of a Signal Cord Hanger, and by which a signal cord is carried or conducted.

Signal Cord Hanger. Fig. 2003. A guide for the signal cord, hanging usually from the center of the clere story or upper deck.

Signal Cord Pulley or Sheave. Figs. 2005, 2006. A wheel in a signal cord guide over which a signal cord runs.

Signal Cord Sheave. A Signal Cord Pulley.

Signal Cord Splice. A metal coupling with right and left hand screws for permanently splicing the ends of a broken cord.

Signal Cord Strap. See Signal Cord Hanger.

Signal Cord Thimble. See Signal Cord Bushing.

Signal Hose. An air hose similar to, but of smaller diameter than, an air brake hose, and used between cars to connect the train air signal lines.

Signal Lamp. See Tail Lamp.

Signal Lamp Bracket. Figs. 2044, etc. A bracket attached to the car body to hold the signal lamp or marker.

Signal Lamp Socket (M. C. B. Standard). Fig. 2906. In 1903 a form of combination lamp holder and flag bracket was adopted as Recommended Practice. In 1911 the dimensions showing the slot and taper of the socket were advanced to standard and the bracket omitted.

Signal Pipe (Train Air Signal Apparatus). A continuous pipe running from car to car through the train, substantially a duplicate of the brake pipe, but working with a lower pressure of air. The signal pipe couplings are also similar to brake pipe hose couplings, but are arranged so that they will not couple with the latter.

Signal Pipe Cut-out Cock (Train Air Signal Apparatus). A cock placed at each end of every car for closing the signal pipe when desired.

Signal Pipe Strainer. Strainer used in signal pipe.

Signal Reducing Valve. (Train Air Signal). Fig. 1429.

Signal Reservoir (Train Air Signal Apparatus). See Whistle Reservoir.

Signal Valve (Train Air Signal Apparatus). Figs. 1427, 1466. A valve attached to a branch from the signal pipe, which, on the opening of the car discharge valve in any car, and the consequent reduction of pressure in the signal pipe, permits the air to escape to blow the signal whistle. On motor cars this valve and whistle are placed in the cab at each end of the car.

Signal Whistle (Train Air Signal Apparatus). Fig. 1432. See Whistle.

Sill (Car Building). The main longitudinal timbers which are connected transversely by the end sills, body bolsters, and cross ties. Sills are divided into side sills, intermediate sills and center sills. For the splice for broken sills required by the regulations for the interchange of cars see Interchange of Traffic. See also End Sill, Platform End Sill, Side Sill, etc.

The lower horizontal member of the frame surrounding a window or door. See Door Sill, Window Sill.

See Lumber Specifications.

Sill Knee Iron. An L-shaped or right-angled iron casting or forging bolted into the inside corner of a car frame to strengthen it.

Sill and Plate Rod Washer. A large rectangular washer for the ends of the sill and plate tie rod.

Sill and Plate Tie Rod. 19, Figs. 287, 288; 14, Fig. 364. A vertical iron rod which passes through the sill and plate of a car body frame and ties the two together. A Brace Straining Rod is a similar part for low passenger car trusses below the windows.

Sill Splice. See Interchange of Traffic.

Sill Splicing (M. C. B. Standard). Fig. 2879.

Steel Center Sills.—At the convention of 1905 the following methods for splicing of center sills on steel cars and cars constructed with steel underframes were adopted as Recommended Practice. In 1911 these splices were advanced to Standard.

The splice for center sills, except as otherwise herein stated, to be located not less than 7 inches from either side of the body bolster, consisting of butt joints. The butt joints to be reinforced by plates on both sides to be not less than twice the length of the protruding end, but not exceeding 24 inches, and not less than same thickness of web plate, with the one on the flange side of channel to include flanges, while the outside plate should only cover the web. The rivets to be spaced as shown on Figs. "A" and "B" of the drawing.

Fig. "A" shows the method of splicing center sills

in front of body bolster, and Fig. "B" shows methods of splicing center sills back of body bolster.

Fig. "C" shows method of splicing in cases where cars are damaged to such extent that the center sills have to be cut off less than 8 inches from the front side of the body bolster; this method is not recommended for sills with protruding end less than 3 inches. The outside plate in this splice may be made of pressed steel or a casting. The rivets to be spaced as shown on sketch.

Fig. "D" shows the method of splicing side sills; this splice may be located on either side of the body bolster. The rivets to be spaced as shown on sketch.

In 1909 the illustrations were revised by the addition of end sills to drawing. Advanced to Standard in 1911.

In 1912 the text of standards was changed to show the limit of length of projection for splicing as 7 inches.

WOODEN SILLS.—In 1909 the form of splice shown on the drawing for the splicing of center sills of freight cars was adopted. Five-eighths inch diameter for bolts and 11-16 inch for bolt holes were adopetd as Recommended Practice for assembling sill splices for freight cars.

The butt or step splice, without side plank, was adopted for the splicing of all freight-car sills other than center sills.

In 1911 all reference to draft sills was omitted on account of being construed in some quarters to mean draft timbers, and the illustrations advanced to Standard.

Sill Step (Freight Cars). 15, Figs. 287, 288; 24, Fig. 291. A U-shaped iron attached to the sill of a car as a step for trainmen. See SAFETY APPLIANCES.

Sill Strap Bolt. A strap bolt used to fasten the side and end sills together. When set into the sill it is called a joint bolt.

Sill Tie Rod. A transverse iron tie rod in the floor of a car for holding the sills together.

Sill Timber Key. A metal block let into a gained seat on the sills to relieve the sill bolts from shearing stresses.

Sills, Uniformity for Section of (M. C. B. Standard). In 1899 the following finished sizes for sections of longitudinal car sills were adopted as standard of the Association:

For cars such as box, stock, flat, long gondolas, refrigerators, etc., 32 feet and over in length, but under 40 feet:

4 "x8"	4 "x9"	4 "x10"	4½"x12"	5"x14"
4½"x8"	4½"x9"	4½"x10"	5 "x12"	
5 "x8"	5 "x9"	5 "x10"		

For cars 40 feet long and over such as furniture and special long gondolas:

4½"x8"	4½"x9"	5"x10"	6"x12"	6"x14"
5 "x8"	5 "x9"	6"x10"		
	6 "x9"			

It is believed that the above recommendations afford a sufficient range of sizes to cover all requirements of design; they are good merchantable sizes, and if used as suggested car repairs will be greatly expedited, as there will be less delay in getting special sizes of lumber, and requisitions for regular sizes can be filled more promptly, as lumbermen can saw in advance of orders with a reasonable certainty of selling their stock.

Single Plate Wheel. A wheel, in which the hub and rim are united by only a single plate, which is strengthened usually by ribs, called brackets, or sometimes by corrugations. See WHEEL.

Single Track Snow Plow. Fig. 215. A snow plow for use on single track railroads and so constructed that it throws the snow to both sides of the track.

Sink (Dining Car). A shallow metallic box to receive and carry off dirty water. See Fig. 1728 for sink plug.

Six-Wheel Truck. Figs. 981-983, 1008-1020. See TRUCK.

Skid Shoe. Fig. 2785. An iron shoe used to slide broken car wheels to a side track in order to avoid blocking the road.

Slack Adjuster. Figs. 1346, 1347, 1508-1513, etc. A device for automatically taking up the slack in the foundation brake gear when normal piston travel is exceeded.

Slat. A narrow strip of board or metal.

Slat Seat. A seat composed of narrow strips of wood.

Sleeping Car. Figs. 170, 171, 174-178, 236, 244, 404-407, 409-411, 413. A car provided with fixed seats, arranged to face each other, which can be used for day travel and at night can be made up into berths. A pair of seats, which makes a lower berth, and its corresponding upper berth, together make up a section. The mattress and bedding are carried in a pocket under the deck, the bottom of the pocket being hinged to lower and form the upper berth, while the seat cushions and backs are arranged on the seat frame to form the lower berth. See Figs. 1458, 1459.

Most of the sleeping cars in the United States are owned and operated by the Pullman Company and hence are often referred to simply as Pullman cars. The Pullman sleeping cars are commonly referred to either as standard or tourist cars.

EMIGRANT SLEEPING CARS, COLONIST CARS and TOURIST SLEEPING CARS resemble standard sleeping cars, but are without such expensive upholstery. Compartment sleeping cars are divided into compartments, generally with one upper and one lower berth in each. A corridor runs along the side of the car. See also CAR.

Sleeping Car Seat. Figs. 1600, 1601.

Sleeping Car Section. Figs. 1600, 1601. The space in a sleeping car occupied by two double seats in daytime and by two berths (a lower berth and its corresponding upper berth) at night.

Slewing Gear (Pile Driver). The means for causing the swinging platform to revolve.

Slewing Rings (of a Derrick). Rings attached to the upper end of the boom for attaching a rope by which to move or steady it when loaded.

Slide Valve (Triple Valve). 3, Fig. 1360. A plain side valve, controlled in its motion by the piston, by means of which the air is admitted to, and exhausted from, the brake cylinder, applying and releasing the brake.

Slide Valve Feed Valve. See FEED VALVE.

Slide Valve Spring (Triple Valve). 6, Fig. 1360.

Slideover Seat. Figs. 1675, etc.

Sliding Chair. Figs. 1298, 1336. A casting attached to a brake beam which slides on an inclined member in such a way as to secure a proper adjustment of the brake shoe as it wears.

Sliding Door. A door which opens by sliding sideways instead of swinging on hinges. Such doors are almost universally used on freight cars; also on bag-

gage, express and postal cars, subway trains and tunnel cars. They are hung by hooks called the door hangers, which slide on a top door track. See also CAR DOOR HANGER.

Sliding Door Bracket. A DOOR BRACKET.

Sliding Door Curtain. Fig. 587. A curtain which automatically rolls up when a sliding door is opened. Used to darken the motorman's cab on electric cars.

Sliding Door Friction Roller. A small wheel attached to the top or bottom of a sliding door to make it run easily. It may or may not carry the weight of the door.

Slip Case (Postal Car). Fig. 1864. A small pigeon hole case for use on a postal car.

Sloped Floor Sheet. See HOPPER SLOPE SHEET.

Smoke Bell. A cover or screen of glass, porcelain or metal, shaped somewhat like a bell, and placed over a lamp to protect the ceiling of a car or room. Large smoke bells are often called canopies.

Smoke Bell Bracket. A separate carrier for a smoke bell.

Smoke Bell Stem. A tube attached to the upper part of a smoke bell and serving to carry away the gases so as to bring the smoke bell lower and nearer to the lamp.

Smoke Flue. A smoke pipe.

Smoke Jack. 20, Fig. 364. A term commonly applied to the outside portion of a smoke flue when used on caboose and work cars.

Smoke Pipe (Heaters). The pipe by which the smoke is conducted to the outside of the car, usually called stove pipe, but the stove pipe of heaters is called a smoke pipe or smoke flue, to distinguish it from the air pipes.

Smoke Pipe Cap. A covering on top of the smoke pipe to exclude rain and wind. Also called jack.

Smoke Pipe Casing (Heaters). An outside pipe which incloses a smoke pipe, leaving a space between the two through which air is admitted from the top and is thus warmed.

Smoke Screen (Baker Heaters). A conical-shaped box, the front of which is the feed door and the bottom of which is the hole through which the coal enters the fire pot, and which is covered by the safety plate.

Smoke Top (Baker Heaters). The upper part of the heater, made of Russia iron, in a conical form.

Smoking Car. A passenger car reserved for smokers Combination cars frequently have a smoking compartment. See CAR.

Smoking Room (Sleeping Cars). A compartment now almost universal in modern sleeping cars and parlor cars.

Snatch Block. Properly a single block which has an opening (notch) in one cheek to receive the rope. The snatch block is usually provided with a swivel hook. The term is also popularly applied to any form of single block provided with a hook, although more properly it applies to only one with an opening at the side for readily inserting or removing the rope.

Snow Flanger. Fig 212. See FLANGER.

Snow Plow. Figs. 215-218. A car so constructed that it will remove snow from railroad tracks. Snow plows are generally of either the wedge or rotary types. What is frequently called a wedge plow has a wedge-shaped front end, and is pushed through the snow by a locomotive. A wing-elevator snow plow has large wings which may be swung out by means of compressed air. Such a plow clears a wider space than one without the wing-elevator, and the sloped surfaces on the wings throw the snow well clear of the track. Snow plows are usually equipped with FLANGERS. See DOUBLE TRACK SNOW PLOW, SINGLE TRACK SNOW PLOW.

A rotary snow plow has at the front end a wheel, set at right angles to the track, and furnished with blades. This wheel is driven through a horizontal shaft by a steam engine located on the car and when the whole machine is pushed forward by a locomotive the blades cut the snow from before the plow and discharge it through a chute to one side of the track.

Snow Scraper. A Flanger.

Soap. See LIQUID SOAP FIXTURE.

Soap Dish. Figs. 1736, 1738.

Soap Holder. A soap dish attached to a partition like a bracket. See SOAP DISH and LIQUID SOAP FIXTURE.

Socket, Signal Lamp. See SIGNAL LAMP SOCKET.

Socket Washer. A large washer with a cavity to receive the head or nut of a bolt or rod so that it will not project beyond the surface of the wood to which it is attached. Also called cup washer.

Sofa (Sleeping Cars). A longitudinal seat which makes up as a berth by pulling out sidewise so as to drop the back. Now used only in staterooms.

Sofa Arm Rest Bolt. Figs. 1635, 1636.

Sofa Arm Rest Fixtures. Fig. 1638, etc.

Sofa Back Leg Socket. Fig. 1643.

Sofa Back Pivot Hinge and Bushing. Fig. 1640.

Sofa Bolt (Sleeping Cars). Fig. 1637. A sliding bolt used for holding a sofa in its place. It is operated from the front by a sofa pull working through a sofa crank. Sofas standing against the side of the cars are now little used.

Sofa Caster. Fig. 1633. See CASTER.

Sofa Hinge. A hinge by which the seat and back of a sofa are fastened together so that they can be changed from a sofa to a bed.

Sofa Rail End and Socket. Fig. 1642.

Solenoid. A coil of insulated copper wire wound on a spool which, when the electric current flows through it, may draw or attract an iron rod, core or plunger into its interior. A modified form of electro magnet. Used as a means for operating regulators, switches and other electrical apparatus.

Solid Bottom Gondola Car. Figs. 57, etc. A gondola car without openings in the floor or bottom for discharging the load. See also CAR.

Spanner. A wrench for uncoupling hose, etc., formed like the arc of a circle, with notches or lugs for engaging in dogs or grooves on a spanner nut. An ordinary wrench is termed a spanner in Great Britain.

Spark Strip. A filling strip placed between a box car side door and the car to prevent the entrance of sparks or cinders.

Specification for Cast Steel Truck Sides. See TRUCK SIDES, CAST STEEL, SPECIFICATIONS FOR.

Specifications for Tank Cars. See TANK CARS, SPECIFICATIONS FOR.

Specifications for Wheels. See WHEELS, SPECIFICATIONS FOR.

Speed Recorder Figs. 2079, etc. A device, usually driven from an anxle, which records the speed of

a train. Its use is confined practically to official cars, dynamometer cars and locomotives.

Spiral Elliptic Sea Spring. A spring made of a thin band of steel wound in a spiral coil, the transverse section of which is elliptic.

Spiral Seat Spring. The common form of SEAT SPRING.

Spiral Spring. See HELICAL SPRING.

Spiral Spring Cap. A casting or plate which forms a bearing for the top of a spiral spring, and which also holds it in its place. A similar seat is used at the other end.

Spittoon. See CUSPIDOR.

Splice Plate. Fig. 480. A plate used to fasten the ends of two members of a frame together, so that they make a continuous member.

Splicing Sills. See SILL SPLICING.

Split Key. A form of pin which is self-fastening, consisting essentially of two parallel strips or bars of metal, which, when united, constitute one pin, but the ends of which may be forced apart to prevent the pin being withdrawn.

Spoke. "One of the radial arms which connect the hub with the rim of a wheel."—Knight.

Spoke Wheel. A wheel, the rim or tire of which is connected with the hub by spokes instead of one or more plates. See WHEEL.

Spool (of Hoisting Gear). The drums on which the hoisting rope or chain is wound.

Spreader. See BALLAST PLOW.

Spring. Figs. 718, 1169, 1170, 1172, etc. Elliptic springs, Figs. 1172, etc. An elastic body to resist concussion. Springs are also used to produce motion in a reverse direction to that caused by some other applied force, as a brake spring and the spring of a door latch. The leading forms of springs are ELLIPTIC SPRINGS and SPIRAL or HELICAL SPRINGS. Spiral springs are designated according to the number combined one within the other, as double coil, triple coil, etc., or if the springs are placed side by side, as two group, four group, six group, etc.; elliptic springs, according to the number united to work together as one spring, are designated as double or duplicate, triple or triplicate, quadruple, quintuple and sextuple. The main springs about a car are nearly all spiral springs, except that elliptic springs are almost exclusively used for the bolster springs of passenger cars.

The principal springs of a car supporting its weight are the bolster springs, also called bearing springs or body springs. Equalizing bar or equalizer springs are used in addition on passenger cars, as also sometimes journal springs. Side journal springs are used on street cars, and are sometimes key-shaped or spool-shaped. See also DRAFT SPRINGS.

See SPRING DAMPENER.

Spring Band (Elliptic Springs). A wrought iron strap which embraces the plates at the center.

Spring Bed Sections. Fig. 1644.

Spring Block. See EQUALIZER SPRING BLOCK.

Spring Buffer. See BUFFER.

Spring Cap. X, Fig. 965, 72 and 75, Figs. 989, 1010. A cup-shaped piece of cast or wrought iron for holding the top of a spring and against which the latter bears. They are further distinguished by the name of the spring, as bolster spring cap, etc. The spring seat comes below the spring, but both these parts are very commonly called spring plates, especially in large group springs.

Spring Caps for Freight Car Trucks. See SPRINGS and SPRING CAPS FOR FREIGHT CAR TRUCKS.

Spring Controller. A telescopic band which guides or keeps coil springs in proper position.

Spring Dampener. Figs. 1178, 1181. A device to increase the capacity of a spring by bringing into play a certain amount of friction which helps to absorb the load or shock, the friction increasing at a greater rate than the load as the latter increases. Some spring dampeners are intended to retard the sharp vibration of a coil spring and make its motion more like that of an elliptic spring. See also FRICTION DRAFT SPRING.

Spring Door Latch. A latch, the bolt of which is thrown into contact with a catch by a spring, and is disengaged by a knob or handle. Such latches are not arranged so as to be fastened with a key. See LATCH.

Spring Door Lock. A lock ususally called a night latch.

Spring Edge (Car Upholstery). A term applied to a method of upholstery which protects the frame work entirely by springs, so that it is not felt by the occupant of the seat.

Spring Hanger. See SWING HANGER.

Spring Hinge. A hinge fitted with a spring to make the door self closing. A double acting spring hinge (Fig. 1830) is one which will permit the door to open either way and also to make it self-closing.

Spring Plank. G, Fig. 965. 43, Figs. 991, 1010; Fig. 1135, 1141. A transverse member underneath a truck bolster and on which the bolster springs rest. Also called sand plank. A SPRING PLANK SAFETY HANGER passes under the spring plank. A swing spring plank is used in passenger and other SWING MOTION TRUCKS. In rigid bolster trucks the spring plank is bolted to the lower arch bar of the truck frame.

Spring Plank Bearing. 44, Figs. 991, 1010. A casting on which a spring plank rests.

Spring Plank Bolt. A horizontal bolt connecting the spring plank and truck columns. Rivets are also used.

Spring Plank Safety Hanger (Passenger Equipment Trucks). 45, Figs. 991, 1010. A U-shaped strap of iron attached to the transoms, and passing under the spring plank, so as to hold it up in case the swing hangers or their attachments should break.

Spring Plate. A spring seat or cap.

Spring Pocket or **Strap Drawbar** A drawbar with a rectangular strap or "pocket" at the back end, in which the draft spring is placed.

Spring Seat. 73 and 74, Figs. 989, 991, 1010. A cup-shaped piece of cast or wrought iron, on which the bottom of a spring rests. See SPRING PLATE. They are further distinguished by the name of the spring for which they serve, as bolster spring seat, equalizer spring seat, etc.

Springs and Spring Caps for Freight-Car Trucks (M. C. B. Standard). Figs. 2901, etc.

In 1898 detail designs of spring coils and caps suitable therefore were adopted as Recommended Practice.

In 1901 a committee presented revised drawings with full details and specifications. They were submitted to letter ballot and adopted as Recommended Practice.

In 1901 designs with full details and specifications for springs for 100,000-pound capacity cars were presented, and as a result of letter ballot were adopted as Recommended Practice.

In 1912 the form of spring caps was changed.

In 1914 by letter ballot design of springs for cars of 140,000 lbs. capacity were adopted.

In 1915 these items were advanced to standard.

Springs, Helical, Specifications for. (M. C. B. Recommended Practice.)

In 1914 by letter ballot specifications for helical springs for passenger and freight equipment cars were adopted, as follows:

1. *Process.*—The steel shall be made by the open-hearth, electric or crucible process.

2. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

	Bars 1 in. and under	Over 1 in.
Carbon	0.90—1.10 per cent.	0.95—1.15 per cent.
Manganese, not over	0.50 "	0.50 "
Phosphorus, not over	0.05 "	0.05 "
Sulphur, not over	0.05 "	0.05 "

3. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, to determine the percentage of carbon, manganese, phosphorus, sulphur and silicon. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 2.

4. *Check Analysis.*—A check analysis shall be made by the purchaser or his representative from the finished material representing each lot as specified in Section 5, and shall meet the requirements specified in Section 2.

5. *Number of Chemical Tests.*—One sample from each 500 springs or less shall be taken. If the springs are small, the entire spring shall be taken; if large, a section weighing ½ lb. shall be cut from any part of the spring. The sample shall be stamped as soon as chosen with the inspector's stamp. If the sample for chemical analysis is cut off hot, it shall be cooled in such a way as not to harden it.

6. *Tests.*—(*a*) *Free Height.*—Place each spring on a flat plate, and measure the distance between the plate and the other end of the spring. This measurement is the free height.

(*b*) *Solid Height.*—Place the measured springs, either singly or in lots, in the testing machine and apply a load at least 25 per cent greater than the capacity of the springs, then measure the distance between the two plates of the machine. This is the solid height.

(*c*) *Set.*—Remove the load and again measure the free height at the same point in the circumference at which the first free height was taken. If now the second free height is less than the first by more than 1/32 in., the spring or springs will be regarded as having taken permanent set and will be excluded from further consideration.

(*d*) *Working Height.*—Apply the specified working load and measure the height.

7. *Number of Tests.*—Unless otherwise specified, 10 per cent of all springs will be subjected to the above tests.

8. *Compression Tests.*—All springs shall be compressed solid at least six times before submitting them for inspection and tests.

9. *Preparation for Tests.*—Unless otherwise specified, all springs shall be tested after being assembled.

10. *Dimensions.*—All springs shall not vary more than ⅛ in. from specified height or 1/16 in. from specified diameter.

11. *Weight.*—Ten per cent of the springs shall be weighed, and if any springs are found that weigh less than the specified minimum, the whole lot shall be weighed and all springs that weigh less than the minimum shall be excluded.

12. *Finish.*—The bars shall be free from injurious defects and shall be rolled within 0.01 in. of the specified diameter.

13. *Marking.*—The springs shall be marked as specified by the purchaser.

14. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

15. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, develops imperfections or does not come within the permissible variations given in Sections 10 and 11, will be rejected and shall be replaced by the manufacturer at his own expense.

16. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Sprocket. A toothed wheel.

Spud. Fig. 1739. A bushing or coupling by which the hole of a sink or water cooler drip is connected with the drain or drain pipe.

Spur Wheel. A toothed wheel.

Square Door Bolt. Fig. 1660. A door bolt made of a square and straight bar of metal. When the bolt has an offset it is termed a square neck door bolt.

Stake. 21, Fig. 291; 7, Fig. 314. A piece of timber inserted in a pocket on the sides and ends of flat cars to hold the load in place. The sides of wooden gondola cars are sometimes held in a similar manner. The side stiffening pieces on steel hopper and gondola cars are frequently called stakes.

Stake Pocket (Gondola and Flat Cars). 10, Fig. 335; Figs. 958, 959. A metal receptacle or collar, attached to the side and end sills to receive the end of a stake which supports the side or confines the load. Also used near the top of gondola cars to receive the stakes used in applying a coke rack or other appliance for increasing the depth of the car.

Stake Pocket Strap or **U-Bolt.** A U-shaped bolt which sometimes serves as a substitute for the ordinary form of stake pocket, when the stakes are intended as permanent attachments.

Stake Pockets, Permanent (M. C. B. Recommended Practice). In 1905, as a result of letter ballot, the following Recommended Practice was adopted regarding Permanent Stake Pockets:

1. That the method of securing permanent stake pockets to cars of wooden construction be by U bolts.

2. That the method of securing permanent stake pockets to cars of steel construction be by rivets or U bolts.

3. That malleable iron be used in the manufacture of permanent stake pockets.

4. That stakes should be located to suit the construction of the car or the requirements of the service, but should not be placed farther apart than 4 feet from center to center.

Stake Pockets, Temporary (M. C. B. Recommended Practice). In 1905, as a result of the letter ballot, the following dimensions were adopted as Recommended Practice for Temporary Stake Pockets:

For flat cars and gondola cars with sides less than 30 inches high, 4 inches wide by 5 inches deep.

For gondola cars with sides 30 inches and over, 4 inches wide by 4 inches deep.

Stake Pockets, Temporary, Longitudinal Spacing of (M. C. B. Recommended Practice). Fig. 2908. In 1906 a plan for longitudinal spacing of temporary stake pockets for gondola cars was adopted as Recommended Practice.

Stanchion. A prop or support.

A metal post or hanger with an eye in one end, which holds a rod or other object, as a hand rail or curtain rod. The opposite end is usually fastened by a nut, or with a flange or lugs, which form a part of the stanchion.

Movable stanchions are required in postal cars. See Fig. 1864.

Standard Gage. The most common distance between the rails of railroads, which is throughout the world 4 ft. 8½ in. See GAGE. This gage originated from the use of an even 5 ft. gage, with outside flanges. As inside flanges came to be preferred, and had to run on the same rails (then with much narrower heads than now), the present standard was of necessity used.

Staple. A U-shaped piece of metal which is pointed at the ends, to be driven into wood to hold a hasp, hook, pin, etc. The term is also applied to the keeper, which is screwed or bolted to the door frame, and which holds the door hasp.

Starting Valve. A valve on the locomotive to admit steam to the train line for heating purposes.

Stateroom. A compartment in sleeping and private cars sometimes containing a stationary bed and in other designs the usual berths.

Stateroom Sleeping Car. A sleeping car having one or more separate compartments or state-rooms in addition to the standard sections or berths in the main part of the car. A drawing-room sleeping car has one or more separate compartments which are larger than a stateroom.

Stay. A beam, bar, rod, etc., by which two or more objects are connected to prevent lateral deviations of one or both of them.

Stay Rod. A rod which acts as a stay.

Steam and Air Equipment for Passenger Equipment Cars (M. C. B. Standard). In 1912 the following items were transferred to standard:

Two-inch train line.

End valves with not less than 1½-inch openings.

Steam and Air Connections for Passenger Equipment Cars (M. C. B. Recommended Practice). Figs. 2913, 2936. In 1903 the following specifications for steam and air line connections were adopted as Recommended Practice.

Steam hose, 1⅝-inch inside diameter and of such length as to provide 31 inches from face of coupling gasket to end of hose nipple; 1½-inch steam hose couplings of dimensions to agree with those shown, with gaskets having 1½-inch diameter opening, gaskets to be so constructed that the normal diameter of opening will always be maintained; couplings not provided with gravity traps; inlet valves to have reduced openings which should be as small as possible and maintain the volume of steam required by the radiating pipes for the severest weather conditions.

That the steam heat, air-brake and air-signal connections be located as shown on the drawing.

That the air-brake and air-signal hose should be 1 inch in diameter and 22 inches long.

In 1911 the above dimensions were changed to read: Air-brake hose must be 1⅜ inches inside diameter and 22 inches long, and the air-signal hose must be 1 inch inside diameter and 22 inches long.

In 1911 the angle cock was changed to show 30 degrees from the vertical.

In 1911 the steam and air connections were erroneously shown as standard. In 1912 they were changed to Recommended Practice.

Steam Car. A term used to designate ordinary railroad cars when it is desired to distinguish them from electric cars.

A self-propelled car using steam as its motive power.

Steam Coupler. See STEAM HOSE COUPLER.

Steam Crane. Figs. 203, etc. A crane operated by steam engines. Also frequently provided with gears for propelling itself by means of the same engines that operate the hoisting apparatus.

Steam Drum (Car Heating Apparatus). Figs. 2189, etc. A part of the indirect steam heating system, being the covered coil or nest of tubes in which the circulating water is heated by the steam surrounding the pipes. Also called jacket.

Steam Gage (Steam Heating). A dial or gage for recording the pressure of steam in the steam pipes on a car or locomotive.

Steam Hose. Figs. 2075. See STEAM HOSE COUPLER.

Steam Hose Clamp Lock. Fig. 2195. Used on the coupler connecting the steam hose between the cars.

Steam Hose Coupler. Figs. 2132, 2194, etc. Couplers for connecting steam hose between passenger train cars. See Fig. 2005 for a clamp lock for steam couplers.

Steam Hose Couplings. (M. C. B. Recommended Practice.) Figs. 2913 and 2936.

In 1913 the following specifications for steam hose couplings were adopted as Recommended Practice:

1. Coupling contour to be such that coupling will interchange with the coupler as shown on Fig. 3 on the drawing.

2. Coupler must have a locking attachment which will securely lock the two couplers together without depending on the hose in any way.

3. The angle of the nipple to a line perpendicular to the coupling face of the coupling should not be less than 20 degrees.

4. The coupler should be of the two-piece type, having the nipple separate and screwed into the coupler head with 1½-inch pipe thread. The nipple shall be of the type having a shoulder to engage clamp-nipple shown on Fig. 4.

5. The clamp shall be of the two-piece type, as shown on Fig. 5.

6. The minimum diameter of hose through gasket to be 1 7/16 inches.

7. Gaskets shall be flat face, securely held in place

in coupler head, but so designed that they can be removed and replaced without removing hose or coupler head from car.

Iu 1913 it was adopted as Recommended Practice that no pipe having an internal diameter less than that of 1-inch standard weight be used on passenger cars, and that on all new equipment 1¼-inch extra-heavy pipe be used.

In 1913 the position of bolting lugs on hose clamps at nipple and coupling ends, as shown on the drawing, was adopted as Recommended Practice.

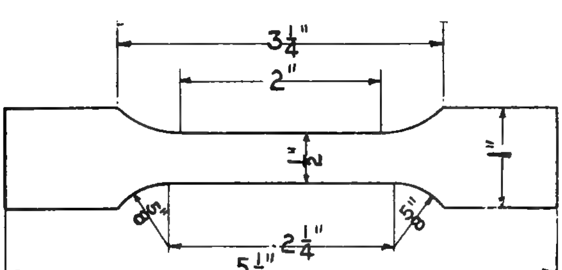
Steam Hose, Specifications for. (M. C. B. Recommended Practice.)

In 1913 the following specifications for steam hose for passenger equipment cars were adopted as Recommended Practice:

Steam-heat hose must be composed of a tube of rubber, wrapped with five-ply cotton fabric and the whole covered with rubber.

The railway company's inspector will select for test one piece at random from each lot of 201 pieces. When this hose is received at the test laboratory, a section 2½ inches long will be cut from one end in order to determine the friction, tensile strength and elongation. The remaining portion will then be subjected to steam heat in the digester. After this section has been heated another section 2½ inches long will be cut from it and used to ascertain the friction, tensile strength and elongation, in order to show the change in these characteristics due to the action of heat.

Friction Test Before Steaming.—A section 1 inch long will be cut from the hose and supported in such a manner that it will turn freely on its axis. A twenty-pound weight will be suspended from the separated end of the fabric. The latter must unwind uniformly, if at all, and not faster than 6 inches in ten minutes.



TEST SPECIMEN.

Tensile Test After Steaming.—A strip cut from the tube with a die or other suitable means to the dimensions shown in the above illustration will be marked at points 2 inches apart, and the width and thickness will be accurately measured. It will then be slowly stretched in a suitable tensile-testing machine until it breaks. The ultimate tensile strength must not be less than 600 pounds per square inch, and the elongation of the 2-inch section at the time of fracture must not be less than 6 inches.

Friction Test After Steaming.—A section 1 inch long will be supported in such a manner that it will turn freely on its axis. A fifteen-pound weight will be suspended from the separated end of the fabric. The latter must unwind uniformly, if at all, and not faster than 6 inches in ten minutes.

Tensile Test Before Steaming.—A strip cut from the tube with a die or other suitable means to the dimensions shown in the illustration will be marked at points 2 inches apart, and the width and thickness will be accurately measured. It will then be slowly stretched in a suitable tensile-testing machine until it breaks. The ultimate tensile strength must not be less than 450 pounds per square inch and the elongation of the 2-inch section at the time of the fracture must not be more than 8 inches or less than 4 inches.

Digester Test.—The digester shall consist of a cylinder containing dry saturated steam at a pressure of 45 lb. per sq. in. The hose shall be put into this digester and will remain there for 48 hours continuously. An examination of this section, after being submitted to the heat of the steam, should not disclose any blistering of the inner tube or any loosening of the tube from the fabric. Examination and test after heating, prescribed in the specifications, will be made as soon as possible after the specimen has cooled for (24) hours. The tests will be made at a temperature of not less than 60 degrees Fahrenheit.

SIZE AND DIMENSIONS.

	Maximum Inches	Minimum Inches
Length	24¼	23¾
Inner diameter	....	....
Outer diameter	....	....
Thickness of tube	....	⅛
Thickness of cover	....	1/16

Tube.—The tube should be composed of at least two calendars of rubber. It must be free from holes, bits of wood, bark, sand and other foreign matter, and from other imperfections. It must be so firmly joined to the fabric that it can not be pulled off without tearing it.

Fabric.—The fabric must be of duck, with the warp containing not less than 27 strands, 3 threads per strand, and the filler 18 strands and 4 threads per strand. It must be frictioned on both sides and have, in addition, a distinct layer of rubber on one side, readily visible between the plys when the finished hose is cut open.

Cover.—The material of the cover should be a rubber compound which has good weather-resisting qualities, as firmly attached to the fabric as is the tube, and to be equally free from defects. The end of the hose should be cut off true to length, but shall not be capped.

Serial Number.—Each lot of 200 hose or less must bear the manufacturer's serial number, beginning with one on the first of each year and continuing consecutively until the end of the year. Serial numbers of hose which are rejected must not be used again. With each lot of 200 hose or less, one extra piece of hose must be furnished free of cost.

Label.—Each piece of hose must have securely vulcanized to it a label of white or red rubber, as shown herewith:

Rejection.—If the sample fails to pass the above tests, the lot represented by it will be rejected and the same serial number must not be applied to any other steam hose during the same calendar year.

Inspection.—If the sample passes all the tests, all pieces represented by it will be accepted if free from injurious mechanical defects.

Rejected hose will be returned at the expense of the manufacturer.

Steam Motor Car. See MOTOR CAR.

Steam Pipe. The pipe under passenger cars corresponding to the brake pipe and connected with hose and couplings for conveying steam from the locomotive to heat the cars in the train.

Steam Shovel. Figs. 206, 207. A shovel operated by steam hoisting engines mounted on a car. The shovel or dipper holds from 1 to 6 cu. yds. of dirt and is mounted on the end of a heavy beam, which is carried by the boom. The dipper is operated and controlled by engines in such a manner as to permit of its being filled with earth or rock, lifted and swung over an adjacent car and there dumped. Used in construction work. See CAR.

Steam Trap (Car Heating). Figs. 2133, etc. A device for catching and liberating the water of condensation in any steam pipe line. For vertical steam trap see Figs. 1968, 2031, 2088. For T-trap see Fig. 1973. For half moon steam line trap, see Fig. 2103.

Steel, Specifications for Miscellaneous Castings for Passenger and Freight Equipment Cars (Recommended for M. C. B. Practice).

In 1915 the following specifications were adopted:

1. *Process.*—The steel may be made by the open-hearth, crucible or any other process approved by the purchaser.

2. *Heat Treatment.*—Castings shall be allowed to become cold, they shall then be uniformly reheated to the proper temperature to refine the grain (a group thus reheated being known as an annealing charge), and allowed to cool uniformly and slowly. If, in the opinion of the purchaser or his representative, a casting is not properly annealed, he may at his option require the casting to be reannealed.

II. CHEMICAL PROPERTIES AND TESTS.

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	Optional	per cent.
Manganese	Optional	"
Phosphorus, not over	0.05	"
Sulphur, " "	0.05	"

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, to determine the carbon, manganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 3.

5. *Check Analysis.*—(*a*) A check analysis shall be made from the finished material representing each melt, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section 3.

(*b*) The purchaser shall have the privilege of taking drillings for analysis from a casting, so long as it does not destroy or weaken the casting.

III. PHYSICAL PROPERTIES AND TESTS.

6. *Tension Tests.*—The steel shall conform to the following minimum requirements as to tensile properties:

Tensile strength, lb. per sq. in......60,000
*Elongation in 2 in., per cent..1 400000/ (tensile strength)
Reduction of area, per cent, 30.

*Not under 22 per cent.

7. *Alternative Tests to Destruction.*—In the case of small or unimportant castings, a test to destruction on three castings from a lot may be substituted for the tension tests. This test shall show the material to be ductile, free from injurious defects, and suitable for the purpose intended. A lot shall consist of all castings from the same melt, annealed in the same furnace charge.

8. *Test Specimens.*—(*a*) Sufficient tests bars, from which the test specimens required in Section 9 may be selected, shall be attached to castings weighing 500 lb. or over, when the design of the casting will permit. If the castings weigh less than 500 lb., or are of such a design that test bars can not be attached, two test bars shall be cast to represent each melt; or the quality of the casting shall be determined by tests to destruction as specified in Section 7. All test bars shall be annealed with the castings they represent.

(*b*) The manufacturer and the purchaser shall agree whether test bars can be attached to castings, on the location of the bars on the castings, on the castings to which the bars are to be attached, and on the method of casting unattached bars.

(*c*) If the purchaser or his representative so desires, a test specimen may be cut from the finished casting; such casting so destroyed shall be paid for by the purchaser.

(*d*) Tension test specimens shall be of the form and dimensions shown on Fig. 1. Annealing coupons shall be located at points agreed upon by the manufacturer and the purchaser.

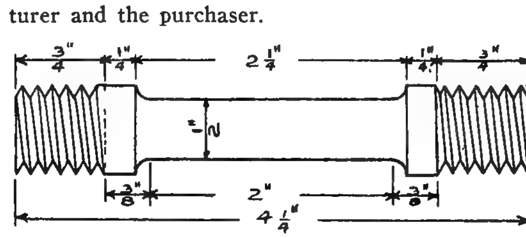


FIG. 1.—TEST SPECIMEN.

9. *Number of Tests.*—One tension test shall be made from each melt.

IV. VARIATION IN WEIGHT.

10. *Weight.*—All castings shall come within the maximum and minimum weight, where shown on the prints, and when castings weighing more than the allowable maximum weight are presented, such castings shall be accepted at the maximum weight, provided they meet all other tests; the excess weight shall be at the expense of the manufacturer.

V. WORKMANSHIP AND FINISH.

11. *Workmanship.*—The castings shall substantially conform to the sizes and shapes shown on the drawings, and shall be made in a workmanlike manner.

12. *Patterns.*—When patterns are furnished by the purchaser, the manufacturer shall make sure that the allowance for shrinkage in these patterns agrees with his own practices, and castings shall be rejected which do not conform closely to dimensions on prints, or if

distorted by improperly matched flasks, undue rappings or any other defect caused by molding. Special attention should be given to properly rounding all fillets and corners shown on drawings. Where surfaces are machined, the castings shall have the proper allowance for finish. Under no circumstance shall manufacturer change purchaser's patterns, without written permission from the purchaser.

13. *Finish.*—(*a*) The castings shall be free from all injurious defects. Castings shall not be painted before inspection. Castings rusted to any extent, or covered with any material to hide defects, shall be rejected.

(*b*) Any casting found with blow holes, cracks, low spots or thin sections filled with cement, "Smooth-on," or like material will be rejected, and shall not be further considered. Oxy-acetylene, electric, or similar welding will not be permitted, unless authorized by the inspector, and then only when the defects are cleaned to solid metal and only at locations where the defects will not in any way be detrimental to the strength of the casting; this welding allowed only in order to improve the appearance of the casting.

14. *Marking.*—The manufacturer's name or identification mark shall be cast and the melt number stamped on each casting, this at such location as shall be agreed upon by the manufacturer and the purchaser.

15. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which shall concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

16. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops weak spots, shrinkage cracks or imperfections, or is found to have finishing defects or fails to pass any of the tests herein required, will be rejected and shall be replaced by the manufacturer at his own expense.

17. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Steel Shearing Values of Structural, Rivet and Mild. (M. C. B. Recommended Practice.)

In 1915 the following rule was adopted for use in all calculations for strength of parts:

The allowable stress per sq. in. for iron or steel, subject to shear in a plane perpendicular to the direction of rolling, shall not exceed 80 per cent of the allowable stress per sq. in. for tension, in the direction of rolling.

Steel, Specifications for; Structural Steel, Steel Plate, Steel and Steel Sheets for Freight Equipment Cars. (M. C. B. Recommended Practice.)

In 1915 the following specifications were adopted:

1. *Scope.*—These specifications apply to all shapes, plates and sheets.

2. *Process.*—The steel shall be made by the open-hearth process.

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon, not over	0.25 per cent.
Manganese	Optional per cent.
Phosphorus, not over	0.05 per cent.
Sulphur, not over	0.05 per cent.

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, to determine the percentage of carbon, manganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 2.

5. *Check Analysis.*—A check analysis may be made from the finished material representing each melt, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section 2.

6. *Bend Tests.*—(*a*) The test specimen for structural steel shall bend cold through 180 deg. without fracture on the outside of the bent portion as follows: For material ¾ in. in thickness and under, flat on itself; for material over ¾ in. to and including 1¼ in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for thicknesses over 1¼ in. around a pin the diameter of which is equal to twice the thickness of the specimen.

(*b*) Angles ¾ in. or under in thickness shall open flat, and angles ½ in. or under in thickness shall bend shut, cold, without fracture.

Note.—The above tests may be made either by pressure or by blows.

(*c*) Bend test specimens shall be 1½ in. or over in width by the thickness of the material, with planed or milled edges.

7. *Number of Tests.*—At least one bend test for structural steel shall be made for each thickness from each melt, and shall be taken from the finished product.

8. *Permissible Variations.*—The cross section or weight of each piece of steel shall not vary more than 2.5 per cent from that specified, except in case of sheared plates, which shall be covered by the following permissible variations to apply to single plates:

(*a*) *When Ordered to Weight.*—For plates 12½ lb. per sq. ft. or over.

Under 100 in. in width, 2.5 per cent above or below the specified weight.

100 in. or over in width, 5 per cent above or below specified weight.

For plates under 12½ lb. per sq. ft.

Under 75 in. in width, 2.5 per cent above or below the specified weight.

75 to 100 in. in width, 5 per cent above or 3 per cent below the specified weight.

100 in. and over in width, 10 per cent above or 3 per cent below the specified weight.

(*b*) *When Ordered to Gage.*—The thickness of each plate shall not vary more than 0.01 in. under that ordered.

An excess over the nominal weight corresponding to the dimensions on the order shall be allowed for each plate, if not more than that shown in Table No.

1; 1 cu. in. of rolled steel being assumed to weigh 0.2833 lb.

TABLE NO. 1.

Thickness Ordered, In.	Nominal Weight, Lb. per Sq. Ft.	Allowable Excess (Expressed as Percentage of Nominal Weight), for Width of Plates. Under 50″	50″ to 70″ excl.	70″ and over.	Under 75″	75″ to 100″ excl.	100″ to 115″ excl.	115″ and over.
1/8 to 5/32	5.1 to 6.37	10	15	20	..	..	..	..
5/32 to 3/16	6.37 to 7.65	8.5	12.5	17	..	..	..	..
3/16 to 1/4	7.65 to 10.2	7.0	10	15	..	..	..	..
1/4......	10.20.......	..	..	..	10	14	18	..
5/16......	12.75.......	..	..	..	8	12	16	..
3/8......	15.30.......	..	..	..	7	10	13	17
7/16......	17.85.......	..	..	..	6	8	10	13
1/2......	20.40.......	..	..	..	5	7	9	12
9/16......	22.95.......	..	..	..	4.5	6.5	8.5	11
5/8......	25.60.......	..	..	..	4	6	8	10
Over 5/8	....	..	..	..	3.5	5	6.5	9

(*c*) A variation from the length ordered of 1/8 in. either way will be permitted for lengths 12 ft. and under and a variation of 1/4 in. either way will be permitted for lengths over 12 ft.

9. *Finish.*—The finished material shall be free from injurious seams, slivers, flaws and other defects, and shall have a workmanlike finish.

10. *Marking.*—The name of the manufacturer and the melt number shall be legibly stamped or rolled on all finished material, but small pieces may be shipped in securely fastened bundles, with the above marks legibly stamped on an attached metal tag.

11. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's work which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

12. *Rejections.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops weak spots, brittleness, cracks or other imperfections, or fails to pass any one of the tests herein required, will be rejected, and shall be replaced by the manufacturer at his own expense.

13. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Steel, Specification for; Structural Steel, Steel Plate and Steel Sheets for Passenger Equipment Cars. (M. C. B. Recommended Practice.)

In 1915 the following specifications were adopted:

1. *Scope.*—These specifications apply to all shapes, plates and sheets.

2. *Process.*—The steel shall be made by the open-hearth process.

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon, not over....................	0.25 per cent.
Manganese	Optional per cent.
Phosphorus, not over................	0.05 per cent.
Sulphur, not over..................	0.05 per cent.

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt to determine the percentage of carbon, maganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than 1/4 in. beneath the surface of the test ingot. A copy of this analysis shall be given to the purchaser or his representative. This analysis shall conform to the requirements specified in Section No. 3.

5. *Check Analysis.*—A check analysis may be made from the finished material representing each melt, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section No. 3.

6. *Tension Tests.*—(*a*) The material shall conform to the following requirements as to tensile properties:

	Structural Steel.	Plates for Cold Flanging.
Tensile strength, lbs. per sq. in..	50,000–65,000	48,000–58,000
Yield point, min. lb. per sq. in..	0.5 tens. str.	0.5 tens. str.
Elongation in 8 in. min. per cent.	1,500,000 / Tens. str.	1,500,000 / Tens. str.

(*b*) The yield point shall be determined by the drop of the beam of the testing machine.

7. *Modifications in Elongation.*—(*a*) For material over 3/4 in. in thickness, a deduction of 1 from the percentage of elongation specified in Section 6 (*a*) shall be made for each increase of 1/8 in. in thickness above 3/4 in., to a minimum of 18 per cent.

(*b*) For material under 5/16 in. in thickness, a deduction of 2.5 from the percentage of elongation in 8 in., specified in Section 6 (*a*), shall be made for each decrease of 1/16 in. in thickness below 5/16.

8. *Bend Test.*—(*a*) The test specimen for structural steel shall bend cold through 180 deg. without cracking on the outside of the bent portion, as follows: For material 3/4 in. or under in thickness, flat on itself; for material over 3/4 in. to and including 1 1/4 in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for material over 1 3/4 in. in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

(*b*) The best specimen for plates for cold flanging shall bend cold through 180 deg. flat on itself without cracking on the outside of the bent portion.

9. *Test Specimens.*—(*a*) Tension and bend test specimens shall be taken from the rolled material.

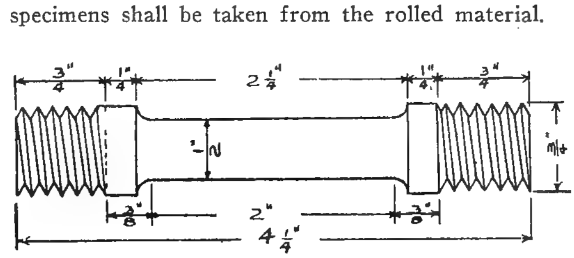


FIG. 1.—TEST SPECIMEN.

(*b*) Tension and bend test specimens, except as specified in paragraph (*c*), shall be of the full thickness of material as rolled, and may be machined to the form and dimensions shown in Fig. 1, or with both edges parallel.

(*c*) Tension and bend test specimen for plates and bars over 1 1/2 in. in thickness or diameter may be machined to a thickness or diameter of at least 3/4 in. for a length of at least 9 in.

10. *Number of Tests.*—(*a*) One tension and one bend test shall be made from each melt; except that if material from one melt differs 3/8 in. or more in thickness, one tension and one bend test shall be made

from both the thickness and the thinnest material rolled. Shapes less than 1 sq. in. in section need not be subjected to a tension test.

(*b*) If any test specimen shows defective machining or develops flaws, it may be discarded and another specimen substituted.

(*c*) If the percentage of elongation of any tension-test specimen is less than that specified in Section 6 (*a*), and any part of the fracture is outside the middle third of the gage length, as indicated by scribe scratches marked on the specimen before testing, a retest shall be allowed.

11. *Permissible Variations.*—The cross section or weight of each piece of steel shall not vary more than 2.5 per cent from that specified, except in the case of sheared plates, which shall be covered by the following permissible variations to apply to single plates:

(*a*) *When Ordered to Weight.*—For plates 12½ lb. per sq. ft. or over:

Under 100 in. in width, 2.5 per cent above or below the specified weight; 100 in. or over in width, 5 per cent above or below the specified weight.

For plates under 12½ lb. per sq. ft.:

Under 75 in. in width, 2.5 per cent above or below the specified weight.

75 to 99 in., inclusive, in width, 5 per cent above or 3 per cent below the specified weight.

100 in. in width or over, 10 per cent above or 3 per cent below the specified weight.

(*b*) *When Ordered to Gage.*—The thickness of each plate shall not vary more than 0.01 in. under that ordered.

An excess over the nominal weight corresponding to the dimensions on the order shall be allowed for each plate, if not more than that shown in the following table, 1 cu. in. of rolled steel being assumed to weigh 0.2833 lb.

Thickness Ordered, In.	Nominal Weight Lb. per Sq. Ft.	Allowable Excess (Expressed as Percentage o Nominal Weight), for Width of Plates, as follows: Under 50″	50″ to 70″ excl.	70″ or over.	Under 75″	75″ to 100″ excl.	100″ to 115″ excl.	115″ or over.
1/8 to 5/32	5.10 to 6.37	10	15	20	..	..	..	..
5/32 to 3/16	6.37 to 7.65	8.5	12.5	17	..	..	..	..
3/16 to 1/4	7.65 to 10.20	7	10	15	..	..	..	..
1/4......	10.20.......	..	..	..	10	14	18	..
5/16......	12.75.......	..	..	..	8	12	16	..
3/8......	15.30.......	..	..	..	7	10	13	17
7/16......	17.85.......	..	..	..	6	8	10	13
1/2......	20.40.......	..	..	..	5	7	9	12
9/16......	22.95.......	..	..	..	4.5	6.5	8.5	11
5/8......	25.50.......	..	..	..	4	6	8	10
Over 5/8	....	..	..	..	3.5	5	6.5	9

(*c*) A variation from the length ordered of ⅛ in. either way will be permitted for lengths 12 ft. and under and ¼ in. either way will be permitted for lengths over 12 ft.

12. *Finish.*—(*a*) The finished material shall be free from injurious defects and shall have a workmanlike finish.

(*b*) Material ⅛ in. and under shall be flattened so that the sheets are practically free from waves or buckles and shall be free from all mill scale and rust. For all sheets less than 1/10 in. there are no further requirements. For sheets 1/10 in. or more in thickness material should be a medium soft steel capable of being formed hot or cold by pressing, and should meet requirements of Section 12-c.

(*c*) Blue enameled sheets and patent leveled sheets, etc., will be used in passenger car construction as called for by the blue-print. These sheets shall be practically flat, free from easily discernible waves, buckles, and furnished resquared.

(*d*) Material for molding shall be such that it can be successfully drawn and pressed cold without rupture. This material, when so ordered, shall have a bright, finished surface, entirely free from mill scale, rust, and shall otherwise be reasonably flat, but need not be leveled. No test for either of these grades, other than successful working, is required.

VI. MARKING.

13. *Marking.*—The name or brand of the manufacturer and the melt number shall be legibly rolled or stamped on all finished material, except that bars and other small sections shall, when loaded for shipment, be properly separated and marked for identification. The melt number shall be legibly marked, by stamping if practicable, on each test specimen.

VII. INSPECTION AND REJECTION.

14. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

15. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops weak spots, brittleness, cracks or other imperfections, or fails to pass any one of the tests herein required, will be rejected and shall be replaced by the manufacturer at his own expense.

16. *Rehearing.*—Samples tested in accordance with this specification which represent rejected material shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Steel; Specifications for Galvanized Sheets for Passenger and Freight Equipment Cars. (M. C. B. Recommended Practice.)

In 1915 the following specifications were adopted:

1. *Process.*—The sheet material manufactured under this specification may be either a mild steel or iron made from puddled bars made wholly from pig iron, and shall be thoroughly cleaned before being coated.

2. *Bend Test.*—Test specimen as described in Section 3 shall be subjected to the following tests:

(*a*) Test specimen shall bend double on itself around two thicknesses of the material tested and straightened, without showing any cracking or flaking of the galvanizing on either side of the test specimen.

(*b*) Test specimen of the base material shall bend twice in the same direction, first around a mandrel the diameter of which is equal to 15 gages of the material tested and straightened, and then bend flat on itself and straightened, without cracking of the specimen.

(*c*) Gages 26 and lighter shall double-lock seam without cracking of the sheet or galvanizing.

3. *Test Specimen.*—(*a*) Strips about 8 in. long and

2 in. wide shall be cut from the center of a sheet selected at random from each lot of 1,000 sheets or less, and the average thickness or weight of the coating across this width shall be used.

(*b*) Corrugated sheets shall be flattened with a wooden maul before making the required tests.

4. *Workmanship.*—The sheets shall conform to the sizes ordered.

5. *Finish.*—The sheets shall be free from blackened and acid spots and other surface defects or poor galvanizing.

6. *Permissible Variations.*—(*a*) The inspector shall weigh and check the measurements of one sheet in each 200 sheets in each order or shipment.

(*b*) A variation in weight of the finished sheet of 2½ per cent either way from that shown in Table No. 1 will be allowed.

TABLE I.

*Gage No.	Thickness of Sheets, In.	Weight of Sheets per Sq. Ft., Oz.	Minimum Weight of Coating per Sq. Ft., Oz.
16	.0625	42.50	2.00
18	.0500	34.50	1.90
20	.03750	26.50	1.80
22	.03125	22.50	1.70
23	.028125	20.50	1.60
24	.0250	18.50	1.50
25	.021875	16.50	1.45
26	.01875	14.50	1.40
27	.017187	13.50	1.35
28	.015625	12.50	1.30
30	.0125	10.50	1.30

*The above gage is of the finished sheet.

7. *Inspection.*—(*a*) The inspector representing the purchaser shall have free entry at all times, while the work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(*b*) The purchaser may make tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

8. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops black spots, improper galvanizing, improper trimming or other defects, or fails to pass any one of the tests herein required, will be rejected, and shall be replaced by the manufacturer at his own expense.

9. *Rehearing.*—Samples tested in accordance with these specifications, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Steel Tired Wheel. A wheel with a steel tire which is usually shrunk on, welded, bolted or fastened with retaining rings. See CAR WHEEL.

Step. 6, Fig. 364; Fig. 557, etc.; Fig. 604. A ledge on a stair or round or rung of a ladder. A footpiece for ascending to or descending from a car or for standing in certain places or positions. Passenger car steps are from their location generally called platform steps and sometimes box steps. In freight cars a U-shaped iron, called a SILL STEP, is used. A small ledge on the end of a freight car near the top for a brakeman to stand on when applying brakes, called the brake step, is also sometimes used. A bracket called a tank step is attached to the tanks of tank cars. Steps in stairs are connected by vertical risers.

Step Box. Fig. 569. A step for use between the bottom car step and a low platform.

Step Hanger. A vertical board or metal plate by which the steps are supported from the corner of a car and from the platform end sill.

Step Iron (Platform Steps). A flat iron bar bent to conform to the shape of the steps and their risers, and to which they are fastened. It is bolted at the upper end to the platform end sill.

Step Ladder (Sleeping Car). Figs. 1600, 1601, etc. A folding step ladder for use in a sleeping car, to reach the lamps, upper berths, etc. See POSTAL CARS, U. S. GOV'T SPEC.

Step Nosing. A metallic facing or molding for the tread of steps.

Step Riser. The vertical portion of a step in stairs.

Step Timber. A timber bolted to the end sill and platfor mend sill, to which the platform steps are hung.

Step Treads Figs. 559, 562-568, 570-573.

Stiffener. Figs. 477, 479. A reinforcing member. The term is commonly applied to bars used to strengthen the doors of freight cars.

Stile. The upright pieces on the outer edge of a door or sash, as door stile, sash stile, window stile, etc.

Stirrup. A kind of ring or bent bar of iron resembling somewhat the stirrup of a saddle. A drawbar carry iron is sometimes called a stirrup.

Stock Car. Figs. 89-90, 92-107, 344-350. A car for the transportation of live stock, equipped with roof, slatted sides and side doors, single or double deck and frequently with feed and water troughs. See DOUBLE DECK STOCK CAR, and CAR.

Stock Car Door. Fig. 817.

Stock Cars, Rounding Corners of Doors, etc. See DOORS, DOOR JAMBS and ALL OTHER INSIDE CORNERS, etc.

Stop Bar. See SASH LOCK STOP.

(Sleeping Car.) A bar to connect the two seats on which the seat bottoms may rest when drawn down to make up a lower berth. It rests upon a stop bar plate.

Stop Bar Guide. An attachment to hold a stop bar in place laterally.

Stop Bar Hinge. The hinge which enables the stop bar to swing horizontally.

Stop Bolt (of Car Door Lock). An attachment for throwing a door latch out of gear.

Stop Cock. A simple form of COCK having a body and tapered plug which has an opening through it. When the plug is turned so that the holes in it correspond to the ports in the body the liquid flowing in the pipe can pass through the cock. When the plug is turned so that the openings do not correspond, the flow is stopped.

Stop Key Journal Bearing. A key or wedge with a lug or projection which bears against the end of the axle to restrain lateral motion and thus dispense with a collar on the axle.

Stop Latch. A spring door latch with a stop bolt by which the latch can be fastened on one side so as not to act.

Storage Battery (Electric Lighting). Figs. 2432, 2486, etc. An electro-chemical device, consisting of a num-

ber of cells connected in series when used for car lighting purposes, each cell containing two groups of plates peculiarly constructed and prepared, immersed in a liquid electrolyte, the functions and properties of which are to receive and store electrical energy and to deliver it to the lighting circuit of the car as occasion may require. Storage batteries are used in connection with axle generators on the car and also in "straight storage systems" where the batteries are charged at some central point and placed in the cars after charging. Storage batteries are of two kinds, one known commercially as Edison Alkaline and the other as Lead-Sulphuric Acid. The Edison storage battery is constructed throughout of nickel-plated steel. The active materials are nickel hydrate for the positive plates and iron-oxide for the negative plates. The electrolyte is an alkaline solution, potassium hydrate in water. The lead-sulphuric acid battery consists of specially prepared lead plates immersed in dilute sulphuric acid. Storage batteries are generally carried in boxes attached to the underside of the car body.

See Motor Car for cars propelled entirely by electric current from storage batteries.

Storage Gas Tank (Acetylene Lighting). Fig. 2385. An iron tank filled with asbestos discs saturated with Acetone, into which acetylene gas is forced under pressure.

Storage Heaters (Car Heating). Figs. 901-903.

Storage System of Acetylene Gas Lighting. Figs. 2385, etc.

Storage System of Car Heating. Figs. 901-903. A direct system of car heating, in which the radiating pipes are enlarged and inclose a smaller pipe or tube which is filled with salt water or other heat-retaining subtsance, and which when heated continues to radiate heat after the steam is shut off.

Stove. An apparatus in which a fire is made for warming a room, house or car by direct radiation. Stoves are out of use for heating passenger cars, but cast iron stoves are largely used for caboose cars.

A cook stove permanently fixed against the side of a room and directly connected with the chimney without the use of stove pipe, is called a range; used in dining cars, etc.

Alcohol and oil stoves are used for heating refrigerator cars or produce cars for the transportation of perishable products in cold weather.

Stove Pipe. A tube, usually of sheet iron, for conveying the smoke from a stove or heater, and creating a draft. A Smoke Flue.

Stove Pipe Damper. A circular disk in the stove pipe for regulating the draft.

Stove Pipe Jack. A covering or bonnet for the aperture of a stove pipe on the outside of a car.

Stove Pipe Ring. A metal plate or ring attached to the ceiling of a passenger car around the opening through which the stove pipe passes from the inside to the outside of the car. It is used for ornament or to make a finish around the opening for the stove pipe.

"Straight Air" Brake. A term applied to the original form of the Westinghouse air brake, which is still used on street cars. With this form of brake, the compressed air is used as a direct force from the main reservoir supply of the locomotive through direct piping to the brake cylinders on the vehicles to apply the brakes. The valve on the locomotive is used to admit air to the brake pipe and brake cylinders in order to apply the brakes, to hold it there when admitted, and to exhaust it when desiring to release the brakes. This form of brake was superseded by the plain automatic air brake. See Automatic Air Brake.

Strainer. See Brake Pipe Air Strainer, Reducing Valve Strainer, Signal Pipe Strainer, Branch Pipe Strainer. For a combination of a strainer and nipple used in car heating see Figs. 2130. See also cross pipe fitted with strainer, Fig. 2253; it prevents sediment, etc., from passing out of the train pipe into the heating apparatus.

Strap. A term commonly applied to long, narrow pieces of wrought iron used to bind members of a structure together.

Strap Bolt or Lug Bolt. A round bolt with a flat bar of iron welded to it, and usually with a hook on the end which serves the purpose of a head. The flat bar has holes in it, by which it is attached to a piece of timber or other object by one or more separate bolts or screws.

Strap Brake (Hoisting Gear). A method of controlling the spools by an iron strap which is pressed down upon the spool.

Strap Hinge. A door hinge, the two parts of which are made longer than those of a butt hinge, and of a triangular shape.

Strap Washer or **Washer Plate.** A wrought iron strap which takes the heads of several bolts.

Strike Plate. The keeper for a beveled latch bolt against which it strikes, so as to snap shut automatically.

Striker Arm. A Seat Arm. The terms striker arm, seat back arm and seat arm are commonly used.

Striker Plate. See Strike Plate.

Striking Casting. See Striking Plate.

Striking Plate. 12, Figs. 287, 288; 11, Fig. 291; 13, Fig. 314; 29, Fig. 364; Figs. 479, 671-677. A metal plate placed on the end sills of freight cars against which the horn of the coupler strikes, preventing damage to the end sill.

String Board (Passenger Car Steps). A vertical board which supports the ends of the steps. A step hanger.

Stringer. 3, Figs. 287, 288, 335; 14, Figs. 351, 352.

A term sometimes applied to a floor nailing strip or a steel member which acts as a support for a nailing strip. A longitudinal floor stringer sometimes occupies a position similar to that of an intermediate sill but is not designed to perform its duties. See Nailing Strip.

Stringer Pocket. Fig. 957 A casting for supporting the end of a beam or stringer. In automobile and similar cars, for facilitating the use of a second or upper deck for increasing the loading capacity for small freight.

Stringer Support. See Floor Beam.

Strut (of a Truss). A member subjected to a strain of compression. A vertical strut is usually called a post.

Stud. A comparatively short vertical wooden post in the side or end framing, usually to act as a brace or support for some other member of the frame. Also used as a nailing strip or furring. See Nailing Strip and Furring.

A headless bolt, threaded on both ends. A standing bolt, pin, boss or protuberance designed to hold an attached object in place, especially one formed of a headless bolt permanently screwed into a tapped hole in a casting or forging so as to become a part thereof.

Sub-Carline (Rrefrigerator Car). A strip of wood un-

der the main carline, supporting the sub-roof. See CARLINE.

Sub-Floor (Refrigerator Car). A layer of flooring boards under the main floor, and usually separated from it by an air space and hair felt or some form of special insulation.

Sub-Roof (Refrigerator Car). The inside layer of boards of the roof proper, supported on sub-carlines.

Sub-Sill. Fig. 439. A sill or timber bolted under another sill to reinforce it. See BUFFING SUB-SILL.

Suburban Car. Figs. 146, 147, 184, 185-187, 195, 229, 397-399. A passenger car for use on short runs, particularly between large cities and their suburbs. See PASSENGER CAR, CAR COACH.

Subway Car. An electric motor car for use in subways in large cities.

Sugar Cane Car. A flat car especially arranged for carrying sugar cane.

Supply Pipe. (Air Compressor). A pipe sometimes connected to the air inlet of an air compressor by means of which the air supply is drawn from a point away from the compressor.

(Lavatory Fittings.) Pipes which carry hot or cold water to the basin faucets.

Supply Valve (Steam Heating). A valve for regulating the supply of steam in the radiator pipes of a car.

Suspension. The method of supporting a railway motor. Except in the case of gearless motors, the suspension is designed to put as little dead weight as possible on the axle.

Figs. 2439, etc. The iron work and fittings which are attached to a truck for supporting or suspending the axle generator and which include the belt tightening and aligning devices. The generator is almost invariably carried outside the truck frame, the four most-used systems of suspension being the bottom pivoted, top pivoted, parallel link and sliding. The parallel link is most used.

Sweeping Car or **Sweeper.** A car with rotary brooms for sweeping snow from a railroad track. The brooms are attached to a horizontal shaft which is connected by suitable gearing with the axles, and the brooms are thus made to revolve. Used on electric roads.

Swing Back Car Seat. A car seat the back of which swings over the cushion, without reversing, top-to-bottom. It requires that both sides of the seat back be upholstered so that either side may be used. Such a seat back requires but one head roll.

Swing Bolster. A truck bolster (so called in distinction from a rigid bolster) which bears on springs that are supported by a transverse timber called a spring plank, which is suspended by hangers or links so that it can swing laterally in relation to the truck. As the springs rest on this plank and they support the bolster, the latter can swing with the spring plank. The object of providing this swinging motion to the bolster is to prevent, as much as possible, lateral blows and shocks from being communicated to the car body, and, vice versa, to prevent the momentum of the car body from acting with its full force on the truck frame and wheel flanges.

Swing Bolster Spring. See LATERAL MOTION SPRING.

Swing Cables (Steam Shovel). The wire ropes passing around the swinging circle and carried back to the swing gear and drum.

Swing Engine (Steam Shovel). The engine geared to the swing drum and used to revolve the swinging circle.

Swing Figurehead (Steam Shovel). The fixed pulley or sheave about which one of the swing cables is passed to be lead back to the swing gear and drum.

Swing Gear (Steam Shovel). The gear and drum about which the swing cables are wound and which controls the movement of the swinging circle.

Swing Hanger. 46, Fig. 989, 991, 1010. Bars or links, attached at their upper ends to the transoms or some other rigid member of a swing motion truck, and carrying the spring plank at their lower ends. Various forms are (1) solid bars with an eye at each end; (2) swing link hangers, made like a long link of a chain; (3) those made with a fork or clevis at one end and an eye at the other, and used commonly on passenger equipment trucks; and (4) those made with a very short link attached to an eye bolt passing through the transom. Also called bolster hanger. See EYE BOLT LINK HANGER.

Swing Hanger Carrier. A bearing for the upper swing hanger pin.

Swing Hanger Friction Block. A casting or bearing of considerable diameter, on which the upper end of a swing hanger rests.

Swing Hanger Friction Washer (Lower and Upper). A cast iron chafing block serving no other purpose than to take the wear. It is only occasionally used. A friction block is almost synonymous, but is usually a larger casting.

Swing Hanger Pin or Axle (Lower and Upper). 47-48, Figs. 989, 991, 1010. An iron bar by which a swing hanger on a car truck is suspended, or which supports a spring plank. The lower swing hanger pivot is sometimes called a cross bar or mandrel pin or axle. The upper one is carried in a swing hanger pin bearing attached to the transom.

Swing Hanger Pin Bearing. 49, Figs. 991, 1010. A casting acting as a bearing for a swing hanger pin.

Swing Hanger Shaft. See SWING HANGER PIN.

Swing Joint. See FLEXIBLE METALLIC JOINT.

Swing Link. See SWING HANGER.

Swing Link Hanger. A SWING HANGER made in the form of an open link.

Swing Motion. A term applied to an arrangement of hangers and other supports for the springs and truck bolster which enables a car body to swing laterally on the truck. See SWING BOLSTER, SWING HANGER.

Swing Motion Truck. Figs. 965, 969. A truck with a bolster and spring plank suspended on swing hangers so that they can swing laterally in relation to the truck frame. Also called swing bolster truck in distinction from a rigid bolster truck.

Swing Spring Plank. A transverse timber underneath the bolster of a four-wheeled truck, or the spring beam of a six-wheeled truck, on which the bolster springs rest. A swing spring plank differs from an ordinary spring plank in being supported by hangers or links. See SPRING PLANK.

Swinging Circle or **Mast Wheel** (Steam Shovel). A large wheel at the foot of the mast or boom about which is wound a chain for revolving the boom.

Swinging Platform (Pile Driver). A platform carrying the entire pile driving gear in such manner that it can be swung about at right angles to the car so as to project for a considerable distance on either side.

It swings upon a center plate, and its movements are controlled by the SLEWING GEAR.

Switch. See LINE SWITCH, ELECTRO-PNEUMATIC COMPRESSOR SWITCH.

Switch Group (Motor Cars). Fig. 2672. A combination of two or more unit-switches or contactors mounted in a suitable frame and protected by a removable cover.

Switch Box Support. A bracket for securing an electric lighting switch to the underframe or car body.

Switch, Regulating. See ELECTRIC HEATER.

Swivel (of a Chain). A twisting link, consisting of a headed pin, entering an eye or ring in an adjacent link. The object is to avoid kinking. Hence the term is applied to many forms of equivalent devices, consisting essentially of a ring surrounding a headed bolt in such manner as to permit rotation.

T

T or **Tee** (Pipe Fitting). A T-shaped tube for uniting one pipe at right angles to two others in the same line. The pipes are screwed into the arms of the T. A REDUCING TEE, which see, has the arms of different diameters.

T-Hinge. A door hinge, one part of which is made like a strap hinge, and the other like a butt hinge, so that the shape of the whole resembles a letter T. See HINGE.

Table. 19, Figs. 1600, 1601. A removable board attached to the side of the car by inserting a table hook fixed to the table into a table hook plate fixed to the side of the car. The outer end of the table is supported by a table leg, which is sometimes vertical and sometimes slanting and which folds back against the table when not in use. The tables of dining cars are generally permanently fastened to the floor and sides of the car. A drop table is sometimes used in the kitchens of dining cars. See DISTRIBUTING TABLE.

Table Fastener. A latch by which a folding table is fastened up out of the way.

Table Hinge. A hinge for a folding table.

Table Holder. A special form of table hook. See TABLE.

Table Hook. See TABLE.

Table Leg Hook. Fig. 1645. A metal hook which is attached to a slanting table leg. It engages in a plate attaching to the side of the car.

Tail Coupling (Alcove Faucet). Fig. 1733.

Tail Gate. Figs. 575, 581. See PLATFORM TAIL GATE.

Tail Gate Sockets. Fig. 617.

Tail Lamp or **Tail Light.** Figs. 2044, etc. A signal used to indicate the rear of a train, and carried on a bracket or socket at the side of the car in order to be visible from the engine. Two are used, one on each side of the train, on the rear of the rear car.

Tail Lamp Socket. See SIGNAL LAMP SOCKET.

Take-Up Reservoir Check Valve (Triple Valve). 37, Fig. 1360.

Tandem Spring Draft Gear. Figs. 721, 734, etc. A draft gear in which the springs are arranged in tandem.

Tank. (Passenger Cars.) A water tank for the wash room.

(Gas Lighting Apparatus.) More properly RECEIVER or HOLDER.

(Tank Car.) 8, Fig. 340. The body of a tank car. Usually a metal cylinder, but also made of wood and ractangular. Glass lined tanks are also in use for carrying mineral water and liquids which would attack metal.

Tank Band. An iron strap which passes around the tank of a tank car to hold it in place on the underframe.

Tank Car. Figs. 81-88, 340-343. A car the body of which consists of a tank for carrying liquids, such as oil, molasses, vinegar, etc.

Tank Cars, Specifications for (M. C. B. Standard).

In 1903 a report was submitted embodying certain specifications for the repairs of old equipment and the construction of new equipment. These specifications were submitted to letter ballot and adopted as a Recommended Practice.

In 1906 these specifications were modified; also, in 1907. In 1908 a further revision was made. In 1910 they were advanced to Standard.

In 1912 the specifications were rearranged and enlarged to include ordinary tank cars, old tank cars having wooden underframes, special tank cars for liquefied petroleum gas (casing-head naphtha) and special tank cars for liquid chlorine gas. In 1913 they were slightly modified to remove ambiguities.

The modified specifications are as follows:

DEFINITIONS.

Tank Car.—Any car to which one or more tanks, used for carrying liquids or compressed gases, are permanently attached.

Tank cars shall be divided into two classes: Ordinary and special.

Ordinary Tank Car.—One used for the transportation of inflammable products, the vapor pressure of which, at a temperature of 100° F., does not exceed 10 pounds per square inch. This class may also include cars for the transportation of non-inflammable products, the vapor pressure of which, at a temperature of 100° F., does not exceed 25 pounds per square inch.

Special Tank Car.—One used for the transportation of inflammable products, the vapor pressure of which, at a temperature of 100° F., may exceed 10 pounds per square inch.

GENERAL REQUIREMENTS.

(a) Tank cars offered for movement over the lines of a railroad must conform to the following specification:

(b) Designs for "special" tank cars must be submitted to the Master Car Builders' Association for approval.

(c) Tanks which bear evidence of damage by fire must be withdrawn from transportation service; provided, that where the damage to the tank is local only, or confined to a section which can be replaced, the railroad and the car owner may, after a joint inspection, agree that all damaged material shall be replaced and the tank made absolutely safe for transportation service; but before being returned to service, the tanks and fittings must be again submitted to the prescribed hydraulic test and properly stenciled.

(d) Tanks which do not meet the prescribed tests shall be withdrawn from transportation service.

SPECIFICATIONS FOR ORDINARY TANK CARS, OTHER THAN WOODEN UNDERFRAME CARS.

1. No tank cars built hereafter shall be accepted for transportation unless equipped with steel underframing or with reinforced shell.

The design and construction of the car throughout must be at least as strong as the following detailed specifications.

2. Steel or iron tanks constructed subsequent to 1903 must be designed for a bursting pressure of not less than 240 pounds per square inch.

3. *Riveted Tank Seams.*—When riveted, all longitudinal and head seams must be double-riveted. Where head blocks are not used, head seams need not be double-riveted.

4. *Dome Heads and Covers.*—Dome heads and covers must be made of either cast or pressed steel, or malleable iron.

The joint of the dome cap must be made tight against vapor pressure, and when necessary to insure this a satisfactory gasket must be used.

5. *Test.*—Tanks must be carefully inspected and tested before being put into service, and again at intervals of ten years, and after that at intervals of not over five years; with the exception that where tanks are used for carrying corrosive products, deterioration is to be expected in a shorter time, and the first test period shall then be reduced to five years. Tanks requiring this five-year test shall be those used for carrying chemicals, such as acids, ammonia liquors, and such other products as hereafter may be specified.

Provided, that any tank damaged to the extent of requiring renewal of sheet, or extensive reriveting or recaulking of seams, shall be retested before being returned to service.

All tests shall be made by completely filling the tank with water of a temperature which shall not exceed 70° F. during test. The prescribed pressure must be held for not less than ten minutes after the tank has been caulked tight and may be applied in any suitable manner.

The tests for tanks built prior to 1903 shall be at 40 lb. per sq. in., and for tanks built since that date at 60 lb. per sq. in., which they must stand without leak or evidence of distress.

After January 1, 1915, all tanks tested to less than 60 lb. pressure shall be stenciled "Not to be used for liquids requiring the inflammable placards under the I. C. C. regulations."

After January 1, 1918, all tanks in transportation service shall be subjected to the full test requirements of 60 lb. per sq. in.

Tanks when tested must be stenciled with the date, pressure at which tested, place where test was made, and by whom, as follows:

Tested (date) ....
Pressure (lb. per sq. in.)...........
At (place) ....
By (name of firm)................

The tank-car owner shall be responsible for the proper carrying out of all inspections and tests and stenciling, and for the certification of the tests to the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles (see Section 8).

6. *Safety Valves.*—By January 1, 1915, all tanks carrying products that give off volatile inflammable vapors at or below a temperature of 80° F., and having a vapor pressure of not more than 10 pounds per square inch at a temperature of 100° F., shall be equipped with 5-inch safety valves of approved design (Figs. 1 and 2), and these valves shall be set to open at a pressure of 12 pounds per square inch.

Provided, that where the lading is such as not to give off inflammable vapors (as determined by flash point from Tagliabue's open-cup tester as used for test of burning oils) at a temperature below 80° F., the setting of the 8-pound valves to 12 pounds may be deferred to such time as the valves require removal.

All required pressures for safety valves are subject to a tolerance of 1 pound above or below that specified.

One valve shall be provided for a capacity of 6,500 gallons or less, and two valves for a capacity of more than 6,500 gallons.

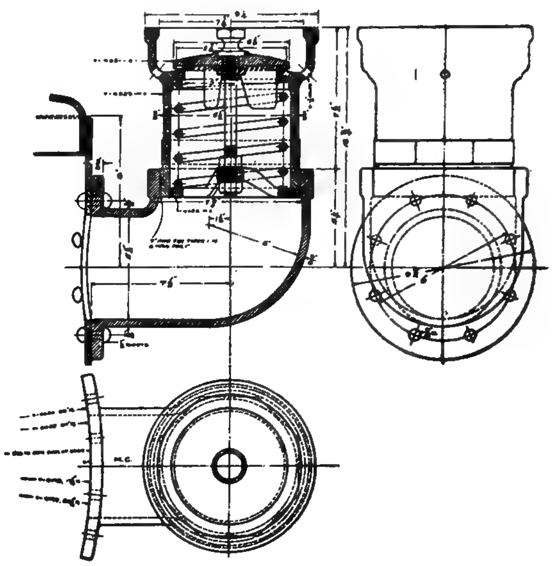


FIG. 1.—STANDARD FIVE-INCH VALVE.

Where tanks carrying such products are divided into compartments, each compartment must be provided with a safety valve.

7. *Test of Safety Valves.*—Safety valves must be tested and adjusted if necessary (a) on new cars, be-

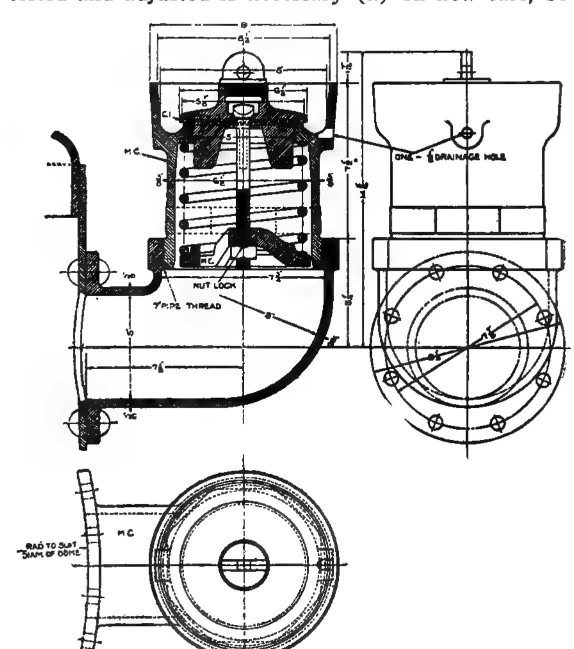


FIG. 2.—ALTERNATIVE FIVE-INCH SAFETY VALVE.

fore the cars are put into service; (b) on existing cars, by January 1, 1916; and thereafter on all cars at intervals of not over two years.

When valves are tested, the date, pressure to which tested, place where test was made, and by whom, must be stenciled on the body of the tank, near the end and adjacent to the stenciling for test of tank, as follows:

Tested (date) ....
Pressure (lb. per sq. in)...............
At (place) ....
By (name of firm)....................

In addition to stenciling on body of car, there shall be stamped on body of valve, in ¼ or ⅜ in. figures, the date of test and pounds pressure to which valve was tested. Date of test on tank and last date on valve must correspond.

The test may be made without the removal of the valve from the car, provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by the required pressure.

Valves improperly set, or not tested and stenciled at proper intervals, shall constitute defects for which the owner shall be responsible.

The tank-car owner shall be responsible for certification of tests to the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles (see Section 8).

8. *Certification of Tests.*—Certificates of all tests of tanks and their safety valves shall be sent to the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, in such form as may be prescribed by the Bureau.

9. *Five-inch Safety Vents with Lead Disks.*—Tank cars carrying volatile non-inflammable products whose vapor pressure at a temperature of 100° F. does not exceed 25 pounds per square inch, may be provided

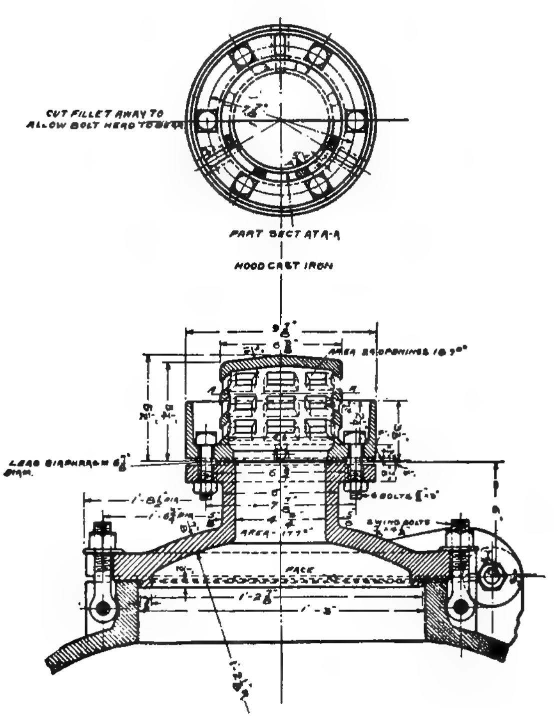


FIG. 3. FIVE-INCH SAFETY VENT WITH LEAD DISC.

with vents depending on frangible lead disks for safety, which vents shall be of approved design, as shown by Fig. 3, or the disks to be of a thickness that shall insure rupture at a pressure not higher than 30 pounds per square inch.

10. *Two-inch Vent Hole or Small Valve.*—Tank cars carrying non-inflammable or non-volatile material, such as sulphuric acid, vinegar, linseed oil, cottonseed oil, lard oil, fish oil, tannery products, glucose, molasses, calcium chloride, caustic soda, silicate of soda, etc., need not be provided with 5-inch safety valves, but each tank must have a small open vent or valve, equal to not less than 2 inches in diameter (see Fig. 4).

If, for any reason, splashing of the liquid or contamination by moisture is to be avoided, a 2-inch vent with frangible lead disk, of a thickness which will insure rupture at a pressure not higher than 30 pounds,

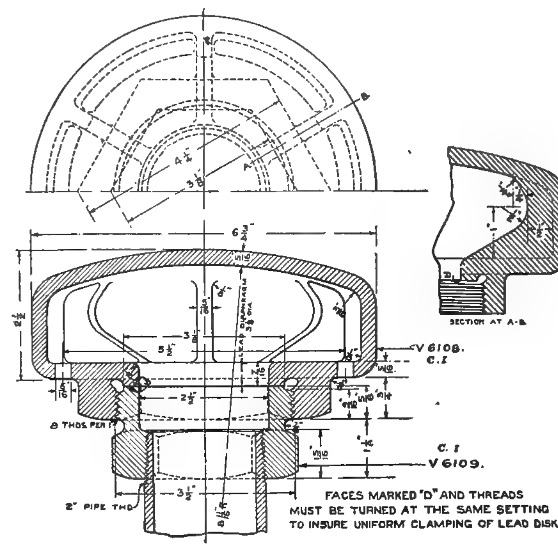


FIG. 4.—TWO-INCH FRANGIBLE LEAD DISC VENT.

should be used in place of the 2-inch open vent (Fig. 4).

11. *Center Sills.*—The center-sill construction of the underframe between bolsters must have an effective cross-sectional area of at least 30 square inches, distributed as shown in Fig. 5, or equivalent.

12. *Bolsters, Draft Gear.*—Each car must be equipped with steel body and truck bolsters, steel couplers, and a draft gear of approved design, having a capacity of at least 60,000 pounds.

13. *Longitudinal Anchorage.*—Particular attention must be given to the longitudinal anchorage of the tanks, which must be thoroughly substantial, to prevent injurious end-shifting. The preferable method of securing tank against end-shifting is by anchoring the tank to the underframe at some one point, rather than by confining it between the head blocks, as the necessary play between tank and head blocks too often results in damage to the head, bending of the underframe at the bolsters and breakage of the discharge nozzles.

MINIMUM REQUIREMENTS FOR LONGITUDINAL ANCHORAGE OF TANK TO UNDERFRAME.

Tank connection—
- For tanks of 8,500 gallons capacity or over:
  - Shearing area of rivets, 25 square inches.
  - Bearing area of rivets, 20 square inches.
- For tanks of less than 8,500 gallons capacity:
  - Shearing area of rivets, 18 square inches.
  - Bearing area of rivets, 14 square inches.

Frame connection—
- For tanks of 8,500 gallons capacity or over:
  - Shearing area of rivets, 12½ square inches.
  - Bearing area of rivets, 10 square inches.
- For tanks less than 8,500 gallons capacity:
  - Shearing area of rivets, 9 square inches.
  - Bearing area of rivets, 7 square inches.

14. *Dome Yokes, Tank Straps, Etc.*—Tanks must be secured from turning on the underframes either by means of an anchorage or by dome yokes, and must also be secured to underframe by means of tank straps, two for tanks not more than 76 inches in diameter, and four for tanks of greater diameter, or their equivalent.

The sectional area of dome yokes and tank bands

must at no place be less than ¾ of a square inch, or 1-inch round iron upset to 1⅛ inch at threaded end.

Cars having no underframe, with tank securely riveted to body bolsters, do not require dome yokes or tank bands.

Explanation: A threaded end, 1⅛ inch in diameter or more, with a body consisting of a flat band 2 by ⅜ inch, or equivalent section, or round iron 1 inch in diameter, will be accepted as meeting the requirements.

The dome yoke proper which passes around the dome may be a rod ¾ inch in diameter, or its equivalent, to which is secured the strap or rod which is fastened to the underframe. The sectional area of dome-yoke strap must be the same as required for tank straps.

Where tanks are equipped with a greater number of tank bands than called for, the total sectional area of all bands will be considered as meeting the requirements, if they equal the total sectional area of the rods specified.

15. *Tank Valve Extension Clearance.*—Steel underframe tank cars in which the tank is secured from end-shifting by means of head blocks, must have a longitudinal clearance for tank valve extension of not less than 6 inches on each side of valve.

16. *Discharge Valve.*—If discharge valves are used, the valves must be so located that breakage of the connection pipe will not unseat the valve. Preferably the top of the discharge-valve handle should be within the tank, but in the event that it is carried through the dome, leaking must be prevented by packing and cap nut.

17. *Cars without Underframes.*—If the car has no underframe the tank shell at bottom must be at least ⅝ of an inch thick, and all circumferential seams in bottom sheet, except head seams, must be double-riveted.

18. *Brakes.*—Each car must be equipped with air brakes of a capacity equal to not less than 70 per cent of the light weight of car, and at least one hand brake operating the brakes of both trucks.

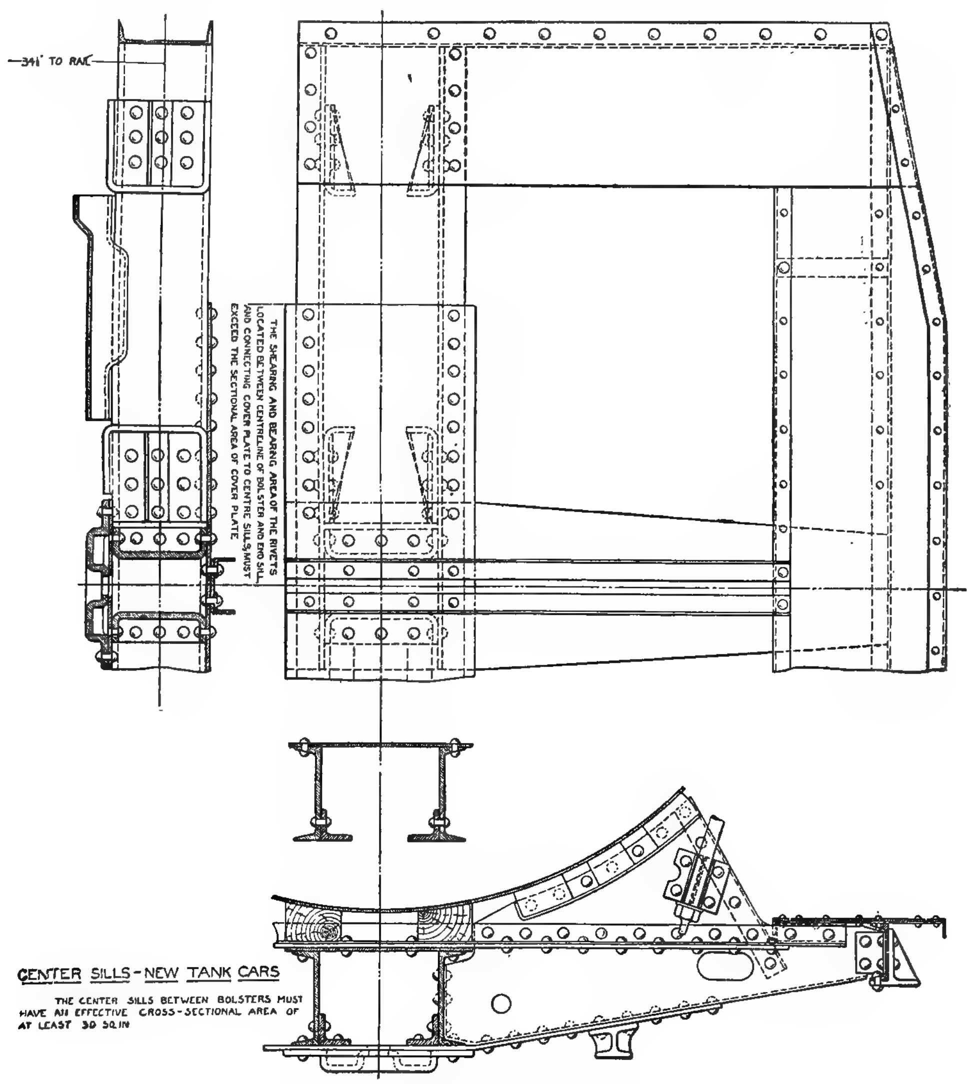


FIG. 5.—CENTER SILL CONSTRUCTION.

19. *Push-pole Pockets.*—There shall be a push-pole pocket at every corner of the car. Where, from the construction of the car, the push-pole pockets can not well be placed on the body, they must be applied to the trucks, so placed above the journal boxes that the push-pole will push toward the center of the truck.

20. *Trucks.*—Each truck must have a strength equal to or greater than the strength of the axles used.

21. All tank cars at home on a railroad must be inspected by inspectors in the employ of that railroad company, and when such tank cars meet the requirements herein set forth, the legend shown by Fig. 6 must be stenciled on each tank head, with the initials

of the railroad company making such inspection and the date the inspection is made.

If foreign tank cars and individual tank cars at home on foreign lines, stenciled with the legend "M. C. B. Construction" by a foreign road, are offered for movement over another railroad, and some of the

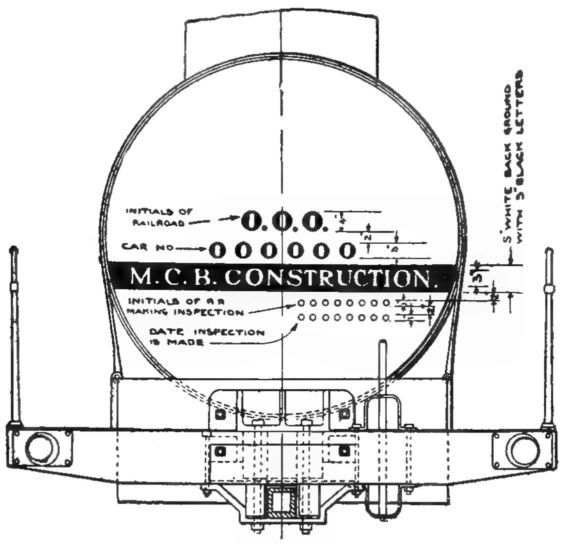


FIG. 6.—LEGEND TO SHOW COMPLIANCE WITH M. C. B. SPECIFICATIONS.

details do not conform to the requirements of the tank car specifications, a report of same should be made through the proper officers to the official in charge of equipment and the car allowed to proceed until further notice.

SPECIFICATION FOR OLD TANK CARS HAVING WOODEN UNDERFRAMES.

1. Tank cars having wooden underframes, of railroad or individual ownership, will be required to conform to the requirements of the "Specification for Ordinary Tank Cars," relating to tests of tanks, safety valves, test of safety valves, 5-inch safety vents with lead disks, 2-inch vent hole or small valve with lead disk, dome yokes, tank straps, tank-valve extension clearance, discharge valve, brakes, push-pole pockets, trucks, etc. and inspection for compliance with M. C. B. specification and, in addition, must be as strong as the construction covered by the following detailed specifications:

2. *Dome Heads and Covers.*—Where tank cars are fitted with cast-iron dome heads and covers not sufficiently strong to stand the necessary 40 pounds hydraulic test, they must be replaced by others of cast or pressed steel, or of malleable iron.

3. *Tank Heads.*—Tank heads less than 7/16 of an inch thick, bearing evidence of damage from impact with head blocks, should be reinforced at bottom by means of steel plate shoes ⅜ inch thick, riveted to head and shell.

4. *Center Sills.*—If cars are not equipped with intermediate sills, the underframes must have two center sills, each not less than 5 inches wide by 10 inches deep, or the equivalent in strength. If the car is equipped with intermediate sills, the center sills must not be less than 5 inches wide by 9 inches deep, or the equivalent in strength. Center sills must not be spaced more than 18 inches apart.

5. *Center Sill Filling Timber.*—Where draft timbers are underneath the center sills, the space between the center sills must be filled in with timbers not less in depth than center sills, extending from end sill to the center of nearest cross-bearer or cross-timber, provided the latter is located not less than 4 feet 6 inches from center of bolster. On cars where the draft arrangement is between center sills, the filler timber must be extended to the cross-tie timber when the cars go to shop for repairs to center sills. Center sills and filling timbers must be securely bolted together by means of ¾-inch bolts. On cars having center or intermediate sills not less than 10 inches wide by 10 inches deep, which may be made up of two 5 by 10-inch sills bolted together, the filling timbers may be omitted.

6. *End Sills.*—End sills not reinforced by buffer blocks must not be less than 9 inches wide by 10 inches deep. End sills 6 inches wide by 12 inches deep, reinforced with buffer blocks not less than 6 inches wide by 10 inches deep and of sufficient length to overlap center sills, will be acceptable as a substitute for 9 by 10 inch end sills.

On existing cars, if buffer blocks are used for the purpose of reinforcing end sills which do not come within the specified requirements, the buffer blocks in no case must be less than 4 inches thick nor end sills less than 6 inches thick. The total strength of the end sill and buffer block must be equal to the strength of the construction specified.

7. *Draft Timbers.*—Draft timbers secured to inside of center sills and extending to cross-bearer or cross-timber will be accepted as a substitute for filling timbers referred to above. Where center sills are 9 inches wide by 10 inches deep, or over, and draft timbers are placed between same, they need not extend farther back than body bolster, provided they are adequately secured to center sills by means of seven ⅞-inch bolts or their equivalent, and butt against body bolster. Draft timbers located underneath the center sills must not be less than 4 inches wide by 8 inches deep, and each draft timber must be held to center sills, end sills and buffer blocks by means of seven or more ⅞-inch bolts or six 1-inch bolts. Where an arrangement for supporting draft timbers is substituted for one or more bolts and the construction is of equal strength, the same will be acceptable. Draft timbers extending beyond bolster must be secured to center sills by additional bolts.

8. *Draft Gear.*—The draft gear and draft attachments must be at least as strong as the design shown in Fig. 7.

Cars should be provided with draft-gear stops gained into draft timbers or heeled on end sills, filler timber or body bolster, and secured with five ¾-inch bolts; but cars having stops gained into draft timbers or heeled on end sills, filler timber or body bolster, secured with three ¾-inch bolts, may be continued in service until such time as they go to shop for repairs, when five bolt stops must be provided.

In all cases, tail yokes or attachments of equal strength must be used. Tail bolts, tail straps, or American continuous draft gear, will not be accepted.

9. *Head Blocks.*—Head blocks must not be less than 10 inches wide unless reinforced by metal plates, and of sufficient depth to extend at least 6 inches above bottom of tank, and may be made of two pieces bolted together and bolted to underframe by means of not less than four ⅞-inch vertical bolts. They must be cut out to suit curve of tank. The ends of each head block should preferably be tied to corresponding end of head block at the other end of car by means of rods not less than 1 inch in diameter, with 1⅛-inch threaded ends, and each head block supported at center

by means of a substantial casting securely bolted to end and center sills. Where the construction of the car does not permit of this fastening, the following may be substituted:

The ends of each head block tied to corresponding end of head block at the other end of car by rods not less than 1 inch in diameter, with 1⅛ inch threaded ends, and each head block secured by two stay rods 1 inch in diameter anchored to center sills;

Or, head block supported at center by means of a substantial casting securely bolted to end and center sills and two 1-inch rods passing diagonally through head block toward bolster and secured to underframe;

Dome must have a capacity to provide for an expansion of 3½ per cent of the contents of the tank, measuring from the inside top of shell to the top of the dome.

Cover for dome may be secured either by screw joint, by bolting, or by yoke with center screw. Lid must be provided with suitable gasket to insure tightness against the escape of gas under pressure.

3. *Safety Valves.*—The safety valves to be of the same pattern as those used for other inflammable products, set to blow at a pressure of 20 pounds gauge pressure, with a tolerance of 1 pound above or below that pressure.

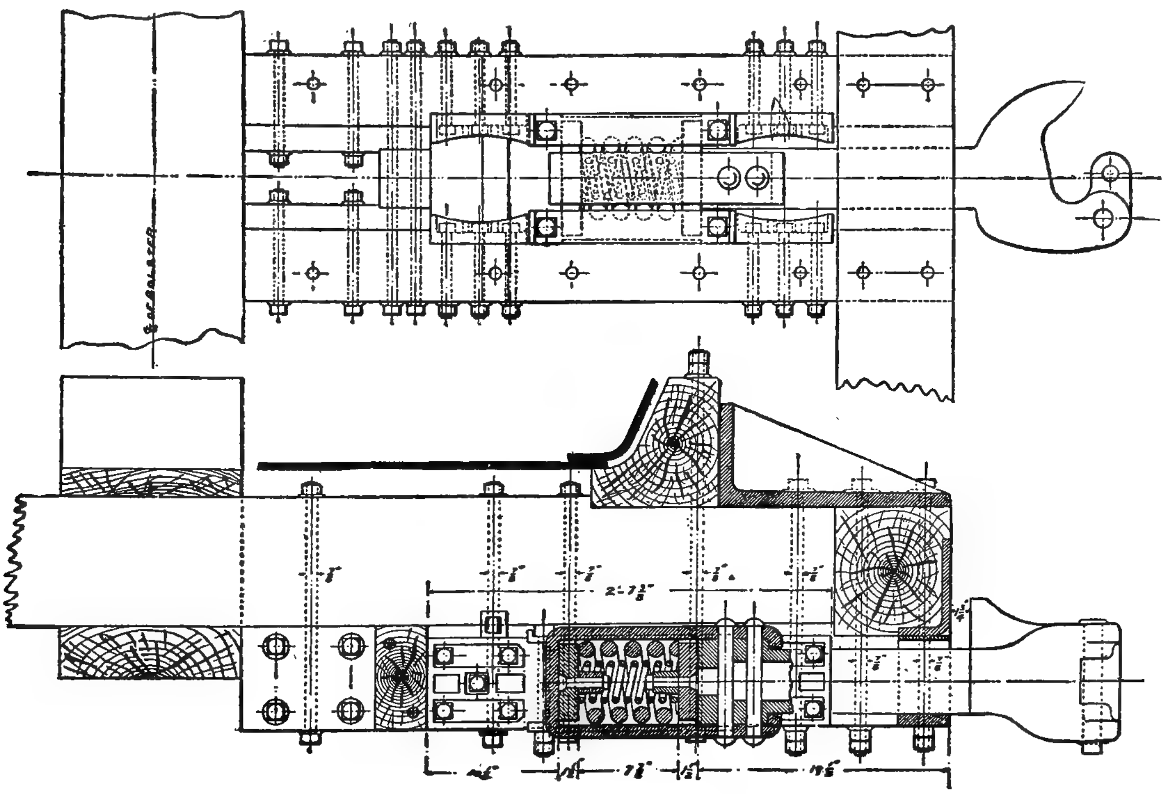


FIG. 7.—MINIMUM REQUIREMENTS FOR WOODEN UNDERFRAME TANK CARS.

Or, head block secured by two stay rods 1⅜ inches in diameter, anchored to center sills;

Or, head block secured by two stay rods 1 inch in diameter, anchored to center sills, and two 1-inch rods passing diagonally through head block toward bolster and secured to underframe;

Or, head block secured by two stay rods 1 inch in diameter, anchored to center sills, and two straps not less than ¾ inch thick, and 3 inches wide, passing over head blocks securely fastened to underframe.

SPECIFICATION FOR SPECIAL TANK CAR FOR CARRYING VOLATILE INFLAMMABLE PRODUCTS WITH A VAPOR TENSION OF OVER TEN POUNDS PER SQUARE INCH AT A TEMPERATURE OF 100 DEG. F.

1. *Tanks.*—For these cars the tanks may be either welded or riveted; with or without steel underframes. The welded tank is preferred on account of tightness.

Where riveted tanks are used, all longitudinal and head seams must be double-riveted.

Heads must be not less than ½ inch thick; and if head blocks are used, heads must not be less than ⅝ inch thick.

2. *Domes.*—Domes of steel plate, preferably drawn without vertical seams, riveted or welded to the shell proper.

4. *Test of Safety Valves.*—The safety valves must be tested and adjusted, if necessary, at intervals of not over six months, and the pressure and date of the last test shall be plainly stenciled on the body of the valve, as follows:

Tested (date) ....
Pressure (pounds per square inch)......
At (place) ....
By (name) ....

The test may be made without the removal of the valve from the car; provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by 20 pounds.

Valves improperly set, or not tested at proper intervals and stenciled, shall constitute defects for which the owner shall be responsible.

5. *Lagging of Tank.*—The barrel, ends and dome to be lagged with a thickness of 2 inches of 85 per cent carbonate of magnesia, or its equivalent, covered with sheet-iron jacket ⅛ inch thick. Tank before lagging to be well painted. The sheets of the jacket to to be lapped so as to shed rain and maintain the dryness of the lagging.

6. *Test of Tank.*—Tank to be tested before being put into service and once every two years thereafter with a cold-water pressure of 100 pounds per square

inch, which it must stand without leakage or evidence of distress.

The tank car owner shall be responsible for the proper carrying out of all tests and inspection. Tanks, when tested, must be stenciled with pressure, date and place where test was made, and by whom, as follows:

Tested (date) ....
Pressure (pounds per square inch)......
At (place) ....
By (name) ....

7. If discharge valves are used, the valves must be so located that breakage of the connection pipe will not unseat the valve. Preferably the top of the discharge-valve handle should be within the tank, but in the event it is carried through the dome, leakage must be prevented by packing and cap nut. An alternative arrangement, by which the valve is placed on top of the car and the contents of the car discharged by air, will be accepted.

8. *Stenciling.*—In some convenient location on either the sides or the ends of the car shall be stenciled the words: "For Liquefied Petroleum Gas."

On the side of the dome shall be stenciled: "Caution: Liquefied Petroleum Gas (Casing Head Naphtha): Before removing manhole cover, safety valve must be lifted and held open until the internal pressure, if any, is relieved."

9. All other requirements for these special tank cars to be the same as those for "Ordinary Tank Cars."

10. The designs for these "Special Tank Cars" to be submitted to the Master Car Builders' Association for approval.

SPECIFICATIONS FOR SPECIAL TANK CAR FOR TRANSPORTATION OF LIQUEFIED CHLORINE GAS.

1. Liquefied chlorine gas may be shipped in a lagged tank car of approved design, which shall be tested before being put into service with a cold water pressure of 300 pounds per square inch, and stenciled in accordance with the requirement in this respect of the specification for ordinary tank cars.

2. Car shall be provided with an approved design of small safety valve and fusible seal, which must be so located that in case the car became involved in a fire the seal would be exposed.

3. The designs for these "Special Tank Cars" to be submitted to the Master Car Builders' Association for approval.

Tank Dome. 10, Fig. 340. A vertical cylinder attached to the top of a tank on a tank car. It permits of the application of a manhole cover which need not be air tight, and also permits the tank proper to be filled full, which would be impossible if there were no dome.

Tank Head. 9, Fig. 340. The circular end sheet of a cylindrical tank.

Tank Head Block. A block securely bolted to the underframe transverse to the sills at either end of the tank, to prevent any longitudinal motion of the tank with respect to the car. The block is shaped to fit the end of the tank. See FILLER BLOCK and TANK CAR, SPECIFICATIONS FOR.

Tank Nozzle. A short pipe used to empty the tank. It is usually cast in one piece with the TANK VALVE.

Tank Saddle. The bearing which supports the tank. In some tank cars the saddle is the body bolster.

Tank Slabbing. Longitudinal strips or filling pieces between the tank and the saddle of a tank car.

Tank Step (Tank Car). A metal shelf or bracket fastened to the tank to facilitate access to the top of the dome.

Tank Valve (Tank Car). A valve attached to the bottom of the tank to draw off the contents.

(Water Cooler.) A valve used with water tanks which extend to the roof, and sometimes with other smaller fixed tanks, for enabling them to be completely drained when desired. Also called water cooler valve.

Tank Valve Rod. An iron rod for opening and closing a tank valve, usually extending from the valve to the top of the dome.

Tank Valve Rod Bracket. An iron brace in the tank having a threaded hole or bushing through which the tank valve rod screw passes.

Tank Valve Rod Screw. The screw on the upper end of a tank valve rod which passes through the tank valve rod bracket and causes the valve to open or close when the rod is turned.

Taper Charge Vibrator or **Relay** (Electric Lighting). An automatic and sensitive electrical device similar in construction to the battery voltage relay. It acts as an auxiliary regulator in connection with the generator regulator to taper the charging current of the generator after the voltage of the battery has reached a predetermined value, indicating that the latter is fully charged. Its action on the regulation differs from that of the battery voltage relay in that instead of abruptly cutting off the charging current it tapers the same, causing the charging current to decrease gradually to zero. The taper charge vibrator or relay gradually assumes control of the apparatus and finally regulates the axle generator as a constant potential machine.

Telegraph Blank Rack. Fig. 2039.

Telegraph Cock or **Faucet.** A self-closing cock, the lever of which resembles the key of a telegraph instrument. See LEVER FAUCET. When the water enters the cock horizontally they are called horizontal telegraph cocks. When it enters vertically they are called vertical telegraph cocks. See FAUCET.

Temperature Regulator. Figs. 2106-2110. A device for automatically controlling the supply of steam to maintain any desired temperature in the car.

Temporary Safety Chains. See SAFETY CHAINS FOR STEEL AND WOODEN FREIGHT CARS.

Tenon. The projecting end of a piece of timber fitted for insertion into a mortise by cutting away a portion on one or more sides. Sometimes the tenon is made cylindrical. Tenons are secured in their mortises by pins or by giving them a dove tail.

Tension Bar. Any bar subjected to a tensile stress, as the top cover plate of a body bolster.

Terminal. The part of a storage battery plate to which the wires are connected.

Terms and Gaging Points for Wheels and Track See WHEELS AND TRACK, TERMS AND GAGING POINTS FOR.

Testing Air Brakes. See AIR BRAKES, CLEANING AND TESTING OF.

Texoderm. An artificial leather used for curtains and upholstering. It is made by coating a cloth fabric with a compound which gives it the appearance of leather.

Thermo Jet (Steam Heating). A direct steam heating system which maintains the car temperature constant by means of an injector with steam supply valve controlled by the expansion or contraction of a part of the radiating pipes, the steam supply valve being set to a

position indicating the temperature of radiation desired.

Thermometer, Electric. Fig. 2109. Used in connection with the regulation of steam heat in passenger train cars.

Thermostatic Steam Trap (Car Heating). A device to regulate the escape of steam in proportion to the condensation that has taken place.

Thimble. A bushing. A sleeve or tube through which a bolt passes. A filler. See BOLSTER THIMBLE.

Third Rail Shoe or **Collector.** Figs. 2696, 2732, etc. A metallic sliding contact, usually of cast iron, mounted on the car truck, and insulated therefrom, for collecting current from an insulated third rail located alongside the running rails. Positive contact between shoe and rail is maintained by gravity or by a stiff spring.

Thread. See SCREW THREAD.

Three-Pipe Manifold. A pipe fitting forming a return bend for three pipes instead of two.

Three-Stem Equipment. Figs. 527, 662, 664. An improved form of the original Janney draft gear for passenger equipment cars. The coupler head is connected to the center stem and the two side stems and its movement to either side of the center line of the car is resisted by the side stem springs. The center stem is backed by the draft spring proper which is held in a pocket between the sills and which absorbs most of the shocks. The buffer plate is backed by two buffer stem springs which aid in absorbing buffing shocks.

Threshold or Threshold Plate. (Passenger Equipment Cars.) A plate placed across the bottom of a door opening. See DOOR SILL.

(Vestibule.) The plate which covers the buffer plate and connects it with the platform.

Throat (of a Car Wheel). The interior angle of a flange where it joins the tread of the wheel.

Throat Piece (Snow Plow Framing). The curved ribs connecting the inclined plane of the plow with the deck. Being curved they give a projection to the deck, which lessens the tendency of the snow to ride over the top of the plow.

Thumb Piece. A general term applied to many forms of lugs or projections for moving springs, catches, or other movable mechanical parts.

Thumb Screw. A screw with two projecting flat sided flanges adapted to be turned with the finger and thumb.

Ticket Holder. Fig. 1984.

Tie. A beam or rod which secures parts together and is subjected to a tensile strain.

Tie Bar. A bar or rod which acts as a tie.

Tie Timber. See CROSS TIE TIMBER.

Timber Key. See SILL TIMBER KEY.

Timber Pocket. Fig. 472. An iron casting used as a seat or pocket at the junction of timbers in wooden car framing. It avoids the necessity of dovetailing or mortising the timbers together. See POST POCKET.

Tip Car. A car from which the load is discharged by tipping the car body. See also DUMP CAR.

Tire. A heavy hoop or band of iron or (usually) steel forming the ring or periphery of a wheel to impart strength to it and to resist wear. See TIRE FASTENING.

Tire Bolt. A bolt for holding a tire on a wheel center. When retaining rings are used the bolts pass through the rings and hold them and the center and tire together.

Tire Fastening. See WHEELS.

Tire Fastening for Steel Tired Wheels. See WHEELS, STEEL-TIRED, TIRE FASTENING FOR.

Tires, Minimum Thickness for Steel (M. C. B. Recommended Practice). Fig. 2905. In 1894 a Recommended Practice was adopted for Minimum Thickness for Steel Tires of Car Wheels, to be 1 inch, to be measured normal to the tread and radial to the curved portions of the flange through the thinnest part within 4¼ inches from the back of the flange; the thickness from the latter point to the outer edge of tread to be not less than ½ inch at thinnest part as shown on the drawing.

A further practice was adopted of cutting a small groove, as shown, in the outer face of all tires when wheels are new, at a radius of ¼ inch less than that of the tread of tire when worn to the prescribed limit, to facilitate inspection.

Tires, Mounting (M. C. B. Recommended Practice). In 1914, by letter ballot, it was adopted that wheel centers should be machined to the exact diameter specified and the tires' finish bored to the diameter of the center, less 1-1000 inch for each inch in diameter.

Toe Nail. A nail driven in bliquely to fasten the end of a board or other piece of timber to the surface of another. The timber so fastened is said to be toed, or toe nailed.

Toggle Arms (Hopper Doors). The two arms of a toggle joint, which form a strut between the two opposite hopper doors, holding them closed.

Toilet. Another name for a saloon or lavatory.

Toilet Paper Holder. Fig. 1792.

Toilet Rack. Figs. 1745, etc. A rack for toilet articles, etc.

Tongs or **Crabs** (Pile Driver and Wrecking Cars). A device for anchoring the body of the car to the track when in use. A jack screw is used in connection with the tongs to raise the body of the car, so as to bring a strain upon the tongs. See BOLSTER JACK SCREW.

Tool Car (Wreck Train Equipment). A car used for carrying chains, cables, blocking, jacks, and all the necessary tools used in clearing wrecks.

Top Chord (of a Truss). The upper outside member of a truss, particularly one divided up into panels. The members of mere trussed beams are not commonly designated as chords.

Top Door Rail. The uppermost horizontal bar or piece of a door frame.

Top Door Track. See DOOR TRACK.

Top Equalizer Truck. Figs. 999, 1009, 1019.

Top Rail (of Door). See TOP DOOR RAIL.

Top Side Bearing. A body side bearing. See SIDE BEARINGS.

Torch (Pintsch System). A special device combining the ordinary wax taper torch, and a key, which fits the cock of any Pintsch lamp, and will open or close the globe of any lamp from the floor of the car.

Tornado Lamp. A general term applied to lamps which receive their supply of air through a long tube, usually connected with the supports or arms of the lamp, so as to check the effect of sudden gusts of wind. Hurricane lamp is another name.

Torpedo. A cylindrical detonating cap provided with clips for folding under the head of the rail for the purpose of making a loud alarm as a signal on the passage of engines over them. The basis of the deto-

nating compound is fulminate of mercury. The interior pieces of iron, to insure the explosion of the fulminate, are termed anvils.

Tourist Sleeping Car or **Tourist Car.** A sleeping car more plainly finished than a standard sleeping car and generally upholstered in rattan or leather, for the accommodation of travelers who cannot afford to use a standard sleeping car. See SLEEPING CAR.

Towel Rack. Fig. 1748. A tray of rods for holding towels.

Towel Rod. Fig. 1724. A rod fitted to the wall with brackets or otherwise, upon which towels may be hung.

Towel Rod Brackets. Fig. 1737. See TOWEL ROD.

Towel Roller Bracket. A bracket for supporting a towel roller. There are two, the fixed end and loose end bracket. The principal supply of towels, however, is usually carried in a towel rack or hung on towel rods.

Towel Vendor. Fig. 1754.

Track Laying Car. A low push car, primarily for carrying rails short distances in construction. They are frequently without a floor or platform and are provided with fixed rollers at the side for running the rails forward.

A platform car with a cantilever truss extending out from one end of the car or over the track and on which rails may be run out and distributed on the ties. Some track layers are equipped with carriers which carry the rails and ties forward from cars in the rear.

Track Sweeper. See SWEEPING CAR.

Track and Wheels, Terms and Gaging Points for. See WHEELS and TRACK.

Traction Air Brake. Figs. 1397-1444. The adaptation of air brake equipment to electrically propelled cars or trains. The changed conditions of motive power and method of operating such cars or trains, have necessitated various changes in the details of the equipments. See AIR COMPRESSOR, GOVERNOR SYNCHRONIZING SYSTEM.

Trailer or **Trailer Car.** Figs. 190, 195. A car without its own motive power for use in trains operated by motor cars.

Trailer Truck. Figs. 957 and 961. A motor car truck which is not equipped with motors.

Train Air Signal Apparatus. Figs. 1345, 1404, 1410, etc. A substitute for the bell cord arranged to give train signals by compressed air. A separate line of signal pipe, similar to the brake pipe, extends throughout the train, connected between the cars by hose and couplings. A car discharge valve, connected to this signal pipe, is located in each car and attached to the bell cord in such manner that pulling on the cord releases air from the signal pipe. In the cab on the engine or motor car is a signal valve, which is also connected with the main signal pipe and a small signal whistle. The supply of air is received from the main reservoir through a reducing valve, which maintains a pressure of about 45 lbs. per square inch in the signal apparatus.

When the car discharge valve is opened, by pulling on the cord, the diaphragm in the signal valve is operated so as to blow the whistle. Signals can be given in this way with rapidity and great certainty. If the train breaks in two the whistle is blown loudly for a considerable time.

Train Air Signal Stop Cock. A stop cock in the air signal pipe. There is one at each end of a car.

Train Brake Pipe. See BRAKE PIPE.

Train Car. A CABOOSE CAR.

Train Lighting. (M. C. B. Recommended Practice.) See ELECTRIC LIGHTING.

Train Line (Steam Heat). See STEAM AND AIR CONNECTIONS FOR PASSENGER EQUIPMENT CARS.

Train Line (Electric Lighting). A system of heavy conductors, generally three in number, running the entire length of the car either over the roof or under the car body and terminating at each end of the car in a suitable connection device, located either above the vestibule opening or below the platform. Two of these conductors are tapped and connections carried down inside of the car, where connections may be made with the electric lighting system of the car. The other conductor generally has no connection to it in the car. Its purpose is to act as an end feeder or equalizer when a head end generator is employed. The other two conductors or lines may be employed for tying together in parallel the lighting systems of the different cars, irrespective of whether a head end generator is used or not.

Train Line End Valve. See END TRAIN PIPE VALVE.

Train Line Connector (Electric). A device for connecting the train lines of one car to those of another in such a manner as to insure the proper connection of the conductors of one car with those of another independently of sequence or end relations of the various cars; that is to say, the conductor must always join wire No. 1 of one car with wire No. 1 of the next car, etc., no matter whether the cars have been turned end for end or in what order they may stand in the train.

Train Line Jumper. A connection made generally at the rear end of the train on the end farthest from the head end generator connecting the conductor which is not tapped in the cars to one of the conductors that is tapped. The current is carried from the generator clear through to the end of the train and by means of the jumper brought back on one of the other wires. This arrangement of train lines, known as the equi-potential or return loop, insures uniform voltage at each of the cars, irrespective of the drop or loss that may take place in the conductors themselves.

Train Lighting Instruction Car. Fig. 240. A car equipped with train-lighting apparatus for the purpose of instructing employees.

Train Pipe (Air Brake). See BRAKE PIPE.

Train Pipe or **Brake Pipe Bracket.** Fig. 480.

Train Pipe Valve (Car Heating). See END TRAIN PIPE VALVE.

Transfer Table. A platform and section of track on wheels, its length being equal to or greater than the length of a car. Its chief use is to transfer cars from one section of a shop to another, connecting with parallel tracks and running transversely to them.

Transom. Primarily, a cross piece.

(Carpentry.) A horizontal piece framed across a door or double light window. The term is also applied in the general sense of a cross piece in other ways.

(Trucks.) 20, Figs. 991, 1010. B, Fig. 965. One of two horizontal cross beams attached to the side frames, between which the swing bolster is placed.

Transom Bearing Block. A piece of wood or iron placed on top of a transom under the bearing of a swing hanger to raise it.

Transom or Bolster Chafing Plate. See FRICTION BLOCK. and BOLSTER CHAFING PLATE.

Transom Casting. A casting used to attach a transom to a truck frame.

Transom Corner Plate (Passenger Equipment Trucks). 131, Figs. 991, 1010. A plate or casting connecting and bracing the transom and wheel pieces. See TRUCK FRAME CORNER PLATE.

Transom Draft Gear. Figs. 714-717. A special arrangement of draft gear.

Transom and End Piece Tie Rod. 59, Figs. 991, 1010. A road extending through the transom and end piece to stiffen the truck frame.

Transom Opener. A device for opening a transom over a door; very similar to a deck sash opener.

Transom Plate. Iron plates on both sides of wooden transoms of passenger equipment trucks for strengthening purposes.

Transom Tie Rod or Bar. 23, Figs. 991, 1010. A bar passing across a truck close to the transom to hold the wheel pieces and transoms rigidly together.

Transom Tie Rod Washer. 26, Figs. 991, 1010. A bearing for the nut on a transom tie rod.

Transom Truss Rod. 24, Figs. 991, 1010. A transverse rod attached at its end to the wheel pieces, extending alongside the transoms and inclined downward under a central transom truss block, so as to strengthen the transoms. Generally, two such rods are used with each truck.

Transom Truss Rod Seat. A bearing for the transom truss rod on the under side of the transom.

Trap (for Refrigerator Car). An S-shaped pipe, largely used in all forms of plumbing work for permitting the exit of water, while preventing the entrance of air. See STEAM TRAP.

Trap Door. A door in a floor or roof, closing flush therewith when shut. See PLATFORM TRAP DOOR.

Trap Door Latch (Vestibule). Figs. 1841, etc. The latch for the vestibule trap door.

Trap Door Lock. Figs. 1841, 1843, etc. See TRAP DOOR LATCH.

Traversing Jack. A jack that can be moved horizontally on a bed or track while under its load. See JACK.

Tread (of a Step). The part on which the foot is placed. See TREAD BOARD and SAFETY TREAD.

(Of a Car Wheel.) The exterior cylindrical surface of a car wheel inside of the flange which comes in contact with the rail. See WHEEL.

Tread Board (of a Step). The horizontal part on which the foot is placed. Usually covered with rubber or metal safety treads to prevent slipping. See TREAD and SAFETY TREAD.

Triangular Washer. An iron plate or block, the cross section of which is triangular, and which forms a bearing for the nut or head of an inclined brace rod. Also called beveled washer, but the latter term is chiefly used when the angle between the two faces is small.

Triple Valve (Air Brake). Figs. 1346, 1360, 1365, 1366, 1367, 1448, 1449, 1471, etc. A valve device consisting of a body or case, called the triple valve body, which has connections to the brake pipe, the auxiliary reservoir and the brake cylinder, in which a slide valve is operated by a piston, so that when the pressure of the air in the brake pipe is increased the auxiliary reservoir is charged and the air in the brake cylinder is released to the atmosphere; and so that, when the air pressure in the brake pipe is reduced, air from the auxiliary reservoir is discharged into the brake cylinder for applying the brakes. A triple valve performing only these functions is now known as the plain triple valve.

The quick-action triple valve has all the features and performs all the functions of the plain triple valve, and has the additional function of causing a discharge of air from the brake pipe to the brake cylinder, when, in emergencies, the maximum force of the brakes is instantly required. More recent developments have added retarded release and uniform recharge features.

(For Freight Air Brake Gear.) A special form, not differing in principle from the passenger brake valve but generally combined with the reservoir and brake cylinder in one single part for economy and convenience of attachment.

Triple Valve Body. 2, Fig. 1360. See TRIPLE VALVE.

Triple Valve Branch Pipe (Air Brake). A short pipe by which the triple valve is connected with the brake pipe.

Triple Valve, Cleaning and Lubricating. See AIR BRAKES, CLEANING AND TESTING OF.

Triple Valve Gasket. A gasket placed in the joint between the triple valve and the brake cylinder.

Triple Valve Piston (Air Brake). 4, Fig. 1360. See TRIPLE VALVE.

Triple Valve Tests. See AIR BRAKES, CLEANING AND TESTING OF.

Trolley. Fig. 2713, etc. See PANTAGRAPH TROLLEY.

Truck. 19, Fig. 314; Figs. 962-1021. A small, low, four-wheel or six-wheel car, carrying one-half the weight of a car body. The car body is carried on a pair of center plates (truck center plate and body center plate), with a center pin or king bolt passing through them, about which the truck swivels. There are now some types of trucks in use in which the weight of the car is transmitted to the truck through side bearings. The trucks commonly used under freight cars have four wheels, but six-wheel trucks are used in special cases. Passenger equipment cars use either four or six-wheel trucks, the latter being generally used under very heavy cars. See DIAMOND ARCH BAR TRUCK, FLEXIBLE TRUCK, LOGGING TRUCK, PEDESTAL TRUCK, RIGID BOLSTER TRUCK, ROLLER SIDE BEARING TRUCK, SIDE BEARING TRUCK, SWING MOTION TRUCK.

The term is applied to different kinds of small vehicles used on and about stations for handling freight and baggage by hand. Many large terminal stations now use motor driven baggage trucks.

Truck Bolster. 16, Fig. 490; Figs. 493, 495-499; 30, Figs. 989, 991, 1010. A cross beam in the center of a truck, to which the lower center plate is fastened, and on which the car body rests. The truck bolster is connected to the body by a center pin, which passes through it.

Truck Bolster Chafing Plate. A plate attached to a wooden swing bolster to protect it from wear.

Truck Bolster Flitch Plate. See BOLSTER FLITCH PLATE.

Truck Bolster, Gages for Cast and Pressed Steel (M. C. B. Recommended Practice). Fig. M. C. B.-D. In 1914 gages for cast and pressed steel truck bolsters for 80,000, 100,000 and 140,000 lb. capacity cars were adopted as Recommended Practice.

Truck Bolster Guide Bar. See BOLSTER GUIDE BAR.

Truck Bolster Guide Block. A cast iron shoe for the

end of a truck bolster, which slides vertically between the columns or bolster guide bars.

Truck Bolster Truss Rod (Rigid Bolster Trucks). A rod attached near the ends of a wooden truck bolster and passing over a central truss block. In swing bolster trucks, rods of a similar nature are sometimes used, and are termed transom truss rods.

Truck Car. A car used in a wreck train for carrying spare trucks.

Truck Center Bearing Truss. The truss formed by the center bearing top and bottom arch bars.

Truck Center Frame. A frame made in one piece, riveted to the side frames or wheel pieces of steel passenger equipment trucks and taking the place of the transoms in the older types.

Truck Center Plate. 63, Figs. 989, 991, 1010. See CENTER PLATE.

Truck Frame. A structure composed of wooden beams, iron bars or of cast steel in one piece, to which the journal boxes or pedestals, springs and other parts are attached, and which forms the skeleton of a truck. See TRUCK SIDE FRAME.

Truck Frame Corner Plate (Passenger Trucks). See END PIECE CORNER PLATE and TRANSOM CORNER PLATE.

Truck Frame End Piece or **End Sill.** 17, Figs. 991, 1010. See END PIECE.

Truck Frame Knee Iron (Passenger Trucks). An interior angle plate of cast or wrought iron to connect the truck frame together. See END PIECE CORNER PLATE and TRANSOM CORNER PLATE.

Truck Side Bearing. 10, Fig. 490; 61, Figs. 991, 1010. A device attached to the top of the truck bolster, on which a corresponding bearing fastened to the body bolster rests. See SIDE BEARINGS.

Truck Side Frame. A, Fig. 965; Figs. 962, 1139, 1155, 1162. The longtudinal portion of a truck frame, on the outside of the wheels, which extends from one axle to the other, and to which the journal boxes and bolsters or transoms are attached.

Truck Sides, Cast Steel, Limiting Dimensions (M. C. B. Recommended Practice). Fig. M. C. B.—B.

In 1914 the limiting dimensions shown on the drawing for cars of 80,000, 100,000 and 140,000 lb. capacity, were adopted as Recommended Practice.

Truck Sides, Cast Steel, Gages for (M. C. B. Recommended Practice) Fig. M. C. B.—B1.

In 1914 gages for cast-steel truck sides for cars of 80,000, 100,000 and 140,000 lb. capacity were adopted as Recommended Practice.

Truck Sides, Cast Steel, Specifications for (M. C. B. Recommended Practice).

In 1912 specifications for cast-steel truck sides were adopted.

In 1914, by letter ballot, Section 16, Article VII, was amended to provide that all castings not meeting requirements of proof test should be rejected. Modified in 1915.

1. When the manufacturer is ready to make a shipment of material he shall notify the purchaser of that fact and await the arrival of the purchaser's inspector, to whom he shall furnish free any assistance and labor needed to make satisfactory inspection test and prompt shipment.

2. Manufacturer shall protect all castings, so that they do not become covered with rust.

3. *Cleaning.*—At his option the inspector may require that any or all castings be subjected to sand blast in order to make an examination of the surface for checks or cracks.

4. *Painting.*—They shall not be painted before being inspected unless otherwise specified.

5. *Process.*—Castings furnished under these specifications shall be made by the open-hearth process in accordance with the best foundry methods.

6. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon........not below 0.20 or above 0.30 per cent.
Manganese..................not above 0.70 per cent.
Phosphorus..................not above 0.05 per cent.
Sulphur.....................not above 0.05 per cent.

7. *Ladle Analysis.*—To determine whether the material conforms to the requirements specified in section 6 an analysis shall be made by the manufacturer, from test ingot taken during the pouring of each melt. Drillings for analysis shall be taken not less than ¼ inch beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser.

8. *Check Analysis.*—A check analysis may be made by the purchaser from a test coupon, representing each melt, and this analysis shall conform to the requirements of section 6.

9. *Sampling for Chemical Analysis.*—From the coupon described in section 12 (a), which has satisfactorily passed the physical requirements, borings shall be taken for chemical analysis.

10. *Physical Properties.*—The physical properties of steel shall be as follows:

(a) Ultimate tensile strength, lbs. per sq. in., not under 60,000.

(b) Yield point (by "drop of beam"), not under 50 per cent of ultimate tensile strength.

(c) Elongation in 2 in. per cent not less than 1,400,000 divided by the ultimate tensile strength.

11. *Proof Test.*—A minimum of one frame from each heat and not less than 2 per cent of the total frames furnished shall be tested in a suitable machine to the loads shown in the table for different capacity car trucks.

Car Capacity, Lb.	Initial Load, Lb.	Proof Tests. Load, Lb.	Proof Tests. Maximum Deflection, In.	Proof Tests. Maximum Set, In.
80,000	20,000	110,000	0.15	0.01
100,000	25,000	135,000	0.15	0.01
140,000	35,000	175,000	0.15	0.01

After applying initial load, reduce load to 5000 lb. and set deflection instrument at zero; apply the requisite proof load and measure deflection; reduce load to 5000 lb. and measure the set.

Truck sides may be supported at each end, directly beneath the center line corresponding to center line of axle when side frame is in the truck and loaded at center of bolster, opening midway between supports, or they may be supported in the center and loaded at the ends. The deflection and set shall be measured at the center line of spring seat.

12. *Annealing.*—Test coupons shall be annealed with the castings before they are detached. To determine the quality of annealing, the inspector will have one of the test coupons mentioned in section 12 (b) cut half way through and broken off from the casting for examination of the fracture. If, in his opinion, the annealing has not been properly done, he may require the casting to be reannealed, using the second test coupon for examination in this case. If after annealing or reannealing any casting is so much out of gauge as to require heating in order to bring it within the gauge it shall again be reannealed before it may be accepted.

13. *Sampling.*—For the purpose of determining whether the physical and chemical requirements are complied with, the inspector shall select at random on casting from each melt. From this casting the two physical and chemical test coupons shall be removed by the inspector, one of them shall be subjected to physical test, but if the coupon casting proves unsound the other coupon shall be used in its stead for this purpose.

(a) *Physical Test Coupons.*—The manufacturer shall have cast on each truck side two test coupons having a cross section of 1⅛ by 1⅛ in. and 6 in. long. These coupons are to be used for physical and chemical tests and their location upon the casting shall be specified by the purchaser.

(b) *Annealing Coupon.*—There shall be two additional coupons of a cross section not less than the average cross section of the casting. These coupons are to be used to determine the character of the annealing as specified in section II.

14. *Limiting Weights.*—Truck sides shall conform to the weights given in table. In case the castings have met all requirements except that of overweight, they may be accepted at the maximum allowable weight here specified:

Car Capacity, Lb.	Weights, Lb.		
	Minimum.	Normal.	Maximum.
100,000	485	500	515
140,000	640	660	680

15. *Workmanship.*—They shall conform to the dimensions shown on the drawings and shall be free from rust, scale, blowholes and shrinkage cracks.

16. *Marking.*—Each casting shall have the following markings cast upon it in raised letters and figures:

(a) Initials of Railroad Company.

(b) Month and year when cast, thus, 6-12.

(c) Manufacturers' serial number and trade mark (or other designation).

(d) M. C. B. S.

17. *Rejection.*—In case the test pieces do not meet the specifications, all castings from the entire melt shall be rejected. If the side frame selected to represent a melt does not meet the proof test, then all the frames from that melt shall be subjected to the proof test, and all such frames failing to meet the test shall be rejected.

18. *Removal of S.*—From each casting rejected by inspector under these specifications, he shall cause to be chipped the "S." of the letters M. C. B. S. which are specified in section 15 (d).

Trunnion. The pivot upon which any body, as a gun, revolves. The term is usually applied to bearings for objects of irregular shape, and having slow or irregular motion, as distinguished from the journals of wheels, etc.

Truss. A frame to which rigidity is given by uniting the parts so that its figure shall be in effect cut up into triangles, making it incapable of distortion by turning of the bars about their joints. The simplest form of truss is that in which a truss rod and king post are put underneath a beam to strengthen it, or two beams are framed together in the form of a letter A, and tied together at their lower ends by a rod or another beam. These are called king post trusses. Another form is that in which two posts are used, which are called queen post trusses. This is not a perfect truss, since it is capable of altering its shape by simply bending without rupturing its parts, when unequally loaded. In order to prevent this counterbalances should be added. This is the usual way of trussing the underframe of cars. The sills resist bending and act as straining beams, thus preventing great distortion. The usual forms of trusses used for the side framing of cars are the Pratt and the Howe types. In the former all the braces are subject to tension, and in the latter the braces are compression members. The Pratt truss is rarely used alone today for side trussing, but is often used in combination with the Howe truss. The Howe truss is rarely used in its simple form, being usually provided with vertical posts alongside of the vertical tension members. The side of a car is not a perfect truss as ordinarily built, for the middle panel, which contains the door, lacks the essential element of braces or counterbraces. Long cars are reinforced with heavy trusses of the bridge or roof type, and further strengthened by body truss rods.

Truss Block. A distance piece between a truss rod and the compression member of a trussed beam, which forms a bearing for both.

Truss Plank (Passenger Car Framing). A wide piece of timber, set on edge and bolted to, or sometimes gained into the posts on the inside of the car immediately above the sills.

Truss Plank Cap. A strip of wood attached to the top of a truss plank between the seat frames.

Truss Rod. 33, Fig. 364. A rod used in connection with a king or queen post truss, or trussed beam, to resist deflection. It is attached to the ends of the beam, and is supported in the middle by a king post, truss block, or two queen posts between the beam and the rod. See Body Truss Rod.

Truss Rod Anchor. An iron forging or casting bolted to the sills, to which the end of the side truss rod is fastened. It is commonly made integral with the body bolster when a double body bolster is used.

Truss Rod Bearing. A bearing used to furnish support to a truss rod at an angle or bend.

The bearing, over the bolster, of a long body truss rod running from end sill to end sill is called a body truss rod saddle, probably in part from its form. See Queen Post.

Truss Rod Iron. A bar of iron, having an eye, to which a body truss rod is attached, bolted to the under side of a sill below a body bolster. It is a form of attaching body truss rods almost out of use for freight cars, but in use on wooden passenger cars. A Truss Rod Anchor.

Truss Rod Saddle. See Body Truss Rod Saddle and Truss Rod Bearings.

Truss Rod Strut. See Queen Post.

Truss Rod Washer. A large flat or beveled washer, used under a nut on the end of a truss rod. Sometimes called a skew back.

Tufting Button. A button used in upholstery to hold the cord which passes through the upper covering of the upholstered surface, dividing it into squares or diamonds.

Tumbler. A drinking glass.

(Locksmithing.) "A latch engaging within a notch in a lock, bolt, or otherwise, opposing its motion until it is lifted or arranged by the key so as to remove the obstacle."—Knight.

Tumbler Holder. Figs. 1725, etc. A bracket or stand for holding glass tumblers or drinking cups. They are either single or double.

Tumbler Holder and Drip. Fig. 1734. A water cooler drip, the top of which is made large enough to hold a glass.

Tup. See HAMMER.

Turbo-Generator (Electric Car Lighting). Figs. 2434, 2469, etc. A steam turbine of small size direct-connected to a generator for furnishing electric current to light trains by the head end system. The turbo-generator may be mounted in the baggage car or on top of the locomotive boiler and receives steam from the locomotive.

Turn Over Seat. See REVERSIBLE CAR SEAT.

Turnbuckle. Figs. 1570, 1571. A device inserted in the middle of a long rod for changing its length. A form that has gained much favor for use on cars is that shown in Fig. 1570. They are made the following sizes, and larger in proportion.

Size. D	A.	B.	C.	L.
1 inch	6 in.	1½ in.	9 in.	25 in.
1⅛ inch	6 in.	1 11/16 in.	9⅜ in.	25 in.
1¼ inch	6 in.	1⅞ in.	9¾ in.	26 in.
1⅜ inch	6 in.	2 1/16 in.	10⅛ in.	27 in.
1½ inch	6 in.	2¼ in.	10½ in.	27 in.
1⅝ inch	6 in.	2 7/16 in.	10⅞ in.	28 in.
1¾ inch	6 in.	2⅝ in.	11¼ in.	28 in.

D. Size = Outside Diameter of Screw.

A. Length in Clear between head = 6 in. first length for all sizes.

B. Length of Tapped Heads = 1½ D.

C. Total Length of Buckle without Bolt Ends.

L. Total Length of Buckle and Stub Ends when open.

Turtle Back Roof. Figs. 136, etc. A roof for a passenger equipment car which is arched, and without a clere story or upper deck.

Twin Car Seat. A seat stand with a division arm, two cushions, two seat backs with two striker arms each, so that they may be turned to bring the occupants face to face. See RECLINING CHAIR.

Twin Hopper Gondola Car. A gondola car with two hoppers. See GONDOLA and HOPPER BOTTOM GONDOLA.

Twin Spring Draft Gear. Figs. 521, 706, 768. A draft gear in which the springs are arranged alongside of one another.

Twin Washer. A DOUBLE WASHER.

Two-Way Dump Car. Figs. 60, etc. A car from which the entire load may be dumped to either side of the track. See also SIDE DUMP CAR.

Tyre. See TIRE.

U

U-Bolt. A double bolt made of a bar of iron bent to the shape of the letter U, with a screw thread on each end.

U-Bolt Casting. A casting so shaped that a U-bolt can fit around it and connect it to a timber or sill to form a bearing or carrier for a pin or bolt.

Uncoupling Apparatus. See UNCOUPLING LEVER.

Uncoupling Arrangements. (M. C. B. Recommended Practice). In 1897 designs showing the details of uncoupling arrangements to concealed end sill cars and outside end sill cars were adopted as Recommended Practice.

In 1905 the shoulder of the bracket for the uncoupling rod was made bevel.

In 1908 these details were revised and changes made to overcome former defects.

The special feature of this uncoupling attachment is the slotted center bracket. By placing the rod back on top of end sill or head block a longer arm is obtained, which gives sufficient lift with ample slack in the chain, and by using a sloping slotted bracket the rod projects 1½ inches in front of coupler lock, which is about the best position for an efficient lift. The slotted bracket allows the rod to slide back 3½ inches and avoids interference when slack of train is bunched.

The handle shown should preferably project below end of car or be bent as shown by dotted lines, in order to protect the operator's hand.

Three links 3¾ inches, 5¾ inches and 7¾ inches long, respectively, are shown. By using one of these three links, therefore, a chain 6½, 8½ or 10½ inches long is obtained, which should fit all cars and M. C. B. couplers. These links should avoid the use of split links, "S" hooks and other temporary repair devices now very common. The arrangement as a whole is applicable to all types of cars, and if properly applied will largely obviate present troubles. Only a few limiting dimensions are shown on the drawing, as the others must be adapted to each particular class of car; but the dimensions for center arm, chain slack and position of lift pin eye should be carefully adhered to.

In 1911 the uncoupling arrangements for M. C. B. coupler were made to conform to the requirements of the U. S. Safety Appliance Act. Details of M. C. B. Standard attachments are shown in Fig. 2857. See SAFETY APPLIANCES.

In 1915 a recommendation was adopted that the uncoupling arrangement for passenger equipment cars should be located on the left-hand side of car facing the end of the car, the same as for freight equipment.

Uncoupling Chain. See UNCOUPLING ARRANGEMENTS.

Uncoupling Lever or **Uncoupling Rod.** 13, Figs. 287, 288; 12, Fig. 291; Fig. 598; Figs. 775-782. An iron rod with a bent handle forming a lever, usually attached to the end sill, by which the lock of the automatic coupler is opened and the cars uncoupled without going between them. The lever proper is the part attached to the rod and operating the unlocking mechanism, but in the case of freight cars the lever and rod are generally made in one piece. In passenger equipment cars the lever is located on the platform or in the vestibule. The short lever which is directly connected to a passenger coupler is also sometimes called uncoupling lever.

Uncoupling Lever Bracket. Fig. 479. A bracket supporting the uncoupling lever on the end of the car.

Uncoupling Rigging. See UNCOUPLING LEVER.

Uncoupling Rod. See UNCOUPLING LEVER.

Uncoupling Rod Guide. Figs. 606, 620. A guide or support for the UNCOUPLING SHAFT used on passenger equipment cars having wide vestibules. Preferably uncoupling shaft guide.

Uncoupling Rod Foot. Fig. 607. The bottom UNCOUPLING GUIDE ROD.

Uncoupling Shaft (Passenger Equipment Cars). A vertical rod extending up through the platform floor having a square end at the top to take the uncoupling lever and a crank arm at the bottom to which is attached an uncoupling rod. A partial turn of the uncoupling lever pulls out the uncoupling rod and releases the coupler lock, allowing the knuckle to open and the cars to part.

Uncoupling Shaft Bracket. Fig. 479. See UNCOUPLING LEVER BRACKET.

Underframe. Figs. 418-449. A framework, which receives the buffing and pulling stresses and carries the weight of the floor and body of the vehicle. In both freight and passenger cars in America the underframe and body are rigidly connected and mutually stiffen and strengthen one another, but in British carriages the body is framed as an independent structure, and merely rests on the underframe, rubber pads (india rubber body cushions) being interposed to deaden shocks. The only connection is through a body holding-down bolt Underframe includes all the framing below the floor, and includes the platforms, draft timbers, etc See general drawings of the various types of cars

Underhung Door. A sliding door which is supported and slides on a rail below the door

Union (Pipe Fittings). Figs. 2076, etc. A means of uniting the ends of two pipes with a nut The nut is attached to one pipe by a sleeve with a collar, and is screwed on a sleeve attached to the other pipe See PIPE FITTINGS and PIPE UNIONS.

Union Elbow. Fig. 2087. A union having one section in the form of an elbow.

Unit-Switch Control (Motor Cars). Figs. 2684, etc. A control apparatus for single cars and cars operated in multiple unit service. Parts are standardized to perunit of ready renewal. Main power circuit connections are made by pneumatically operated switches assembled in a switch group underneath the car. See Fig. 2544 for section through a unit switch group. For arrangement of the working parts of the air cylinder of a unit switch, see Fig. 2547. See Fig. 2560 for wiring diagram of unit switch control.

United States Gallon. A U. S. gallon contains 231 cubic inches and a U. S. gallon of water weighs 8 1-3 lbs. See IMPERIAL GALLON.

United States Government Specifications for Postal Cars. See POSTAL CARS, U. S. GOVERNMENT SPECIFICATIONS.

United States Safety Appliance Standards. See SAFETY APPLIANCES.

Universal Joint. "A device for connecting the ends of two shafts so as to allow them to have perfect freedom of motion in every direction within certain defined limits."—Knight.

Universal Valve. Fig. 1361. A valve mechanism used with both electric road and steam road passenger brake equipments, which corresponds in a general way to the triple valve in common use, in that it operates to charge the reservoirs and to control the admission of air to and exhaust from the brake cylinder. This valve, however, possesses many distinct and novel features which are made necessary by the rigid requirements of modern traffic conditions. The universal valve is of the built-up type, a simple form of triple valve being the base. This makes it possible to install and operate an equipment, if desired, in stages by adding to the simplest arrangement of apparatus such portions as are demanded by an advance in service requirements, up to the complete form of the device, which is electro-pneumatically operated. The complete form of the device consists of an equalizing portion, which controls the pneumatic service and release of the brake and the charging and recharging of the reservoirs of the equipment; a quick action portion with high pressure cap, which controls the transmission of serial quick action and the obtaining of high emergency pressure in the brake cylinders when an emergency application of the brakes is made; an electric portion which comprises the magnets, switch, etc., controlling the electric service application, electric release and electric emergency applications of the brake; and a pipe bracket to which the various portions of the valve device are bolted and to which all pipe connections are permanently made. The equipment employing this valve is known as the Universal Equipment.

Upholstery. In passenger car construction, the term includes the cushions, curtains, carpets, beds, etc., and generally the materials from which they are made.

Upper Belt Rail (Passenger Car Exteriors). A horizontal bar attached to the posts on the outside and above the windows. See BELT RAIL.

Upper Berth. 2, Figs. 1600, 1601; Fig. 1598. The top berth in a sleeping car section. It folds up by day against the roof, being secured by a berth latch, and the head board, mattresses and bedding are stored in the pocket between it and the roof. See BERTH.

Upper Berth End. The end piece of a sleeping car upper berth.

Upper Berth Front Panel. The central panel of an upper berth.

Upper Berth Ladder. 14, Figs. 1600, 1601; Fig. 1603. For use in entering and leaving an upper berth in a sleeping car.

Upper Berth Lower Rail The bottom or rear bar of the frame of a wooden upper berth. See BERTH FRONT.

Upper Berth Pocket. A pocket against the sides of the car which closes up flush therewith when the upper berth is folded up, but drops open when the berth is made up, to afford a receptacle for clothing and baggage. It has been replaced by a hammock. Similar pockets for the lower berth are made by turning up the head rest of the seat.

Upper Berth Rest. See BERTH BRACKET.

Upper Berth Rest Pivot. A pin attached to a plate fastened to an upper berth. The pin engages in a hole in a BERTH BRACKET.

Upper Berth Spring. Fig. 1648.

Upper Berth Top Rail. The upper or front bar of the frame of a wooden upper berth. See BERTH FRONT.

Upper Brake Shaft Bearing. A metal eye by which the upper end of a brake shaft is held in place.

Upper Buffer Spring. Fig. 533. A spring at the top of a vestibule diaphragm to hold the vestibule face plates in contact.

Upper Deck (Passenger Equipment Cars). Also called clere-story. The raised central portion of the roof. See DECK.

Upper Deck Carline. A carline supporting the upper deck or clere-story, usually called simply deck carline. A through carline, extending under both lower and upper decks, is also sometimes called an upper deck carline or profile carline.

Upper Deck Eaves Molding. A molding, usually called simply deck eaves molding, on the outside edge of the roof.

Upper Door Sash. The part of a double window sash in a car door which covers the upper part of the opening. This upper section is usually made movable, so that it can be lowered for ventilation.

Upper Floor (Stock Car). More commonly called double deck. A deck or floor in a stock car half way between the main floor of the car and the roof, to

double the carrying capacity of the car for pigs, sheep, calves, etc.

(Automobile Car.) A similar arrangement fitted in an automobile car.

Upper Wainscot Rail. A longitudinal wooden bar or rail, fastened to the posts on the inside of a passenger car immediately under the window. See WAINSCOT RAIL.

Urinal. A metal or porcelain receptacle used in saloons, connected to a pipe leading through the floor. They are distinguished as corner or side urinals. A concealing urinal, shutting up flush with the wood work when not in use, is sometimes used.

Urinal Cover. A wooden or sheet metal lid for inclosing a urinal.

Urinal Drip or **Drip Pan.** A pan under a urinal on the floor.

Urinal Handle. A handle in a saloon, placed above the urinal for support.

Urinal Ventilator. A pipe attached to a cap on a urinal, communicating with the top of a car, where some form of wind scoop is often added.

V

V-shaped Screw Thread. A thread with a sharp edge at the top and sharp groove at the root. The Sellers' (U. S.) standard thread is flat at the top and at the root, and the Whitworth is rounded.

Vacuum Brake. A system of continuous brakes which is operated by exhausting the air from some appliance under each car, by which the pressure of the external air is transmitted to the brake levers and shoes. So called in distinction from AIR BRAKES, which are technically understood to refer only to brakes operating with compressed air, although in a literal sense the vacuum brake is also an air brake. An ejector on the engine is ordinarily used for exhausting the air, connected with the rest of the train by pipes and flexible hose between the cars. A continuous pipe is connected through the train between cars by rubber hose, wound with wire to prevent collapsing, and suitable couplings. Under each car is a large cylinder with a piston and rod connected to the brake levers actuating the brake shoes. These cylinders are connected to the train pipe through a simple form of ball valve. An ejector on the locomotive maintains a vacuum of from 20 to 24 inches in the train pipe and in the cylinders under each car. In the release position the piston rests by its own weight in the bottom of the cylinder. To apply the brakes air is admitted to the train pipe and through the ball valve under each car to the space below the piston. The vacuum above the piston permits the atmosphere pressure below the piston to raise it and apply the brakes. A vacuum is always maintained above the piston and is available for applying the brakes at any time. In case the train parts the admittance of air to the broken train pipes applies the brakes in both sections of the train. A vale in the caboose may also be used to admit air to the train pipe and apply the brakes in case of emergency. To release the brakes, the vacuum is restored in the train pipe and under the pistons by working the ejector.

Vacuum Cleaner. Fig. 2084. A device for removing dust from carpets, etc. It usually consists of a motor-driven pump, which creates a vacuum, by means of which the dust is drawn up through a hose and deposited in a receptacle.

Valve. A lid, cover, or plug for opening and closing an aperture or passage.

Valve Body. The shell case or frame of a valve. See TRIPLE VALVE BODY.

Valve Key (Pintsch Gas Lighting Apparatus). A key for opening all the high pressure valves, the lamp key being used for the low pressure valves connected with the burners.

Valve Rod. 13, Fig. 340. A rod for opening and closing a valve. Frequently an extension of the valve stem. See VALVE STEM.

Valve Seat. The surface on which a valve rests.

Valve Stem. A rod attached to a valve, and by which the latter is moved, is called a valve stem or spindle.

Van. See CABOOSE.

Vapor Regulating Valve (Car Heating). Figs. 2247, etc. A valve by which the amount of steam admitted to the heater pipe is controlled. For a more detailed description of operation of the one used with the PRESSURE and VAPOR CAR HEATING SYSTEM see VAPOR RESERVOIR, which acts in conjunction with it. It is possible with this system to combine both the valve and the reservoir, in which case it is called a vapor regulating valve, as above.

Vapor Reservoir. Used in the PRESSURE and VAPOR HEATING SYSTEM, Figs. 2155, 2265, etc., in conjunction with the VAPOR REGULATING VALVE. It is placed below the blowoff, or drip valve, forming an extension to it, and consists of a spiral coil of copper piping surrounding a pipe which forms an extension to the blow-off valve. This pipe has several slots cut through to allow the hot water escaping from the system to trickle over the spiral copper pipe. This spiral pipe is filled with a liquid that boils at a low temperature and an extension of the pipe is connected to a diaphragm in the frame of the automatic VAPOR REGULATING VALVE. One or more joints are used to connect the coil and the diaphragm. The extension of the diaphragm closes the steam valve by means of the stem as soon as the liquid in the coil reaches a temperature at which it boils, and under which conditions the vapor generated has sufficient force to close the valves against the spring. When the liquid in the coil cools, which follows the cutting off of the steam supplied to the radiating coils, the vapor condenses and the spring forces the valve open, allowing a fresh supply of steam to enter the heating pipes and supply additional heat to the car.

Vapor System (Passenger Train Lighting). Figs. 2263, etc. A system of gas lighting designed for use in localities where Pintsch gas charging plants are not available. The gas is produced by mixing air with the vapor of gasolene. The air is taken from the air brake system and passing through a carburetor charged with gasolene becomes a gas suitable for illuminating purposes. The gas is burned in a mantle lamp and produces a soft white light.

Referring to Fig. 2363, air is taken from the auxiliary reservoir of the brake system through check valve 1020 and into the air storage tank through valve 53-B. It then passes up into the car to shut-off valve 2173, which is placed in some convenient location. From valve 2173 the air is carried to thermostatic regulator 2252, and into the carburetor, where it mixes with the gasolene vapor. The gas thus formed passes through regulator 254 to main cock 25-C inside the car and thence through roof piping to the lamps. Check valve 1020 prevents the stored air from returning to the brake system when the brakes are inopera-

tive. With this arrangement, when the car is cut off from the air supply a sufficient quantity of air is held in the tank to keep the lights burning. The carburetor and air storage tank are combined, the carburetor being placed within the tank so that it will be well protected from puncture in case of a wreck. The tank is made of welded steel and is 24¼ in. in diameter by 8 ft. 11¼ in. long. The carburetor consists of a piece of 12 in. wrought iron pipe and is securely fastened to the air tank in such a manner that there is no connection between the air storage compartment and the carburetor. The tank is shown in section in Fig. 2364. That there may be no liquid gasolene present in the gas, the carburetor is packed with an absorbent material, consisting of cotton wicking made up in cartridges about 6 in. long and of a diameter to fit tightly in the carburetor. The cartridges are made by rolling up strips of the cotton wicking with wire cloth. The cartridges are placed in the carburetor with baffle plates between them. Each baffle plate has an opening at the outer edge for the passage of the gas and the arrangement is such that the holes in adjoining plates are on opposite sides of the carburetor, thus causing the air to pass through every part of the carburetor and become thoroughly saturated with gasolene vapor.

Vapor Trap. See STEAM TRAP.

Varnish. A liquid for covering paint or woodwork with a hard, impervious and glossy surface.

Vaulted Deck Window. A deck window shaped like an arch.

Velocipede Car. Figs. 2744, etc. Generally a three-wheeled car, in which the rider sits astride and propels the car with his feet (or feet and hands together), after the manner of a velocipede. They comprise a variety of light cars for inspectors, telegraph line repairers, lamp lighters, etc.

Veneer. "A thin leaf of a superior wood for overlaying an inferior wood."—Webster. By trade usage it is a veneer if it covers other materials than inferior wood.

Vent. "A small aperture; a hole or passage for air or other fluid to escape."—Webster.

Vent Valve (Air Brake). Fig. 1467.

Ventilated Box Car. Figs. 112, 113, 883-912. Similar to an ordinary box car, but arranged for ventilation and suitable for the transportation of produce or other food-stuffs not needing refrigeration. See CAR.

Ventilating Jack (for Saloons). Also called wind scoop. A flaring horizontal tube, constituting a simple form of the ventilating devices which use the current produced by the motion of the cars to cause an exhaust current of air.

Ventilator (Saloon). The fixed oval sashes fitted in the saloons of many of the passenger cars are often arranged with a circular ventilator near the center.

Figs. 2267-2297. A device for admitting or exhausting air to or from a railway car. Ventilators, according to their position, are designed as deck ventilators (end or side), and ventilators, frieze ventilators, etc. They are often designated as automatic or self-acting. Day coaches usually depend upon the deck windows for ventilation, the sash at every other window being hung on different sides, so that the open sash may be hinged on the front end. For a report of tests with various ventilators see Procedings M. C. B. Association, 1894, page 234. See DECK VENTILATOR.

(For Fruit Car.) Figs. 909-911. A system of slats at each end of the car, so arranged as to enable the ventilators to be readily opened or closed from the outside.

(Refrigerator Car.) Figs. 883, 887, etc. A current of air must be admitted to refrigerator cars, which passes through the refrigerator and comes in contact with the lading. As it becomes warm it rises upward and passes out. The ventilator controls the admission of air and its circulation.

See HOPPER VENTILATOR.

Ventilator Blower. A blower used in connection with dining car ventilators.

Ventilator Deflector. A metal plate or board placed in such a position at a ventilator opening that it will cause a current of air to flow into or out of the car when the latter is in motion.

Ventilator Door. A door for closing the aperture of a ventilator.

Ventilator Hood. A shield over the outside of a ventilator to prevent the entrance of sparks, cinders, rain or snow. It is sometimes intended to direct the current of air either into or out of the car.

Ventilator Netting. A wire screen or netting fastened over the outer deck window sash to prevent the entrance of sparks and cinders.

A meeting over the ventilator windows of a fruit car.

Ventilator Opener. See DECK SASH OPENER.

Ventilator Pivot. A pin on which a ventilator door or sash is swung or hinged It is the same as a deck sash pivot.

Ventilator Plug. Fig. 883. A hatch; a door for closing the opening in a refrigerator car ice bunker.

Ventilator Register. A metal plate or frame attached to a ventilator opening, provided with slats arranged so as to turn, or openings which can be controlled, and thus either open or close the ventilator.

Ventilator Sash. Usually a deck sash.

Ventilator Staff. A pull hook or DECK SASH OPENER.

Ventilator Valve. A door for opening or closing the aperture of a ventilator, usually made to turn on pivots at or near its center.

Vertical Steam Trap and Blow-Off. A THERMOSTATIC STEAM TRAP, and a blow-off valve combined. It may be operated from inside of the car.

Vestibule. Figs. 528, etc. Formerly that part of the car nearest the door, cut off from the main saloon by an interior door. It was occupied by the saloon, washing and heating arrangements, etc. Its purpose was to give protection to the interior of the car against drafts and noise.

Usually a platform enclosure, consisting of a face or buffer plate, constituting an arched doorway, connected with a spring extended rod, a foot plate combined with the buffer stems and face plate, a bellows-like connection called a diaphragm between the face plate and car frame and side doors opening to the steps.

Vestibule Body Corner Post. The inner post of a vestibule, set against the end of the car body and directly over the platform sills.

Vestibule Buffer Plate. 79, Fig. 528. An extra long and wide buffer plate, sometimes recessed or chamfered at the ends, where it is connected with the face plate of the vestibule, whose face is flush with the buffer plate.

Vestibule Corner Post. 31, Fig. 404. The outer corner post of the vestibule.

Vestibule Curtain. Fig. 582, etc. A curtain which is stretched across the inside surface made by the vestibule diaphragms and face plates when two cars are coupled, to protect passengers from injury.

Vestibule Curtain Fixtures. Figs. 582, etc.

Vestibule Curtain Handle. Figs. 582-584, 586, 590, 593. A handle or catch used to secure a vestibule passageway curtain to its hook. A release handle is one which automatically unfastens in case of excessive strain.

Vestibule Curtain Hook. Figs. 591, 592. See VESTIBULE CURTAIN.

Vestibule Curtain Shield. Figs. 585, 589, etc. A shield to protect a vestibule curtain when rolled up.

Vestibule Diaphragm. Figs. 536-548. See DIAPHRAGM.

Vestibule Diaphragm Post. 32, Fig. 404. The vestibule post to which the diaphragm is connected.

Vestibule Dome Lamp. A VESTIBULE LAMP.

Vestibule Door. Figs. 852, 855, etc. A door by which the vestibule of a car is entered from the side. In the older or narrow type of vestibule they are double or divided, the two doors being hinged together and swung from the vestibule corner post.

Vestibule Door Hinge. Strap hinges, which fasten the double doors of a narrow vestibule together.

Vestibule Door Rod. A bar or rod across the doors of a narrow vestibule to prevent their being pushed in.

Vestibule End Carline. A platform hood end carline. See CARLINE.

Vestibule End Post. See VESTIBULE CORNER POST.

Vestibule End Window. The window in the end of the vestibule enclosure.

Vestibule Face Plate. Fig. 532. An inverted U-shaped forging and forming with the diaphragm a passageway from the platform of one car to that of the next. The weight of it is carried on the buffer plate and it is kept thrust out against the opposing face plate either by springs or by its own weight.

Vestibule Gate. A gate used to close the vestibule passageway at the rear of the last car in a train.

Vestibule Guard Rail. Figs. 608, 613, 614. A hand rail or hand hold, pivoted at one end and fitting in a socket at the other, and located on the end of the car so that it may be swung across the vestibule door and hold it in an open position.

Vestibule Hood. The platform hood of a vestibuled car.

Vestibule Lamp. Fig. 2314, etc. A lamp used for lighting a car vestibule.

Vestibuled Car (Passenger Equipment). Figs. 139, 140, 143, 147, etc. A car equipped with covered enclosed platforms. See VESTIBULE.

Volt. The unit of electric pressure or electro-motive force.

Voltmeter. An instrument for measuring the voltage of electric currents.

W

Wainscot Panel (Passenger Car Interior). 4, Fig. 1450. A panel under the windows between the two wainscot rails.

Wainscot Rail (Passenger Car Interior). 3, Fig. 1450. A longitudinal wooden strip fastened to the posts and extending from one end of the car to the other. The lower wainscot rail comes immediately above the truss plank; the upper wainscot rail is immediately under the window. The wainscot end rails are the wainscot rails at the end of the car.

Walkover Seat. Fig. 1653, etc. A term used to designate a type of car seats in which the back does not turn over when the seat is reversed. Also called GLIDEOVER and PUSHOVER.

Wall Lamp. A lamp to fit in a recess in the wall of a car or corridor.

Wall Seat End. The seat end next to the wall or side of a car, so called in distinction from the aisle seat end.

Wardrobe (Postal Car). Fig. 1870. See also POSTAL CARS, U. S. GOVERNMENT SPECIFICATIONS.

Wards (of a Lock). The interior circular ridges which fit into corresponding recesses in the bit of a key (the latter also termed wards), the surrounding solid parts of the bit being called the web.

Wash Bowl or Wash Basin. See BASIN.

Wash Bowl Pipe. A waste pipe.

Wash Room. A compartment provided with toilet facilities. See LAVATORY.

Wash Room Pump. More properly BASIN PUMP.

Wash Stand (Postal Cars). Fig. 1765, etc. A cast stand carrying a basin. They are distinguished as corner or side wash stands.

Wash Stand Slab. A stone or metal slab which forms the top for a wash stand.

Washer. Fig. 482. A plate of metal or other material, usually annular, which is placed under a nut or bolt head to give it a better bearing. Two or more washers are sometimes combined and called washer plates, strap washers, double or twin washers, triple washers, etc.; they are sometimes made beveled or triangular for a rod or bolt which is oblique with reference to the bearing surface. A socket washer or flush washer is one provided with a recess for the bolt head, so as to leave it flush with the surface of the adjoining parts. Cut washers or wrought washers are those stamped out of rolled iron plates. Cast washers are made from cast iron. Both are largely used. Washers in car work generally take their name from that of the bolt or rod to which they are attached.

Washer Plate. A STRAP WASHER.

Waste. The spoiled bobbins of cotton or woolen mills, used for wiping machinery and for JOURNAL PACKING. Wool waste is preferable for the latter purpose.

Waste Cock. (Baker Heaters.) A cock attached to the expansion drum or circulating drum of the Baker heater for drawing off or changing the water in the heater pipes.

A cock for drawing off water from a tank or basin.

Water Alcove. Fig. 1768. A recess in the side of a partition of a passenger car to receive the faucet of a water cooler or water pipe and a drinking cup. The term is generally used to designate the metal casing or lining with which the recess is covered. The water tank for supplying water alcoves is usually placed on the other side of the partition, in the saloon, and commonly when so placed extends to the roof.

Water Circulation Heating System. See HOT WATER CIRCULATION HEATING SYSTEM.

Water Closet. Fig. 1779, etc. A commode with water supply to rinse the basin and carry off the contents.

Water Cooler. Fig. 1761, etc. A tank or vessel for carrying drinking water, which is usually cooled with

ice. The sides are generally made double, and the space between filled with some non-conducting substance. They frequently extend to the roof. See WATER ALCOVE, WATER TANK.

Water Drip. A pan or receptacle to receive the waste water from a water cooler. A drip pipe, or waste pipe, connects with it.

A slight projection or raised seam in the roof of a passenger or baggage car over the side doors, or at the end of the car in the platform roof to divert the water so it will not fall upon persons entering the car or passing from one car to the next.

Water Gage. See GLASS WATER GAGE.

Water Seal. See TRAP.

Water Supply. Figs. 1776-1778. The system of water supply used in Pullman sleeping cars is under air pressure, thus doing away with the old method of using pumps for raising water for washing purposes. The system consists of forcing water into the wash bowls by air pressure taken from the air brake system. The water is usually heated by using live steam from the locomotive for this purpose.

Water Tank. A vessel or reservoir for holding water. Those used on cars for drinking water are usually made of sheet iron, and often extend to the roof. They are then usually drawn from by a water alcove, Fig. 1768, the tank being usually in the corner of the saloon, concealed from the interior of the car.

For size and arrangement of water tank in postal cars, see U. S. Government Specification for POSTAL CARS and Fig. 1859.

Wastometer. Fig. 1787. A device for flushing water closets.

Watt. The unit of electric power. The product of one ampere multiplied by one volt. It is equal to 1-746 horsepower.

Wattmeter. An instrument for measuring electric power.

Waved Moldings. Moldings which by a special machine are made of a corrugated section longitudinally.

Way Car. A CABOOSE.

Weather Strips. Fig. 1891, etc.; 1924, etc. A strip for application around the crevices of windows or doors, for excluding the dust and wind, and for preventing water from entering around the windows.

Web. A term applied to the center portion of a beam, as an I-beam, which ties the flanges together. See BODY BOLSTER FILLER.

(Of a Key.) The solid portion of a bit of a key, the recesses cut away being termed wards. See BIT.

Web Filler. See BODY BOLSTER FILLER.

Webbing. A strong fabric, made of hemp or other material which is not likely to stretch, used in upholstering car seats.

Wedge. See JOURNAL BOX WEDGE. The metal piece used to keep a journal bearing in its place in the journal box.

Wedge, Journal Box. See JOURNAL BOXES AND DETAILS.

Weight of Car, Light; Stenciling of. See FOUNDATION BRAKE GEAR.

Well Car. Figs. 78, 339. A flat car with an opening in the center to allow the load to extend below the floor level when it could not otherwise come within the overhead clearance limits. See CAR.

Wheel. A circular frame or solid piece of material which revolves on an axis. See BRAKE RATCHET WHEEL, HAND BRAKE WHEEL, etc.

Fig. 1185, etc. A circular frame or disk, as above defined, serving to support a moving vehicle, as CAR WHEEL, hand car wheel, etc. Car wheels are generally either cast iron (chilled), forged of cast steel or steel tired.

The rules for INTERCHANGE OF TRAFFIC give the defects for which wheels may be replaced.

Wheel Bar (Passenger Truck). A wheel piece.

Wheel, Cast-Iron (M. C. B. Recommended Practice). Fig. 2918, etc. In 1904 designs of wheels for cars of 60,000 pounds, 80,000 pounds and 100,000 pounds capacity were adopted as Recommended Practice. Revised 1907. Modified 1909. Modified in 1911. In 1913 titles of drawings were changed to show gross weight capacity. In 1914 title of sheet N was corrected to read "95,000 lbs."

Wheel Center (Steel Tired Wheels). The portion of a wheel inside of the tire and between it and the hub or boss. The wheel center is sometimes in one piece and sometimes made up of two parts, the hub or boss and the central filling piece. Face plates, front and back, are also used. The term is seldom applied to chilled or cast wheels.

Wheel-Check Gage (M. C. B. Standard). Fig. 2839. In 1896 a standard reference gage for mounting and inspecting wheels was adopted by letter ballot to take the place of the check gage for mounting wheels, and the gage for distance between wheels. At the same date a standard check gage was adopted. In 1907 this was modified. Modified 1909.

In 1911 the mounting and inspection wheel gages were eliminated and a wheel check gage adopted as their substitue.

Wheel-Circumference Measure for Cast-Iron Wheels (M. C. B. Standard). Fig. 2840.

By letter ballot in 1893 a Wheel Circumference Measure was adopted as a standard of the Association. Prior to that date it had been recommended for use in all building shops.

In 1900 a new form of Wheel Circumference Measure was adopted as standard.

In 1910 the brackets used on the wheel circumference measure were replaced with a form to suit the wheel tread and flange contour adopted in 1909. Redesigned in 1911 and in 1913.

Wheel-Circumference Measure for Steel and Steel-Tired Wheels. (M. C. B. Recommended Practice.) Adopted in 1913.

Wheel Defect Gage (M. C. B. Standard). Fig. 2854. In 1903 the wheel defect gage shown in the Rules of Interchange was adopted as standard. Modified 1904, 1905, 1907, 1909.

In 1914 gage had a notch added for measuring flat spots of 1 inch and two inches in length.

Wheel, Diameter of Steel and Steel-Tired (M. C. B. Recommended Practice). In 1911 a recommended practice of 33 inches was adopted as the diameter for all new steel and steel-tired wheels for freight cars.

In 1911 a recommended practice was also adopted that for high-capacity cars built in the future and likely to be equipped with steel wheels, provision be made in the construction of car and trucks to permit the use of wheels varying in diameter from 33 inches to 30 inches.

In 1912 specifications covering dimensions and tolerances for solid wrought-steel wheels for freight and passenger car service were adopted as recommended practice.

Wheel Fit. See WHEEL SEAT.

Wheel Flange. The projecting edge or rim on the periphery of a car wheel for keeping it on the rail.

Wheel Flange Thickness Gages, for New Wheels (M. C. B. Standard). Fig. 2837.

Maximum and minimum wheel flange thickness gages for new wheels were adopted as standard in 1894. Such gages should be used on all new wheels after September 1, 1894, to insure ability to mount them properly to check gage.

In 1907 a modified form of wheel flange thickness gage, applicable to the larger wheel tread then a standard, was adopted as standard. Redesigned in 1909 to suit new tread and flange contour.

In 1911 the minimum flange thickness dimension shown on minimum flange thickness gage as 1 5/32 inches was changed to 1 11/64 inches.

In 1912 the maximum and minimum flange thickness gages were modified so that they can be used for either cast-iron, solid steel or steel-tired wheels; also to limit the maximum and minimum height as well as the throat radius for steel wheels.

In 1914 gage was corrected to have radius with which the gaging point at the throat is struck, from ⅝ to 1 15/16 inches; likewise the ⅝ inch radius, as shown for minimum flange-thickness gage, changed to 1 13/16 inches.

Wheel Flanges, Distance Between the Backs of (M. C. B. Standard). In 1883 the standard distance between the backs of flanges of car wheels was made 4 ft. 5⅜ in.

In 1885 it was decided by letter ballot that in fitting wheels on axles a variation of ⅛ inch each way from the standard distance between flanges would be allowed. Drawing revised in 1896.

In 1907 this standard distance was made 4 ft. 5⅛ in., owing to increase in width of wheel flange. Modified 1909.

In 1909 the minimum distance between the backs of flanges at base line of tread was fixed at 4 ft. 5 3/32 inches.

Wheel, Limit Gages for Inspecting Second-Hand, for Remounting (M. C. B. Standard). Fig. 2842. In 1907 limit gages for use at shops when inspecting second-hand wheels for remounting were adopted as Recommended Practice. Modified in 1909. Advanced to Standard in 1910. In 1911 the method of using gages was shown on above drawing.

In 1911 the note under limit gage on the drawing was changed to cover cast-iron wheels with standard tread and flange adopted prior to 1909 and a new gage added to cover standard tread and flange adopted in 1909.

Wheel, Minimum Thickness for Steel Tire of. See Tires, Minimum Thickness for Steel.

Wheel, Mounting (M. C. B. Recommended Practice).

In 1897 the Recommended Practice for mounting wheels was modified by letter ballot by the omission of that part providing, among other things, that wheels with flanges worn to a thickness of 1⅛ inches or less should not be remounted, and the substitution therefor of the following:

First.—That wheels with flanges worn to a thickness of 1 1-16 inches or less shall not be remounted.

Second.—That the thickness of flanges of wheels fitted on the same axle should be equal and should never vary more than 1-16 inch.

Third.—That in mounting wheels, new or second-hand, the standard wheel mounting and check gage be used in the following manner:

After one wheel is pressed into position, place the stop "A" or "B" of the check gage against the inside of the flange of the wheel with the thinner flange with the corresponding tread stop "C" or "D" against the tread of the wheel. Press the other wheel on the axle until the opposite tread stop comes in contact with the tread with the corresponding gage point "E" or "F" in contact with the outside of the thicker flange.

Wheel Piece. 10, Figs. 991, 1010. The upper side member of a pedestal truck, to which the pedestals are attached.

Wheel Piece Plate. 11, 12, Figs. 991, 1010. A plate used to strengthen a wooden wheel piece.

Wheel Plate (Cast Iron Wheels). That part of a plate car wheel which connects the rim and the hub. It occupies the place and fulfills the same purpose as the spokes do in an open or spoke wheel. See Wheel, Plate Wheel, Face Plate.

Wheel Ribs (Cast Iron Wheels). More commonly, brackets. Projections cast usually on the inner side of plate car wheels to strengthen them.

Wheel Seat or Wheel Fit (of an Axle). The part which is inserted in the hub of a wheel. It is made truly cylindrical and very slightly larger than the axle seat of the wheel. The wheel is pressed on it by hydraulic pressure. See Wheels.

Wheel, Specifications for 33-Inch Cast-Iron, for Cars of Maximum Gross Weights, Not to Exceed 95,000 Pounds, 132,000 Pounds and 161,000 Pounds. (M. C. B. Recommended Practice.) Figs. N, O & P.

Adopted 1893. Revised 1899 and 1904. Modified 1911 in reference to cast date. In 1912 measuring line for nominal diameter was designed as A. B. and the diameters of cores added to drawings. Revised as to form in 1913. In 1914 the thermal-test clause (b) was corrected. In 1914 Section 14, "Marking Wheel," was corrected. In 1915 Section IV, paragraph 7, was modified.

I. MATERIAL AND CHILL.

1. The wheels shall show clean, gray iron in the plates, except at chaplets, where mottling to not more than ½ in. from same will be permitted. The depth of pure white iron shall not exceed 1 in. nor be less than ½ in. in the middle of the tread.

(a) It shall not exceed 1 in. in the middle of the tread nor be less than ⅜ in. in throat for wheels having a maximum weight of 625 lbs.

(b) It shall not exceed 1 in. in the middle of the tread nor be less than 7/16 in. in the throat for wheels having a maximum weight of 675 lbs.

(c) It shall not exceed 1 in. in the tread nor be less than ½ in. in the throat for wheels having a maximum weight of 725 lbs.

(d) The depth of white iron shall not vary more than ¼ in. around the tread on the rail line in the same wheel.

II. PHYSICAL PROPERTIES AND TESTS.

2. *Sampling.*—When ready for inspection, the wheels shall be arranged in groups, all wheels of the same date being grouped together, and for each 100 wheels which pass inspection and are ready for shipment, two representative wheels shall be taken at random, one of which will be subjected to the drop test.

3. *Drop Test.*—The wheels shall conform to the following drop-test requirements:

(a) The test wheel shall be so placed on the three

supports, with flange turned downward, that the tup will strike centrally on the hub. When tested in accordance with the following conditions, the wheel shall stand the following specific number of blows:

Weight of Wheel, Pounds.	Weight of Tup, Pounds.	Height of Drop, Feet.	Number Blows.
625	200	9	10
675	200	10	12
725	200	12	12

4. *Thermal Test.*—Should the test wheel stand the given number of blows without breaking into two or more pieces, the inspector will then subject the other wheel to the following test:

(a) *Preparation.*—The wheel shall be laid with the flange downward in the sand and a channel way 1½ in. wide and 4 in. deep must be molded with green sand around the wheel. The clean tread of the wheel must form one side of the channel way and the clean flange must form as much of the bottom as its width will cover.

(b) *Test.*—The above described channel must be filled with molten cast iron, which shall be hot enough, when poured, so that the ring which is formed, when the metal is cold, shall be solid or free from wrinkles or layers. The time when pouring ceases must be noted, and two minutes later an examination of the wheel must be made. If the wheel is found broken in pieces or if any cracks in the plate extend through or into the rim, all wheels of the same tape size as the wheel broken will be rejected.

5. *Drop-Test Machine.*—The three supports shall not be more than 5 in. wide. The anvil shall be supported on rubble masonry at least two feet deep and shall weigh not less than 1,700 lbs. The striking face of the tup shall be 8 in. in diameter and be flat.

III. RETEST.

6. *Number of Tests.*—In making the drop test, should the test wheel break into two or more pieces with less than the required number of blows, then the second wheel shall be taken from the same lot and similarly tested. If the second wheel stands the test it shall be optional with the inspector whether he shall test the third wheel or not. If he does not do so, or if he does and the third wheel stands the test, the 100 wheels will be accepted as filling the requirements of the drop test.

IV. DIMENSIONS, TAPING AND GAGING.

7. *Dimensions.*—The normal diameter of the wheel produced by the chill must be the M. C. B. standard 33 in., measured at a point 2⅝ in. from the outside of the tread of the wheel. Wheels furnished under this specification shall not vary more than 5/16 in. above or below the normal size measured on the circumference and the same wheel shall not vary more than 1/16 in diameter.

The thickness of the flange shall be regulated by the maximum and minimum flange thickness gages adopted by the Master Car Builders' Association.

8. *Taping.*—All wheels shall be taped with M. C. B. standard design of wheel circumference tape, having numbers 1, 2, 3, 4 and 5 stamped ⅛ in. apart, the figure 3 to represent the normal diameter 103.67 in circumference. The figure 1, the smallest, and the figure 5 the largest.

V. WEIGHTS.

9. All wheels furnished under these specifications shall conform to the respective sections shown by the M. C. B. drawings for different weights of wheels, and weights shall be as follows:

Maximum Gross Weight of Car. Pounds.	Maximum Weight of Wheel Not Exceeding Pounds.	Minimum Weight of Wheel Not Less Than Pounds.
95,000	625	615
132,000	675	665
161,000	725	715

(*a*) *Cores.*—In case of wheels ordered with cores smaller in diameter than the standard, the additional weight should be considered as an addition to the normal weight and paid for by the purchaser.

(b) *Note.*—Weights given in the above table are based on M. C. B. Standard drawings covering wheel design, adopted in 1909.

10. *Under Weight.*—Wheels that are under minimum weight will be set aside and not further considered.

11. *Over Weight.*—Wheels that are over the maximum weight will be at the expense of the manufacturer.

VI. WORKMANSHIP AND FINISH.

12. *Workmanship.*—Chills shall have an inside profile that, in the finished wheel, will produce the exact form of the flange and tread contour shown by the M. C. B. drawings adopted in 1909.

13. *Finish.*—The body of the wheel must be smooth and free from slag, shrinkage or blow holes. The tread shall be free from deep and irregular wrinkles, slag, chill cracks and sweat or beads in the throat, and swelled rims.

VII. MARKING.

14. *Marking.*—All wheels shall be numbered consecutively in accordance with the instructions from the railroad company purchasing them, and shall have the initials of such railroad company, also the wheel number, the weight of the wheel and month, day and year when made, plainly formed on the inside plate of casting. No two wheels shall have the same number. All wheels shall also have the name and place of manufacture plainly formed on the outside plate in casting. Wheels conforming to the requirements and furnished under this specification shall have the letters M. C. B. 1909 plainly formed on the outside plate in casting.

VIII. REJECTION LIMITS.

15. If in any lot of wheels submitted for test the test wheel fails to meet the requirements of the drop, chill or thermal test, then all of the wheels in tape number and weight corresponding to the test wheel will be rejected.

(a) *High Chill.*—In case the rejection is for high chill, weak breaking strength or failure in the thermal test, the test will be continued in the next higher number of tape size.

(*b*) *Low Chill.*—If the rejection is for low chill, the test will be continued in the next lower number tape size.

Wheel, Solid Steel, Plane Gage for (M. C. B. Recommended Practice). Fig. 2905. In 1912 a plane gage was adopted for the purpose of measuring how much wheels are out of plane.

Wheel, Solid Steel, Rotundity Gage for (M. C. B. Recommended Practice). Fig. 2905. In 1912 a rotundity gage was adopted for the purpose of measuring the maximum distance that wheels are out of round.

Wheel, Solid Steel, Sizes and Dimensions for (M. C. B. Recommended Practice). Fig. 2922, etc. In 1912 sizes and dimensions for solid steel wheels for freight and passengers cars were adopted as recommended practice. Revised in 1913.

Wheel, Steel, Branding of (M. C. B. Recommended Practice). Fig. 2907. In 1912 a method of branding of solid steel wheels was adopted.

Wheel, Steel, Gage for Measuring Thickness of Rim (M. C. B. Recommended Practice). Fig. 2906. In 1912 a gage was adopted for the purpose of measuring the thickness of the rim above the limit of wear groove. With this gage it is possible to measure direct the amount of metal necessary to restore the tread to M. C. B. contour; also to measure direct the amount of service metal remaining above the condemning limit after the tread is restored to M. C. B. contour.

Wheels, Steel and Steel-Tired (M. C. B. Recommended Practice).

In 1911 a recommended practice of 33 inches was adopted as the diameter for all new steel and steel-tired wheels for freight cars.

In 1911 a recommended practice was also adopted that for high-capacity cars built in the future and likely to be equipped with steel wheels that provisions be made in the construction of car and trucks to permit the use of wheels varying in diameter from 33 inches to 30 inches.

In 1912 specifications covering dimensions and tolerances for solid wrought-steel wheels for freight and passenger car service were adopted as recommended practice. Revised 1913. In 1914 paragraph 4, "Branding," was corrected, adding the purchaser's name and serial number.

In 1914 wheel centers of 28 inches, 31 inches and 33 inches were adopted by letter ballot.

Wheels, Steel and Steel-Tired, Diameter of (M. C. B. Recommended Practice). In 1914, 33-inch, 36-inch and 38-inch diameters were adopted as standard.

Wheel, Steel-Tired, Tire Fastening for (M. C. B. Recommended Practice). Fig. 2905. In 1912 the form of fastening for steel-tired wheels shown on the drawing was adopted.

Wheel Timber. A term sometimes applied to a wooden WHEEL PIECE.

Wheel and Track, Terms and Gaging Points for. (M. C. B. Standard.) Fig. 2838.

Standard terms and gaging points for wheels and track were adopted in 1894 as follows:

1.—TRACK RAILS are the two main rails forming the track.

2.—GAGE OF TRACK is the shortest distance between the heads of track rails.

3.—BASE LINE, for wheel gages, is a line parallel to the axis of the wheels drawn through the point of intersection of tread with a line perpendicular to the axis, and passing through the center of the throat curve.

4.—INSIDE GAGE OF FLANGES is the distance between backs of flanges of a pair of mounted wheels measured on the base line.

5.—GAGE OF WHEELS is the distance between the outside face of flanges of a pair of mounted wheels measured on a line parallel to the base line, but ⅝ inches farther from the axis of the wheels.

6.—THICKNESS OF FLANGE is the distance measured parallel to the base line between two lines perpendicular thereto, one drawn through the point of measurement of "inside gage of flanges," and the other drawn through the point of measurement of "gage of wheels."

7.—WIDTH OF TREAD is the distance measured parallel to the base line from a line perpendicular thereto, drawn through the point of measurement of "gage of wheels" to the outer edge of tread.

8.—CHECK GAGE DISTANCE is the distance measured parallel to the base line between two lines perpendicular thereto, one drawn through the point of measurement of "inside gage of flanges" on either wheel, and the other drawn through point of measurement of "gage of wheels" on mate wheel.

9.—OVER ALL GAGE is the distance parallel to base line from outer edge of one wheel to the outer edge of mate wheel.

The above mentioned wheel gage distances are either directly or by inference as follows, having been modified in 1909:

	Feet.	Inches.
Inside Gage of Flanges........	4	5 7-32
Gage of Wheels...............	4	7 11-16
Thickness of Flange..........	—	1 15-64
Width of Tread...............	—	4 11-32
Check Gage Distance..........	4	6 29-64
Over All Gage................	5	4⅜

Modified 1909.

Wheel Tread and Flange, Form of (M. C. B. Standard). Fig. 2839.

A form of wheel tread and flange was adopted as a standard of the Association, by letter ballot, in 1886. For action of the Association see Proceedings 1882, pages 178 and 179; Proceedings 1886, page 68.

In 1906 a design of wheel tread and flange was adopted as Recommended Practice, having an increase of ⅛ inch on the flange, and a taper in the tread of one in twenty. In 1907 this was advanced to standard, and is shown on the drawing. Modified 1909.

In 1910 a maximum allowable height of flange for cast-iron wheels of 1½ inches was adopted as standard.

Wheel Tread and Flange for Steel and Steel-Tired Wheels (M. C. B. Recommended Practice). Fig. 2905.

In 1909 the illustration then shown on the drawing was discarded, and the four illustrations now shown substituted, to govern service operations for both steel and steel-tired wheels under both passenger and freight cars.

Also, that the location of limit of wear of groove be ¼ inch below the tread face on steel and steel-tired wheels where same have worn to condemning limit, as shown in the illustrations; the shape of the groove to be as shown on these illustrations and measurements to be taken from the horizontal or inside edge of same.

In 1909 the tread and flange contour for steel and steel-tired wheels was revised as shown. It is exactly similar to the new tread and flange contour for cast-iron wheels from the point of the flange to the outside of the tread only, and the development of the flange from the point to the back face of the wheel or tire has been made of such form that the same mounting and inspecting gage used for cast iron wheels can be used for the new section of steel and steel-tired wheels.

In 1912 the thickness of flange for steel and steel-tired wheels was increased 3/32 inch, making the contour to the base line the same as for cast-iron wheels.

Wheel Truing Brake Shoe. A brake shoe with abrasive inserts to grind the wheel tread and flange true to center while in service. See BRAKE SHOE.

Wheels, Worn and Chipped Flanges and Treads of. See INTERCHANGE OF TRAFFIC, RULES, etc.

Wheels, Wrought Steel, for Freight and Passenger Service; Specifications Governing Dimensions and Tolerances for (M. C. B. Recommended Practice).

I. MANUFACTURE.

1a. *Process.*—The steel shall be made by the open-hearth process.

1b. *Discard.*—A sufficient discard shall be made from the top of each ingot from which the blanks are made, to insure freedom from injurious piping and undue segregation.

II. CHEMICAL PROPERTIES AND TESTS.

2a. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

	Acid.	Basic.
Carbon	0.60 —0.80	0.75 —0.85 per cent.
Manganese	0.55 —0.80	0.55 —0.80 per cent.
Silicon	0.15 —0.35	0.10 —0.30 per cent.
Phosphorus	not over 0.05	not over 0.05 per cent.
Sulphur	not over 0.05	not over 0.05 per cent.

2b. *Ladle Analysis.*—To determine whether the material conforms to the requirements specified in Section II, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. A copy of this analysis shall be given to the purchaser or his representative.

2c. *Check Analyses.*—A check analysis may be made by the purchaser from any one or more wheels representing each melt, and this analysis shall conform to the requirements specified in Section II. A sample may be taken from any one point in the plate; or two samples may be taken, in which case they shall be on radii at right angles to each other. Samples shall not be taken in such a way as to impair the usefulness of the wheel. Drillings for analysis shall be taken by boring entirely through the sample parallel to the axis of the wheel; they shall be clean from scale, oil and other foreign substances. All drillings from any one wheel shall be thoroughly mixed together.

III. TOLERANCES.

3. Wheels should be furnished rough-bored and with faced hubs, and have a contour of tread and flange as rolled or machined according to recommended practice Sheet M. C. B.—C. They should conform to dimensions specified within the following tolerances:

3a. *Height of Flange.*—The height of flanges should not be more than ⅛ inch over and must not be under that specified or 1 inch.

3b. *Thickness of Flange.*—Thickness of flange shall not vary more than 1/16 inch over or under that specified.

3c. *Throat Radius.*—The radius of the throat shall not vary more than 1/16 inch over or under that specified.

3d. *Thickness of Rim.*—The thickness of rim to be measured between the limit of wear groove and the top of the tread at the point where it joins the fillet at throat of flange. The average thickness of service metal of all wheels in any shipment must not be less than 1¾ inches, measured from the limit of wear groove to top of tread. The thickness of rim should in no case be less than 3/16 inch under that specified.

3e. *Width of Rim.*—The width of rim shall not be more than ⅛ inch less nor more than ⅛ inch over that specified.

3f. *Thickness of Plate.*—The thickness of the plate of the wheel shall not be less than ¾ inch at the point where the plate joins the fillet at the rim and not less than 1 inch at the point where the plate joins the fillet at the hub. Immediate minimum thickness to be proportional.

3g. *Limit of Wear Groove.*—The limit of wear groove to be located as shown in Fig. 2905.

3h. *Diameter of Bore.*—The diameter of rough bore shall not vary more than 1/16 inch above or below that specified. When not specified, the rough bore shall be ¼ inch less in diameter than the finished bore, subject to the above limitations.

3i. *Hub Diameter.*—The hub diameter may be either 10 inches or 11 inches in diameter, as specified, with a maximum variation of ⅛ inch below. The thickness of the wall of the finished bored hub shall not vary more than ⅜ inch at any two points on the same wheel.

3j. *Hub Length.*—The length of hub shall not vary more than ⅛ inch over or under that specified.

3k. *Depression of Hub.*—The depression of the hub must be made so that the distance from the outside face of the hub to the line "AB" shall not exceed 1 11/16 inches for wheels used on 5½-inch axles and under, and 1 7/16 inches for wheels used on 6 by 11 inch axles.

3l. *Black Spots in Hub.*—Black spots will be allowed within two inches of the face of the hub, but must not be of such depth that they will not bore out and give clear metal at finished size of bore.

3m. *Eccentricity of Bore.*—The eccentricity between the tread at its center line and the rough bore shall not exceed 3/64 inch.

3n. *Block Marks on Tread.*—The maximum height of block marks must not be greater than 1/64 inch.

30. *Rotundity.*—All wheels shall be gaged with a ring gage, and the opening between the gage and tread at any one point shall not exceed 1/16 inch.

3p. *Plane.*—Wheel shall be gaged with a ring gage placed concentric and perpendicular to the axis of the wheel. All points on the back of the rim equidistant from the center shall be within a variation of 1/16 inch from the plane of the same gage when so placed.

3q. *Tape Sizes.*—Wheels shall not vary more than five tapes under nor nine tapes over the size called for.

3r. *Mating.*—The tape sizes shall be marked in plain figures on each wheel. Wheels must be mated to tape sizes and shipped in pairs.

3s. *Gage.*—Gages and tape used shall be M. C. B. Standard or Recommended Practice as follows:

Wheel circumference measure, M. C. B. Sheet C.
Maximum flange thickness gage, M. C. B. Sheet 16.
Minimum flange thickness gage, M. C. B. Sheet 16.
Rotundity gage, M. C. B. Sheet C.
Plane gage, M. C. B. Sheet C.
Gage for measuring service metal, M. C. B. Sheet C-1.

See Figs. 2837, 2906, 2905.

IV. BRANDING.

The name or brand of the manufacturer, date and serial number shall be legibly stamped on each wheel, also purchaser's name and serial number, if specified. The tape size shall be legibly marked on each wheel. Sheet M. C. B. C-2. Fig. 2907.

V. FINISH.

5. The wheel shall be free from injurious defects, and shall have a workmanlike finish.

5a. Wheels shall not be offered for inspection if covered with paint, rust, or any other substance; to such an extent as to hide defects.

VI. INSPECTION.

6. Inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered.

6a. The manufacturer shall afford the inspector, free of cost, all reasonable facilities and necessary

gages to satisfy him that the wheels are being furnished in accordance with these specifications. Tests and inspection at the place of manufacture shall be made prior to shipment, and free of cost to the purchaser.

6b. The purchaser may make the tests to govern the acceptance or rejection of material in his own laboratory or elsewhere as may be decided by the purchaser. Such tests, however, shall be made at the expense of the purchaser.

6c. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

6d. Wheels which show injurious defects while being finished by the purchaser shall be rejected, and manufacturer promptly notified.

6e. Samples of rejected material must be preserved at the laboratory of the purchaser for one month from date to test report. In case of dissatisfaction with the results of the test, manufacturer may make claim for a rehearing in that time.

Whistle (Signal Apparatus). An air whistle used with the train signal apparatus.

Whistle Reservoir. A small tank or reservoir to store air for operating a pneumatic signal whistle on electric motor cars.

Whistle Valve. Fig. 1433. A valve for admitting air to the alarm whistle on electric cars.

Whitworth Gages. See CYLINDRICAL GAGES.

Wide Gage. In a general usage, the distance between the heads of the rails of a railroad when it is slightly greater than 4 ft. 8½ in., in distinction from BROAD GAGE, which means a material increase, as to 5 ft. or 6 ft.

Wide Vestibule. The modern vestibule extends the full width of the car. The first vestibule extended over the platform proper (or the width of the end door) only. When the present-used vestibules began to be used they were commonly termed wide vestibules and the older type narrow vestibule. See VESTIBULE.

Wind Guard (Pintsch Gas Lighting System). A perforated brass disk, fitting in globe holder below the opal globe, and supplied with a small covered hole for admitting a match or taper when lighting the gas. Its purpose is, as indicated by its name, to protect the flame from the action of drafts from below the globe.

Wind Scoop. See VENTILATING JACK.

Winding Gear (Pile Driver). Consists of spools and a spur gear of the ordinary form controlled by a strap brake and treadle, so that on the release of the brake the shears attached to the hammer rope will descend by their own weight and engage with the hammer eye.

Winding Shaft (Drop Doors of Coal Cars, etc.). An iron bar supported by winding shaft plates or bearings, around which the drop door chain or hopper chain is wound. It carries a ratchet wheel and is usually formed with a square end for applying a wrench or handle to turn it. See DOOR OPERATING GEAR.

Winding Shaft Plate. A plate which acts as a bearing for the winding shaft. See WINDING SHAFT.

Winding Shaft Ratchet Wheel and Pawl. The ratchet wheel and pawl attached to the end of the winding shaft to prevent its turning and allowing the doors to drop.

Windows. Figs. 1885, etc. An opening for the admission of light and of air when necessary. It has a frame on the sides, in which are set movable sashes containing panes of glass. Hence the window itself, especially in compound words, is often termed simply the sash. In Great Britain carriage windows are technically termed lights. Car windows are now generally made of uniform size throughout. In sleeping and parlor cars double windows are almost always used to inclose an air space between them and prevent radiation of heat and drafts. See also SASH.

Window Balance. Fig. 1902, etc. A device in which a spring is used instead of a weight to counterbalance the weight of the sash and glass. See SASH BALANCE.

Window Blind. A wooden screen composed of a frame called the sash, carrying slats, placed in a window to exclude sunshine. Window shades have nearly displaced blinds in first-class passenger cars, blinds being seldom used except in the saloon or lavatory.

Window Blind Bolt. Fig. 1967. A bolt used for holding a window blind in any desired position. It enters a window blind bolt bushing or plate.

Window Blind Lift. Fig. 1959. Commonly called simply blind lift or blind pull. A metal hook fastened to the blind for raising and lowering it, usually attached to the bottom rail, but in street car blinds, which are lowered below the window, to the top rail.

Window Blind Mullion. An upright bar in the center of a window blind sash.

Window Blind Pull. See WINDOW BLIND LIFT.

Window Blind Rest. A wooden strip to fill up the lower part of the groove in which an upper window blind slides, and on which it rests when down.

Window Blind Sash. The frame in which the inclined thin slats of a window blind are held.

Window Blind Slat. See WINDOW BLIND.

Window Blind Spring. A SASH SPRING.

Window Blind Stile. An upright bar in a window blind sash.

Window Blind Stop. An INSIDE WINDOW STOP.

Window Casing. A frame which incloses or surrounds a window.

Window Casing Molding or **Window Cap Molding.** A molding above a window casing.

Window Cove Molding. A small concave molding around the sides and top of a window on the inside of a passenger car.

Window Curtain. A cloth or some kind of textile material loosely hung over a window to exclude sunshine, and which can be spread or drawn aside at pleasure. Curtains of this kind are now little used. See WINDOW SHADE.

Window Curtain Bracket. More commonly simply curtain brackets, for supporting window shade rollers. A more correct term would be shade or window shade brackets, but in common usage, curtain brackets support shade rollers.

Window Curtain Rings. Rings for supporting the curtain from the curtain rod.

Window Curtain Roller. More properly a SHADE or WINDOW SHADE ROLLER.

Window Deflector Ventilator. See DUST DEFLECTOR and VENTILATOR.

Window Dust Guard or **Deflector.** Fig. 1953. See DUST DEFLECTOR.

Window Fastener. A SASH LOCK.

Window Frame. A frame set into the side, end or roof of a car, into which the window sash fits.

Window Glass. Panes of glass used for windows.

Window Guards. Small rods to act as fenders for the end windows.

(Postal Cars). Fig. 1863. Metal rods are used on

the outside and wooden rods on the inside of all postal car windows.

Window Head. A steel plate placed across the top of a window opening or a series of window openings.

Window Latch. A SASH LOCK.

Window Lift. See SASH LIFT.

Window Lintel. A horizontal strip on the outside of a passenger equipment car between the posts, and over the window openings.

Window Molding. (Passenger Car Interiors.) A molding used around, or on each side of, a window, particularly to cover the joint between the panel and post. It sometimes forms a groove in which a window or window blind slides, in place of the inside window stop.

Window Molding Base. An ornament made of wood or metal attached to the lower end of a window molding.

Window Molding Joint Cover. A piece of metal or wood used to cover the joints of window moldings where two pieces join each other.

Window Panel. A panel between windows.

Window Panel Furring. Horizontal distance pieces between the window posts to which the panel is fastened.

Window Post (Passenger Equipment Cars). Fig. 475. A side post located between windows, sometimes extending only from the belt rail to the side plate and sometimes the entire way between the side sill and side plate.

Window Protection Rod or Bar. See WINDOW GUARDS.

Window Rod Bracket. Fig. 2032.

Window Rod Bushing. A support for the ends of a curtain rod.

Window Sash. Fig. 1888, etc. The frame which holds the glass of a window.

Window Sash Balance. See SASH BALANCE.

Window Sash Holder. See SASH LOCK.

Window Sash Lock. See SASH LOCK.

Window Sash Lift. See SASH LIFT.

Window Sash Rail. A horizontal bar in a window sash.

Window Sash Spring. See SASH SPRING.

Window Shade. Figs. 1922, 1973, etc. A window curtain, which is wound on a roller above the window, in distinction from one which is drawn aside. In passenger cars window blinds have been superseded by shades. An automatic shade roller is always used, the old-fashioned pulleys and cord tighteners being practically obsolete.

Window Shade Bracket. Fig. 1981, etc. One bracket has a circular hole and the other a rectangular one.

Window Shade Roller. Figs. 1989, etc. The cylinder on which the shade is rolled up, containing within it the springs which actuate it.

Window Shade Stop. That part of a shade holder which engages with or bears against the window casing and holds the shade.

Window Shade Thumb Latch. Usually a pair of short bars which, when pinched together with the thumb and finger, release the mechanism which locks the shade in a stationary position, permitting it to be raised and lowered.

Window Sill. 40, Fig. 364. A horizontal piece of wood or metal under a window, on which the sash rests when down.

Window Sill Cornice Board. An ornamental strip placed on the inside of a passenger car under the window sill.

Window Sill Molding. A small wooden molding under an inside window sill. In modern cars it is usually a belt molding.

Window Spring. See SASH SPRING.

Window Stile. The upright bars of a window sash.

Window Stop. The strips, or beads, attached to the window posts which hold the sash in place.

Window Ventilator. See DUST DEFLECTOR, VENTILATOR.

Wing Elevator Snow Plow. Fig. 215. See SNOW PLOW.

Wire Gauze (for Ventilator). A fine netting made of wire, with which the outside of deck windows and ventilator openings is covered to prevent the admission of cinders.

Wiring Diagram (Electric Motor Cars). Fig. 2691. Used for AC-DC operation on the New Haven. See Fig. 2700 for wiring of unit switch control.

Wood Screw. A small cylindrical bar of iron or steel with a wood screw thread cut on it and a slotted head so that it can be turned with a screw driver. A lag screw is a heavy type of wood screw. It has a square. instead of a slotted head. See SCREW.

Wood Screw Thread. A form of screw thread used for screws which are intended to screw into wooden objects. It differs from a metal thread in having the spaces between the projections wider.

Worm. A helix, like a screw thread, for winding a rope or a chain upon or for driving a spur wheel.

Worn Couplers, Gage for. See AUTOMATIC CAR COUPLER.

Worn Flat (Car Wheels). Under the rules for the interchange of traffic this defect is defined to be irregular wear under fair usage, due to unequal hardness of the tread of the wheel, and to be carefully distinguished from slid flat, which is a defect produced by the slipping of the wheels from excessive brake pressure. See WHEELS and INTERCHANGE OF TRAFFIC.

Wreck Chain. Fig. 2788, etc. A chain used for hauling and lifting purposes at wrecks.

Wreck Chain Repair Link. Fig. 2795. A device for making quick temporary repairs to a broken chain.

Wreck Train Equipment. Fig. 2786, etc. The cars and tools used in clearing wrecks. The train usually consists of a steam wreck crane, a bunk or sleeping car, a kitchen and dining car, cars for carrying spare trucks, and cars for carrying tools and blocking.

Wrecking Crane or Wreck Crane. Figs. 202-204. A powerful crane mounted on trucks and operated usually by steam but in some cases by electricity, for use in clearing up wrecks.

Wrecking Frog. Fig. 2784, etc. A CAR REPLACER.

Wreck Hook. Fig. 2787, etc. A hook which can be attached to an automatic coupler and will allow a chain to be used in pulling the car.

Wrecking Tools (Passenger Car). Fig. 2783.

Wrench. A contrivance for screwing and unscrewing a nut. A monkey wrench is adjustable to take nuts of various sizes. A socket wrench is one having a cubical cavity to receive a square end. A SPANNER is a wrench for use on round or many-sided nuts, like hose couplings, to which lugs or slots are added for engaging with the wrench.

Wrought Iron Bars for Passenger and Freight Equip-

ment Cars, Specifications for. (M. C. B. Recommended Practice.)

I. MANUFACTURE.

1. PROCESS.—The finished product shall consist either of new muck-bar iron or a mixture of muck-bar iron and scrap, but shall be free from any admixture of steel. Muck bars shall be made wholly from puddled iron.

II. PHYSICAL PROPERTIES AND TESTS.

2. TENSION TESTS.—Unless otherwise specified, the iron shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in...47,000—53,000
Elongation in 8 in., minimum per cent......22

3. PERMISSIBLE VARIATIONS IN PHYSICAL PROPERTIES.—(a) *Tensile Strength.*—Large sections reduced or flats and rounds of ½ in. or under may show a tensile strength of 45,000-52,000 lb. per sq. in.

(b) *Elongation.*—Twenty per cent of the test specimens representing one size may show the following percentage of elongation in 8 in.:

½ in. or over, tested as rolled.....20 per cent.
Under ½ in., tested as rolled......16 per cent.
Reduced by machining...........18 per cent.

FLAT BARS:

⅜ in. or over, tested as rolled.....18 per cent.
Under ⅜ in., tested as rolled......16 per cent.
Reduced by machining...........16 per cent.

4. BEND TESTS.—(a) *Cold-bent Test.*—For round, square and hexagon bars under 2 sq. in. in section, and for flats less than ¾ in. thick, shall bend cold around a pin the diameter of which is equal to the diameter or thickness of the specimen. For rounds, flats and hexagon bars 2 sq. in. or over in section, and for all flat bars over ¾ in. in thickness, around a pin the diameter of which is equal to twice the diameter or thickness of the specimen.

(b) *Hot-bend Test.*—The test specimen, when heated to a temperature between 1700 and 1800 deg. F. (light cherry red), shall bend through 180 deg. without fracture on the outside of the bent portion, as follows: For round, flat and hexagon bars under 2 sq. in. in section, flat on itself; for round, flat and hexagon bars 2 sq. in. and over in section, around a pin the diameter of which is equal to the diameter or thickness of the specimen.

(c) *Nick-bend Test.*—The best specimen, when nicked 25 per cent around the round bar, and along one side for flat bars, with a tool having a 60-deg. cutting edge, to a depth of not less than 8 or more than 16 per cent of the diameter or thickness of the specimen, and broken, shall not show more than 10 per cent of the fractured surface to be crystalline.

5. TEST SPECIMEN.—Tension and bend test specimens shall be of the full section of material as rolled, if possible, otherwise the specimens shall be machined from the material as rolled; the axis of the machined specimen shall be located at any point one-half the distance from the center to the surface of round bars, or from the center to the edge of flat bars, and shall be parallel to the axis of the bar.

6. NUMBER OF TESTS.—(a) All bars of one size be piled separately. One bar from each 200 or less shall be selected at random and tested as specified.

(b) If any test specimen from the bar originally selected to represent a lot of material contains surface defects not visible before testing, but visible after testing, or if a tension-test specimen breaks outside the middle third of the gage length, one retest from a bar will be allowed.

III. PERMISSIBLE VARIATIONS IN GAGE.

7. PERMISSIBLE VARIATONS.—(a) *Round bars* shall conform to the standard M. C. B. limit gages.

(b) *Flat Bars.*—Thickness shall not vary more than corresponding diameter for rounds: thus, 1 in. thick could vary from 0.9905 to 1.0095 in.

(1) Sizes under 3 in. wide shall not be more than 1/32 in. under or over size in width.

(2) Sizes 3 in. and over shall not be under size or more than 1/16 in. wider than ordered.

IV. FINISH.

8. FINISH.—The bars shall be smoothly rolled and free from slivers, depressions, seams, crop ends, and evidences of being burned.

V. INSPECTION AND REJECTION.

9. INSPECTION.—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

10. REJECTION.—Material which, subsequently to the above tests at the mills or elsewhere, and its acceptance, develops weak spots, cracks or imperfections, or is found to have injurious defects, shall be rejected and shall be replaced by the manufacturer at his own expense.

11. REHEARING.—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Wrought Steel Wheels, Specifications for. See WHEELS, WROUGHT STEEL, SPECIFICATIONS FOR.

Y

Yale Lock. Fig. 1794, etc. A trade name designating any lock made by the Yale & Towne Mfg. Co. The principal types of Yale locks are: Time locks, combination locks; cylinder or "pin-tumbler" locks. These locks have small keys bitted on their upper edge to engage with pin tumblers contained in the cylinder. The original flat key has been superseded by the corrugated and paracentric forms. The key raises the pin tumblers to the proper height and is then able to rotate a plug in the cylinder and thus to actuate the lock.

Yoke. A pocket strap, U-shaped, which contains the spring and follower plates of a drawbar. It is the means of attaching the drawbar to the draft gear. See AUTOMATIC CAR COUPLERS (Miscellaneous M. C. B. Standards), and COUPLER YOKE.

Illustrated Section

A synopsis or index of the Illustrated Section is hardly necessary because the items in the Dictionary contain exact references to the illustrations and afford a ready means of referring to them. Roughly, the Illustrated Section is arranged as follows: General photographs of freight and passenger train cars; floor plans of passenger train cars; general drawings of freight and passenger train cars; underframe and framing details for both classes; couplers, draft gear and all exterior parts of the body; trucks and air brakes; interior details; car heating and lighting; motor cars; wrecking equipment and Master Car Builders' standards.

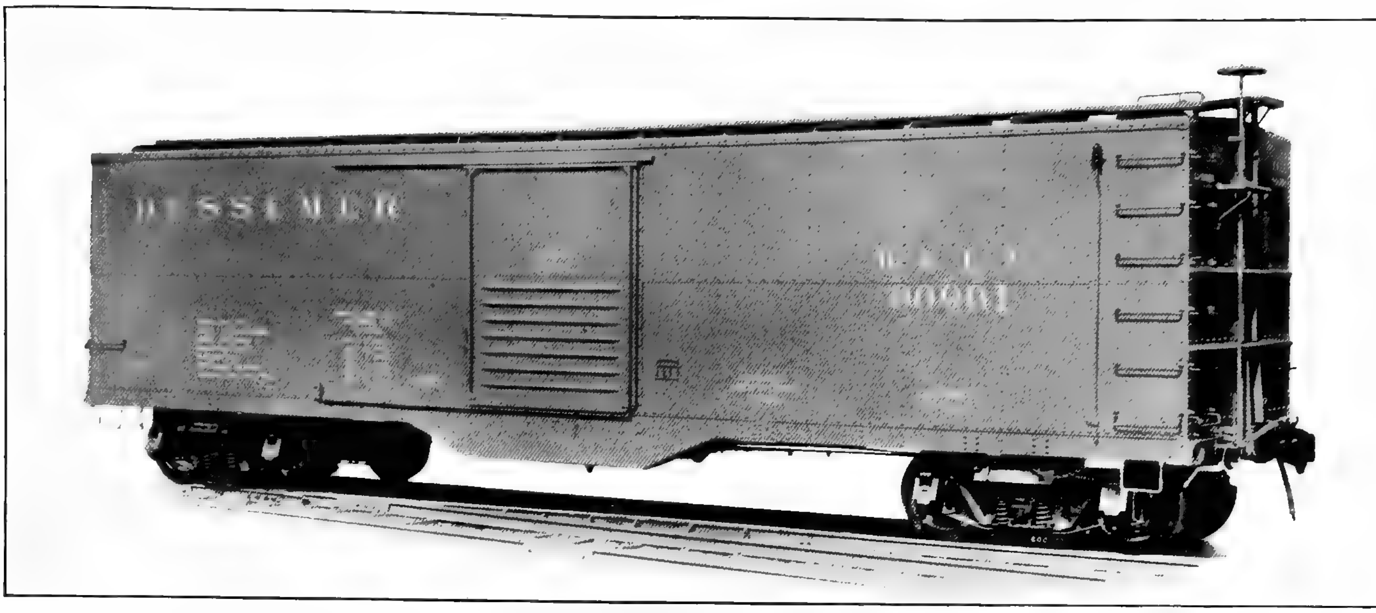


Fig. 1—All-Steel 50-Ton Capacity Box Car, Equipped with Summers Side-Bearing Truck. Weight, 45,700 lbs.; Inside Length, 40 ft.; Inside Width, 8 ft. 10 in.; Inside Height, 8 ft. Builder, Summers Steel Car Co.

(General Drawings of a Similar Car are Shown in Figs. 259-261.)

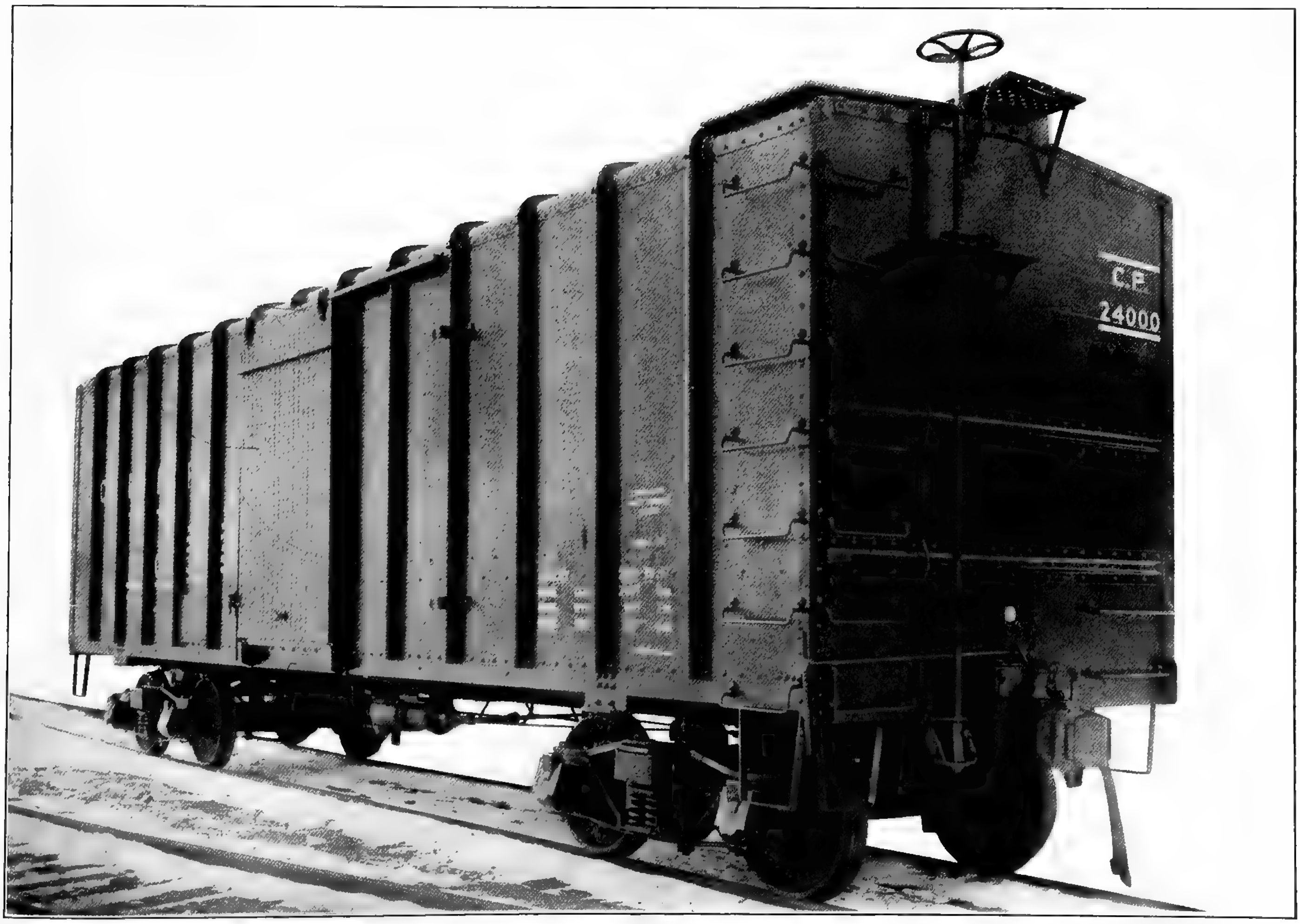


Fig. 2—All-Steel 40-Ton Capacity Box Car. Weight, 37,000 lbs.; Inside Length, 36 ft.; Inside Width, 8 ft. 8 in.; Inside Height, 8 ft. 4 in. Builder, Canadan Car & Foundry Co.

(See Figs. 269-270 for General Drawings.)

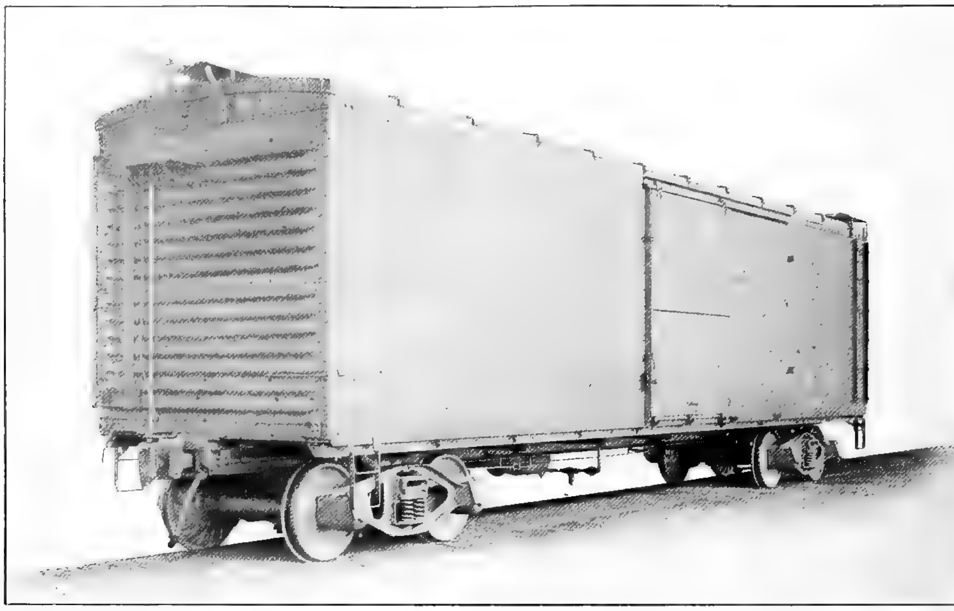


Fig. 3—All-Steel 50-Ton Capacity Box Car. Weight, 45,900 lbs.; Inside Length, 40 ft. 6 in.; Inside Width, 8 ft. 6 in.; Inside Height, 9 ft.; Builder, The Bettendorf Company.

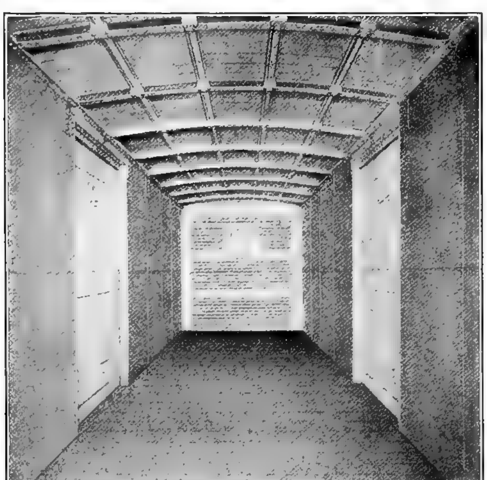


Fig. 4—Interior of Steel Box Car Shown in Fig. 3.

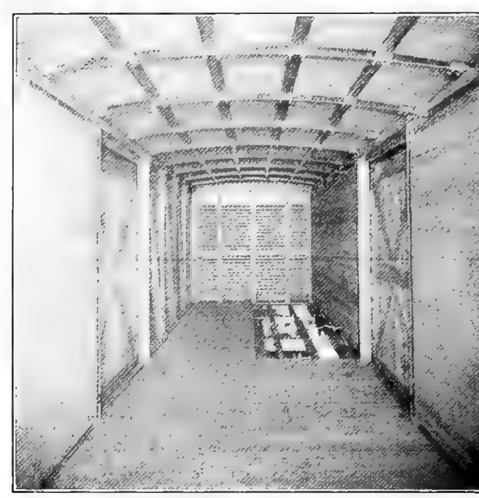


Fig. 5—Interior of Steel Box Car Shown in Fig. 6.

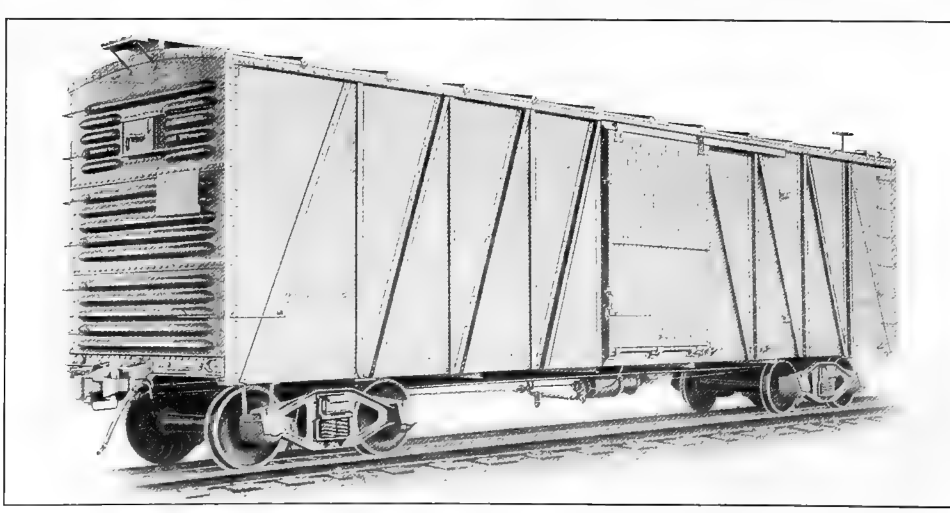


Fig. 6—All-Steel 50-Ton Capacity Box Car. Weight,43,500 lbs.; Inside Length, 40 ft. 8 in; Inside Width, 9 ft. 2 in ; Inside Height, 9 ft. 3 in. Builder, The Bettendorf Company.

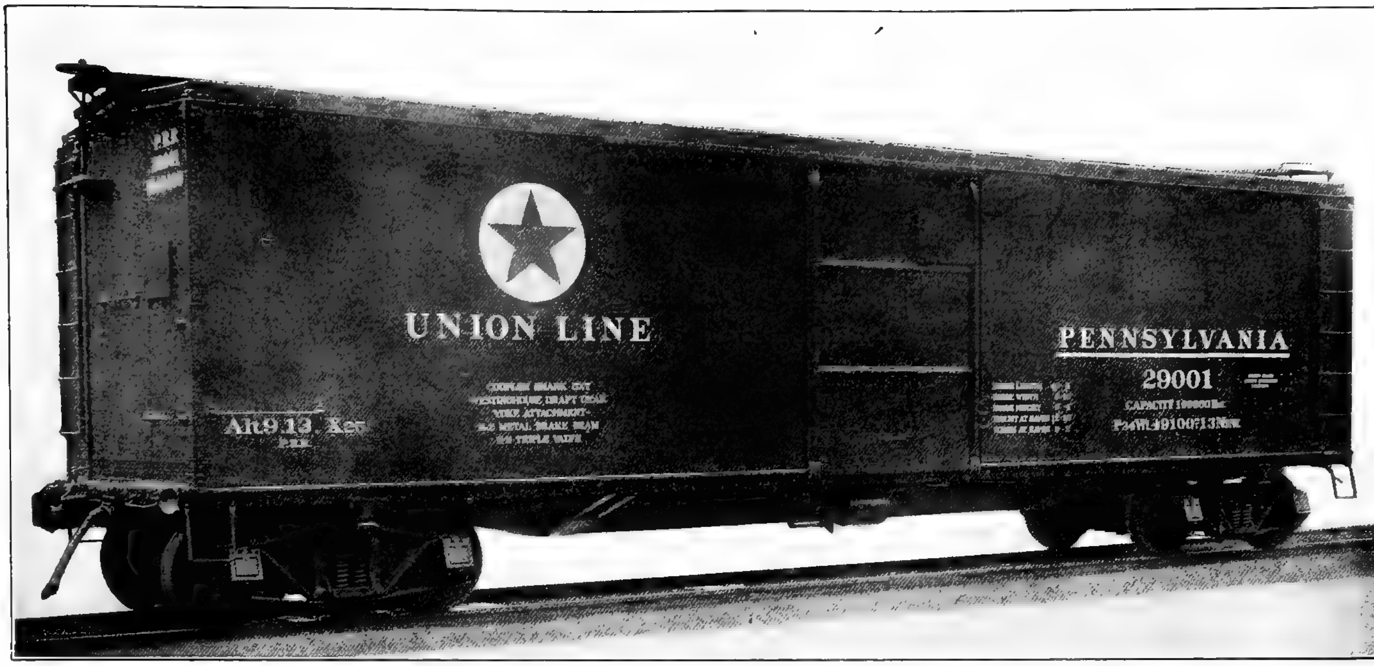


Fig. 7—All-Steel 50-Ton Capacity Box Car. Weight, 49,100 lbs.; Inside Length, 40 ft. 5 in.; Inside Width, 8 ft. 10 in.; Inside Height, 9 ft. 1 in. Builder, Pennsylvana Railroad.

(See Figs. 262-265 for General Drawings.)

Fig. 8—All-Steel 50-Ton Capacity Box Car. Weight, 43,100 lbs.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 4 in. Builder, American Car & Foundry Co.

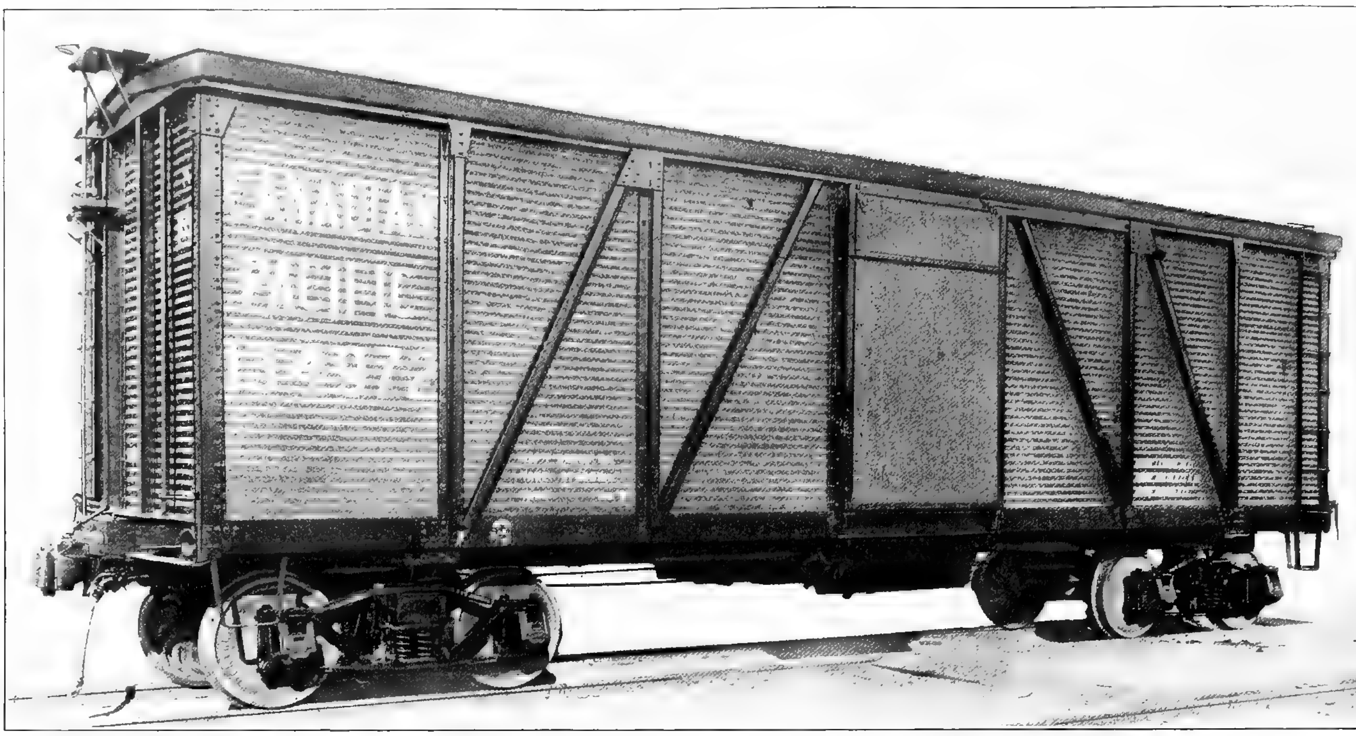


Fig. 9—All-Steel 40-Ton Capacity Box Car. Weight, 37,400 lbs.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 0½ in.

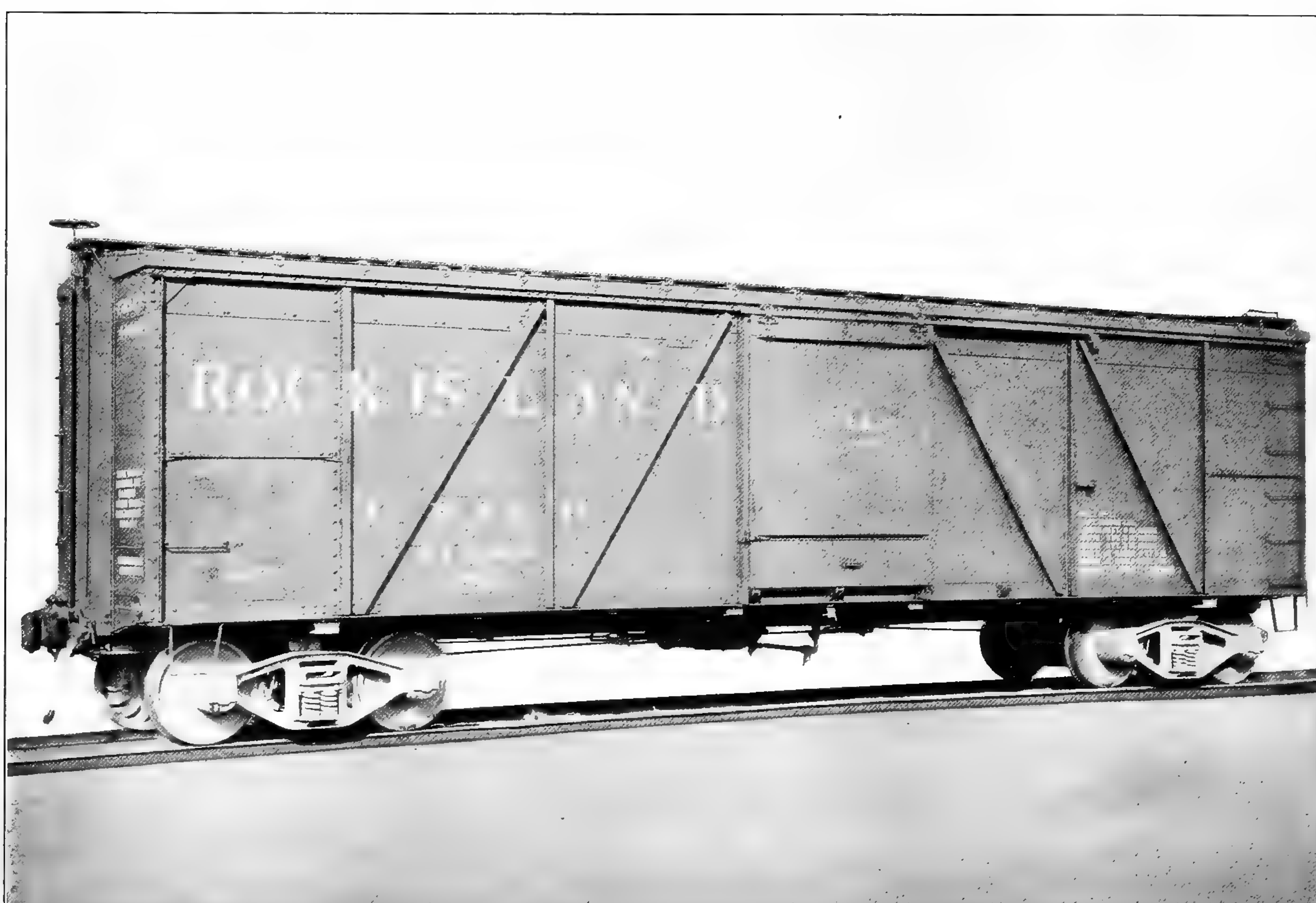


Fig. 10—Steel Frame 40-Ton Capacity Box Car. Weight, 40,500 lbs.; Inside Length, 40 ft; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, Western Steel Car & Foundry Co.

Fig. 11—Steel Frame 40-Ton Capacity Box Car. Weight, 36,600 lbs.; Inside Length, 36 ft.; Enside Width, 8 ft. 6 in.; Inside Height, 8 ft. 0½ in. Cars of This Type Built Under the Patents of the Fowler Car Company, are in Use by the Canadian Pacific; Chicago & North Western; Minneapolis, St. Paul & Sault Ste. Marie, and Illinois Central.

(See Figs. 272-273 for General Drawings.)

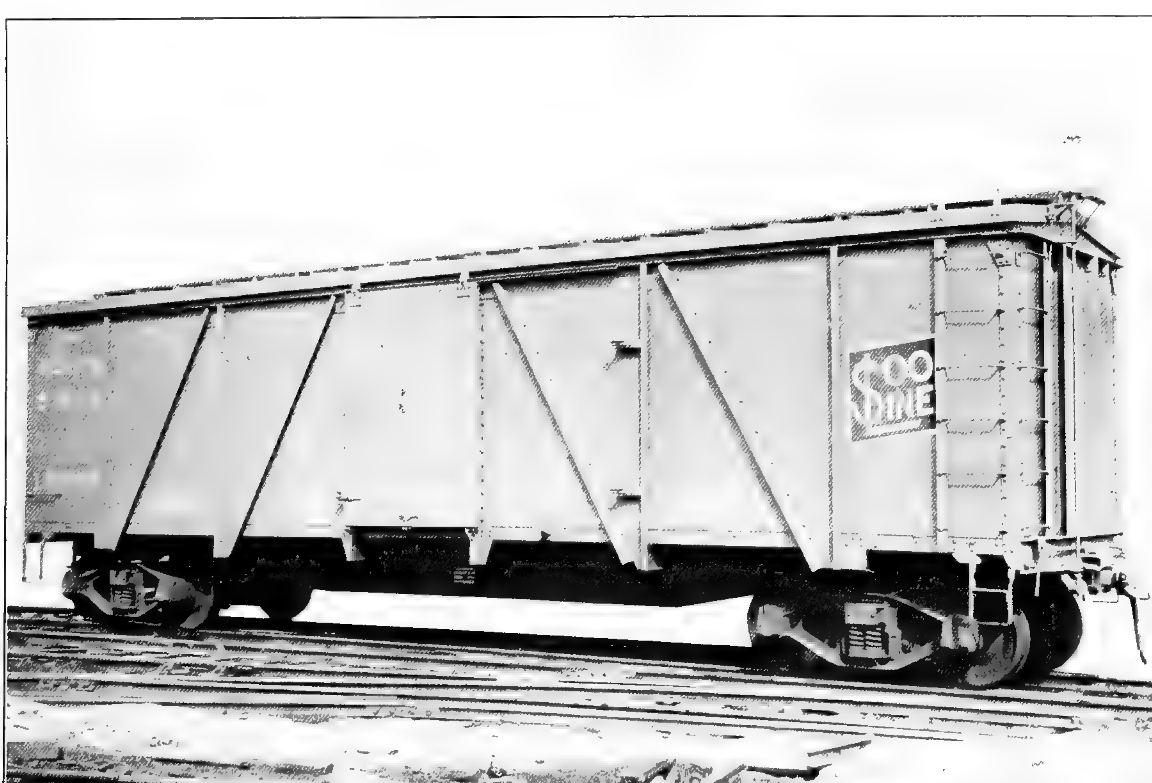


Fig. 12—Steel Frame 40-Ton Capacity Box Car. Weight, 40,700 lbs.; Inside Length, 40 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, American Car & Foundry Co.

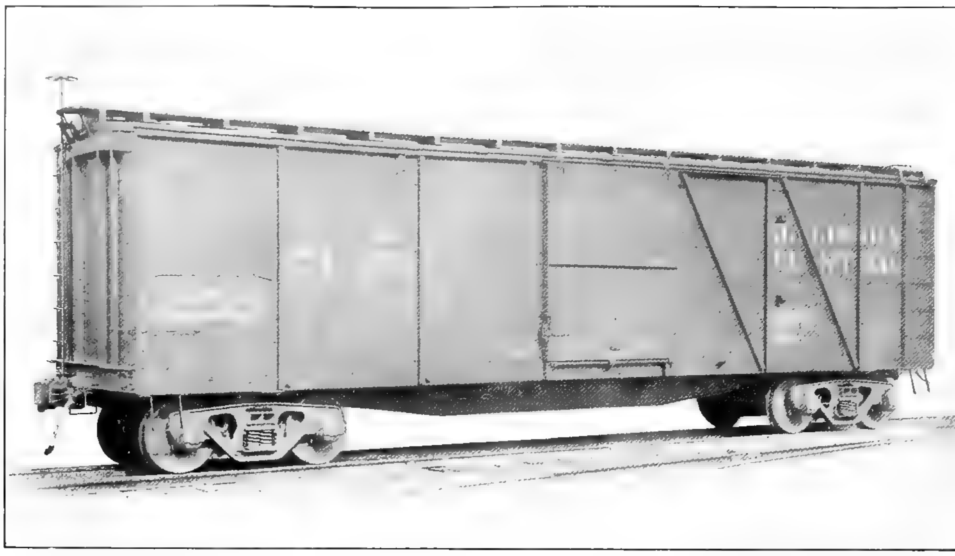


Fig. 13—Steel Frame 40-Ton Capacity Box Car. Weight, 40,400 lbs.; Inside Length, 40 ft. 6 in. Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 4 in. Builder, Western Steel Car & Foundry Co.

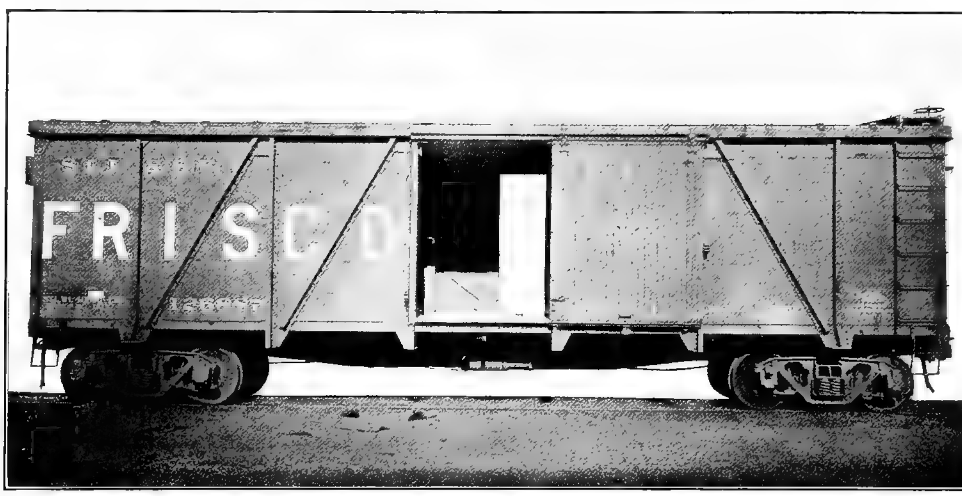


Fig. 14—Steel Frame 40-Ton Capacity Box Car. Weight, 40,700 lbs.; Inside Length, 40 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, American Car & Foundry Co.

(See Figs. 277-278 for General Drawings.)

Fig. 15—Steel Underframe 40-Ton Capacity Box Car. Weight, 39,400 lbs.; Inside Length, 40 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 8 in. Builder, Western Steel Car & Foundry Co.

(See Fig. 289 for General Drawings.)

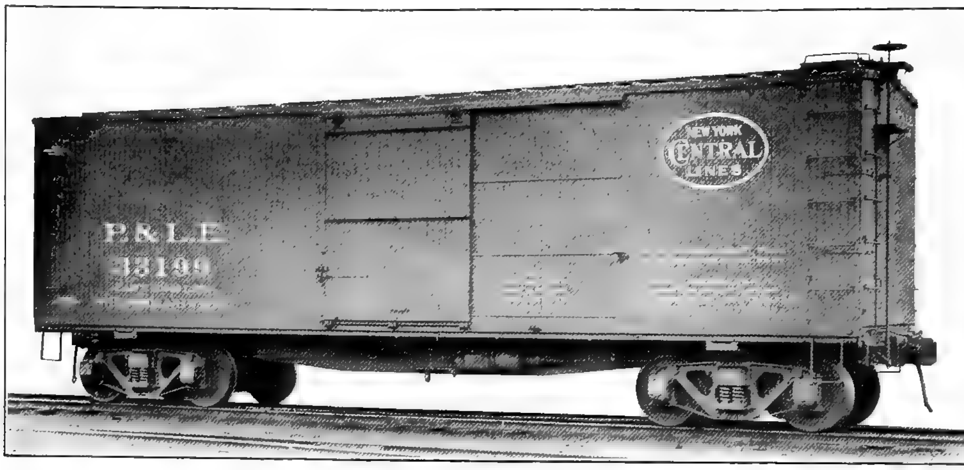


Fig. 16—Steel Underframe 40-Ton Capacity Box Car. Weight, 40,900 lbs.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 4 in. Builder, Pressed Steel Car. Co.

(*See Figs. 285-286 for General Drawings.*)

Fig. 17—Steel Underframe 50-Ton Capacity Box Car. Weight, 42,900 lbs.; Inside Length, 40 ft. 7 in.; Inside Width, 9 ft. 2 in.; Inside Height, 9 ft. 4½ in. Builder, Western Steel Car & Foundry Co.

(*See Figs. 281-282 for General Drawings*)

Fig. 18—Wooden 40-Ton Capacity Box Car with Steel Center Sills. Weight, 36,600 lbs.; Inside Length, 40 ft.; Inside Width, 8 ft. 7 in.; Inside Height, 7 ft. 9½ in. Builder, Haskell & Barker Car Co.

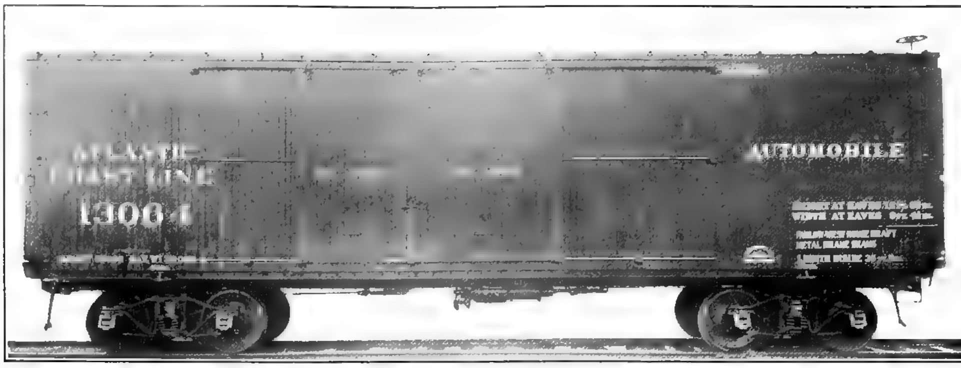


Fig. 19—Steel Underframe 30-Ton Capacity Box Car for Automobile Traffic. Weight, 38,000 lbs.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, The Barney & Smith Car Co.

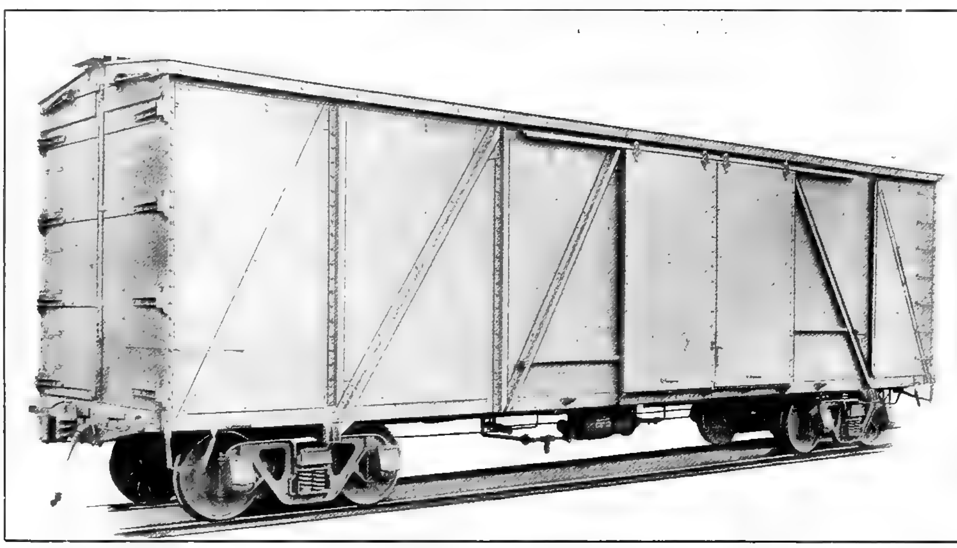


Fig. 20—Steel Frame 40-Ton Capacity Box Car for Automobile Traffic. Weight, 39,100 lbs.; Inside Length, 40 ft. 6 in.; Inside Width, 8 ft. 6 in.; Inside Height, 9 ft. 3 in. Builder, American Car & Foundry Co.

Fig. 21—All-Steel 50-Ton Capacity Box Car for Automobile Traffic. Weight, 51,900 lbs.; Inside Length, 50 ft.; Inside Width, 9 ft. 2 in.; Inside Height, 10 ft. 1 in. Builder, Western Steel Car & Foundry Co.

(See Figs. 267-268 for General Drawings.)

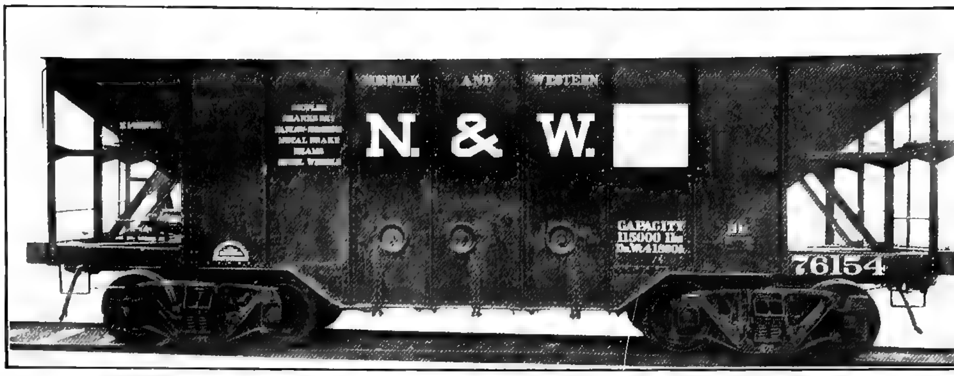


Fig. 22—All-Steel 57½-Ton Capacity Hopper Car. Weight, 41,800 lbs.; Inside Length, 30 ft. 0½ in.; Inside Width, 9 ft. 2 in. Capacity Level Full, Cubic Feet, 1,590. Builder, The Barney & Smith Car Co.

(See Figs. 292-293 for General Drawings.)

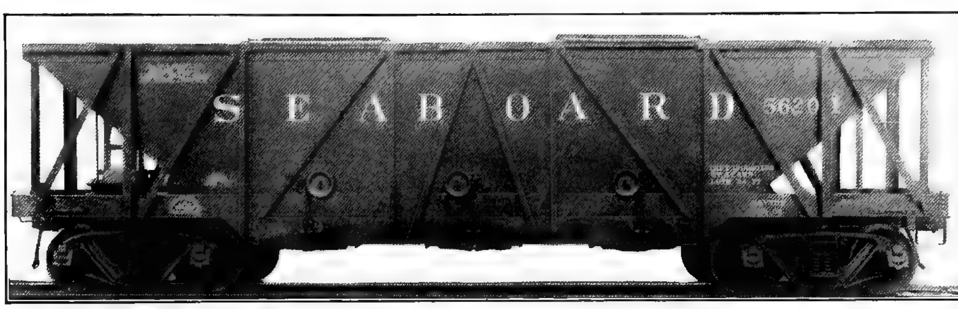


Fig. 23—All-Steel 50-Ton Capacity Hopper Car for Phosphate Traffic. Weight, 42,000 lbs.; Inside Length, 34 ft.; Inside Width, 9 ft. 1⅝ in; Length Over End Sills, 37 ft. 2 in.; Height, Rail to Top of Body, 9 ft. 8¾ in.; Extreme Height, 11 ft. 1¼ in. Capacity Level Full, Cubic Feet, 1,615. Builder, The Barney & Smith Car Co.

Fig. 24—All-Steel 70-Ton Capacity Hopper Car for Coke Traffic. Weight, 58,500 lbs.; Inside Length, 40 ft.; Inside Width, 9 ft. 6 in.; Capacity Level Full, Cubic Feet, 2,851. Builder, Pressed Steel Car Co.

Fig. 25—All-Steel 50-Ton Capacity Hopper Car. Weight, 37,300 lbs.; Inside Length, 30 ft.; Inside Width, 9 ft. 5½ in.; Inside Height, 7 ft. 3½ in. Capacity Level Full, Cubic Feet, 1,800. Builder, American Car & Foundry Co.

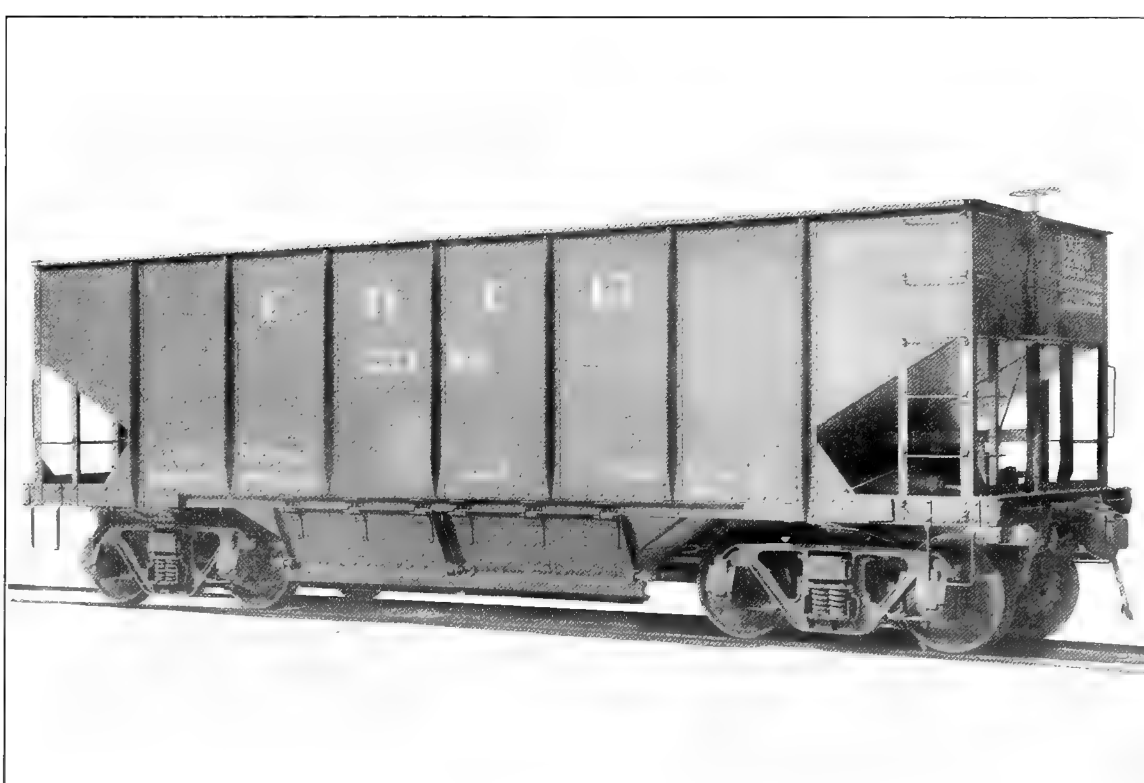


Fig. 26—All-Steel 50-Ton Capacity Hopper Car. Weight, 38,800 lbs.; Inside Length, 30 ft.; Inside Width, 9 ft. 5 in. Capacity Level Full, Cubic Feet, 1,831. Builder, Pressed Steel Car Co.

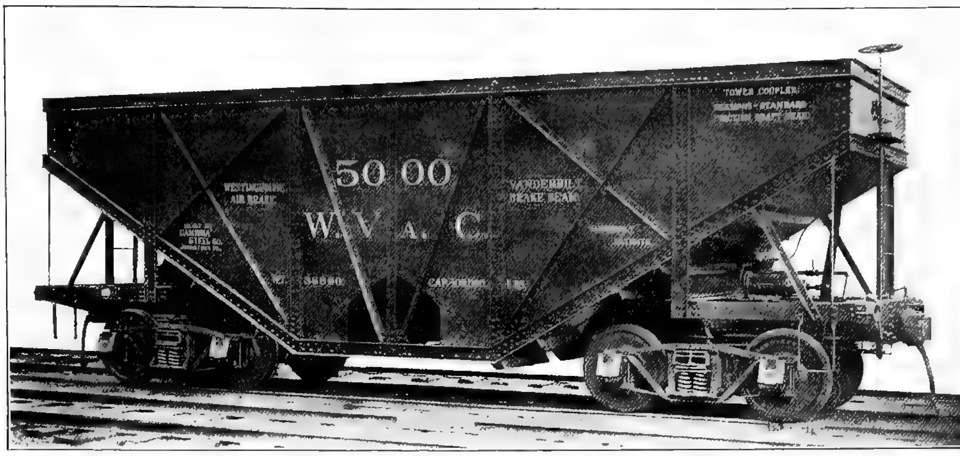


Fig. 27—All-Steel 50-Ton Capacity Hopper Car. Weight, 36,800 lbs.; Inside Length, 30 ft.; Inside Width, 8 ft. 9 in. Capacity Level Full, Cubic Feet, 1,858. Builder, Cambria Steel Co.

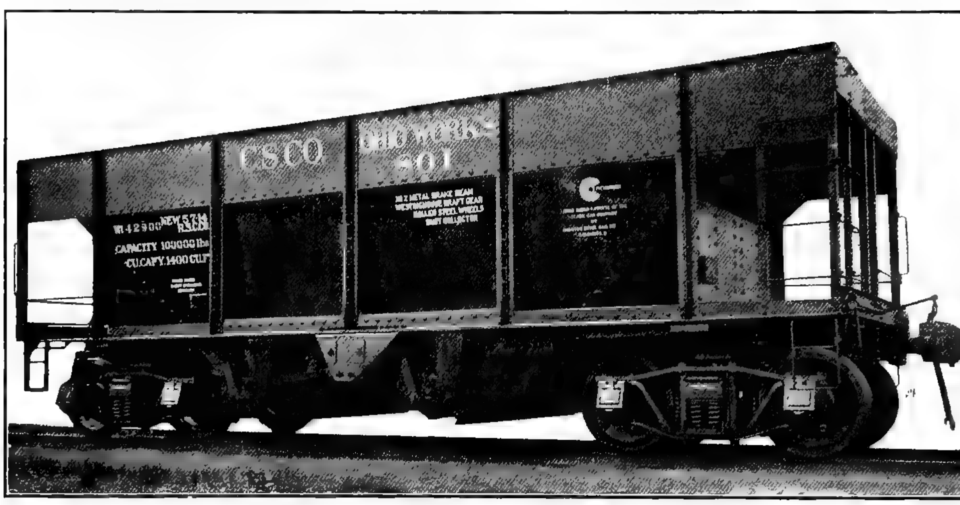


Fig. 28—All-Steel 50-Ton Capacity Hopper Car. Weight, 42,900 lbs.; Inside Length, 36 ft.; Inside Width, 9 ft. 9 in. Capacity Level Full, Cubic Feet, 1,400. Built Under Clark Car Co. Patents by the Ralston Steel Car Co.

Fig. 29—All-Steel 70-Ton Capacity Hopper Car. Weight, 45,900 lbs.; Inside Length, 34 ft. 4½ in.; Inside Width, 10 ft. 1¾ in. Capacity Level Full, Cubic Feet, 2,441. Builder, Pressed Steel Car Co.

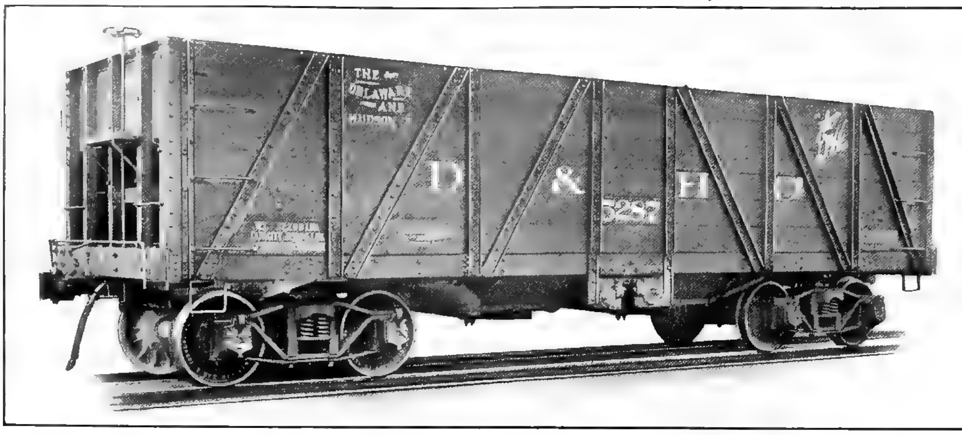


Fig. 30—Steel-Frame 42½-Ton Capacity Hopper Car. Weight, 37,700 lbs.; Inside Length, 32 ft.; Inside Width, 8 ft. 11 in. Capacity Level Full, Cubic Feet, 1,450. Builder, American Car & Foundry Co.

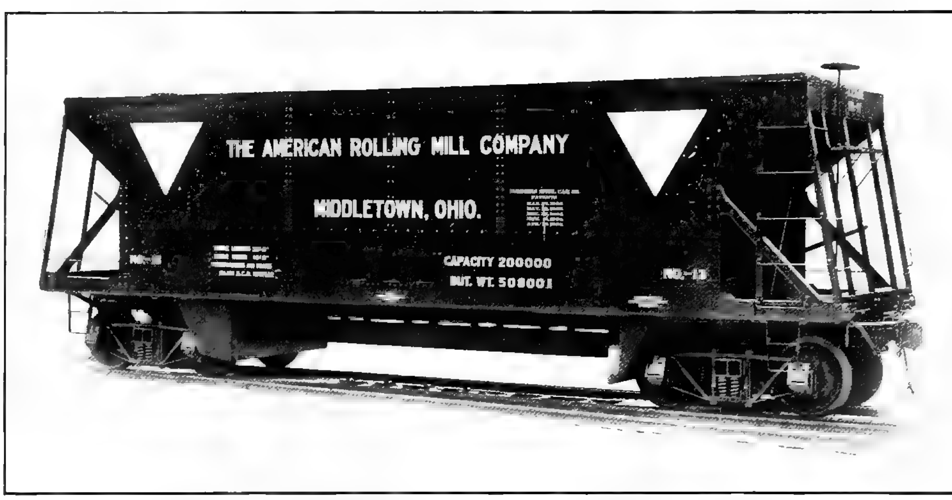


Fig. 31—All-Steel 100-Ton Capacity Side Dump Hopper Car. Weight, 50,800 lbs.; Inside Length, 33 ft.; Inside Width, 10 ft. Capacity Level Full, Cubic Feet, 2,000. Builder, Summers Steel Car Co.

Fig. 32—All-Steel 50-Ton Capacity Hopper Car for Coke Traffic. Weight, 47,500 lbs.; Inside Length, 40 ft. 5 in.; Inside Width, 9 ft. 7 in. Builder, Pressed Steel Car Co.

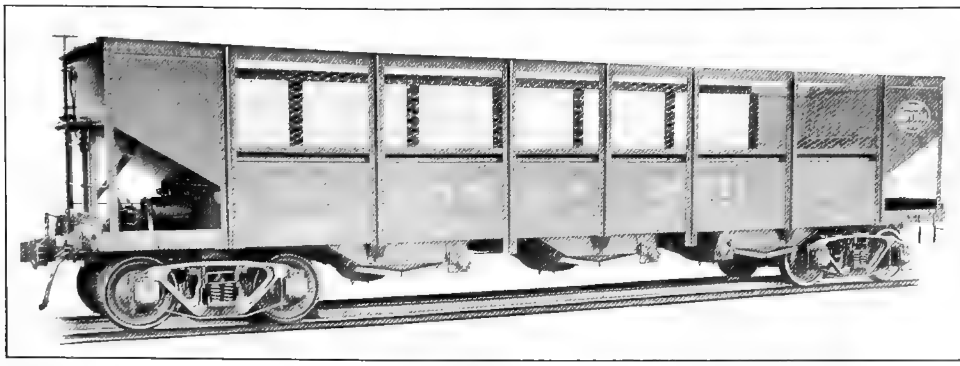


Fig. 33—All-Steel 40-Ton Capacity Hopper Car for Coke Traffic. Weight, 41,000 lbs.; Inside Length, 40 ft. 2¼ in.; Inside Width, 9 ft. 5 in. Builder, American Car & Foundry Co.

(See Figs. 299-300 for General Drawings.)

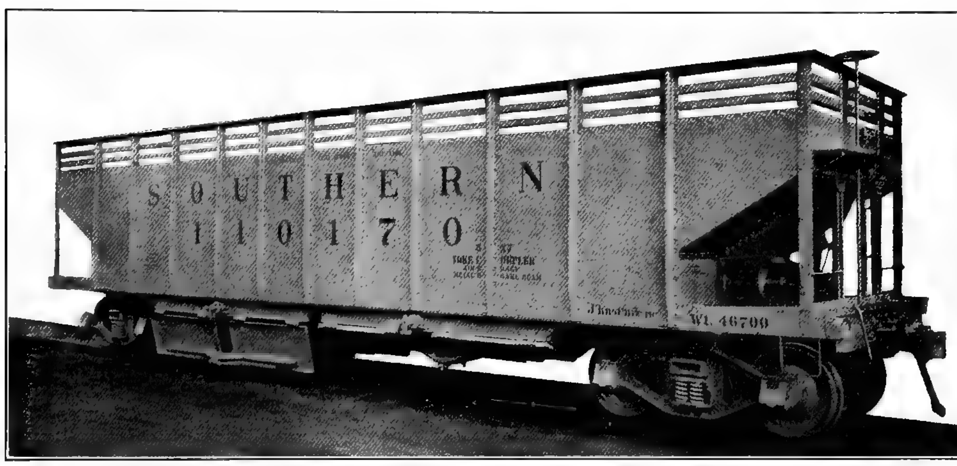


Fig. 34—All-Steel 50-Ton Capacity Hopper Car for Coke Traffic. Weight, 46,700 lbs.; Inside Length, 40 ft. 1⅞ in.; Inside Width, 9 ft. 6 in. Capacity Level Full, Cubic Feet, 2,683. Builder, Cambria Steel Co.

(See Fig. 291 for General Drawings.)

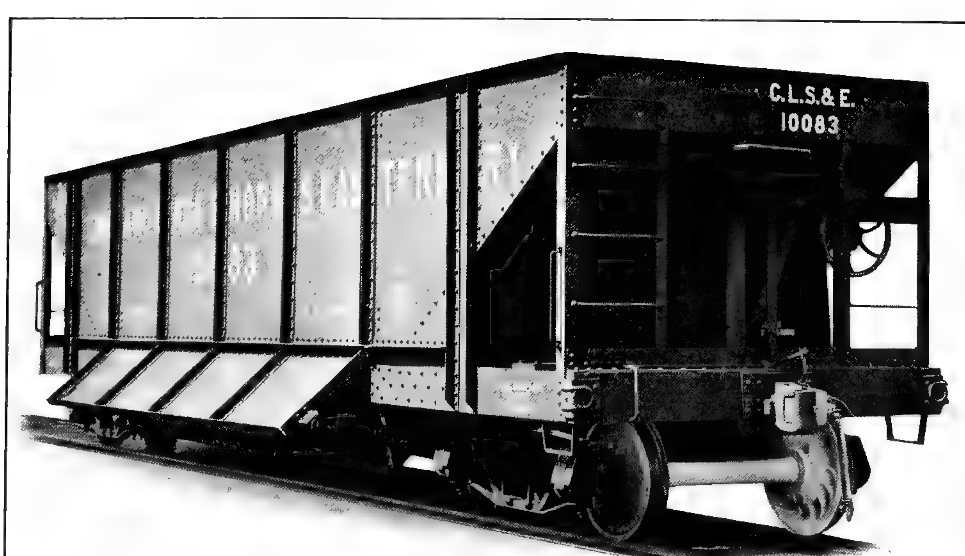


Fig. 35—All-Steel 50-Ton Capacity Hopper Car for Coke Traffic. Weight, 47,600 lbs.; Inside Length, 38 ft. 6½ in.; Inside Width, 9 ft. 3½ in. Capacity Level Full, Cubic Feet, 2,149. Builder, American Car & Foundry Co.

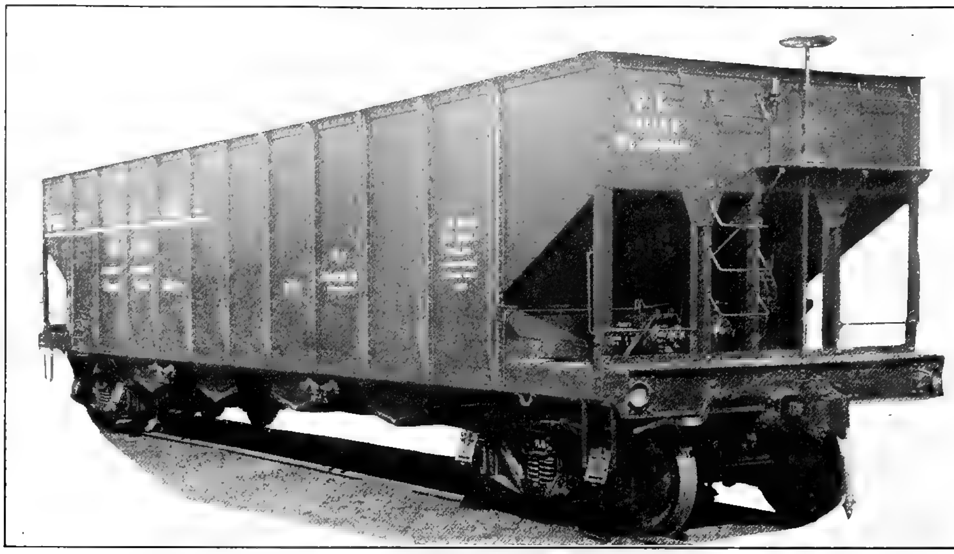


Fig. 36—All-Steel 50-Ton Capacity Hopper Car for Coke Traffic. Weight, 45,600 lbs.; Inside Length, 40 ft. 2 in.; Inside Width, 9 ft. 6 in. Capacity Level Full, Cubic Feet, 2,508. Builder, Cambria Steel Co.

Fig 37—All-Steel 60-Ton Capacity Ore Car. Weight, 42,300 lbs.; Inside Length, 23 ft. 10⅜ in.; Inside Width, 9 ft. 10 in.; Inside Height, 6 ft. 9½ in. Builder, Pressed Steel Car Co.

(See Fig. 309 for General Drawings.)

Fig. 38—All-Steel 50-Ton Capacity Ore Car. Weight, 34,600 lbs. Inside Length, 18 ft. 6 in.; Inside Width, 8 ft. 6 in. Builder, Standard Steel Car Co.

Fig. 39—All-Steel 50-Ton Capacity Ore Car. Weight, 33,300 lbs. Builder, American Car & Foundry Co.

Fig. 40—All-Steel 50-Ton Capacity Ore Car. Weight, 32,900 lbs.; Inside Length, 22 ft.; Inside Width, 8 ft. 11 in. Built Under Clark Car Co. Patents by Ralston Steel Car Co.

Fig. 41—All-Steel 50-Ton Capacity Ore Car. Weight, 34,200 lbs.; Inside Length, 17 ft. 5 in.; Inside Width, 8 ft. 10 in. Capacity Level Full, Cubic Feet, 704. Builder, Western Steel Car & Foundry Co.

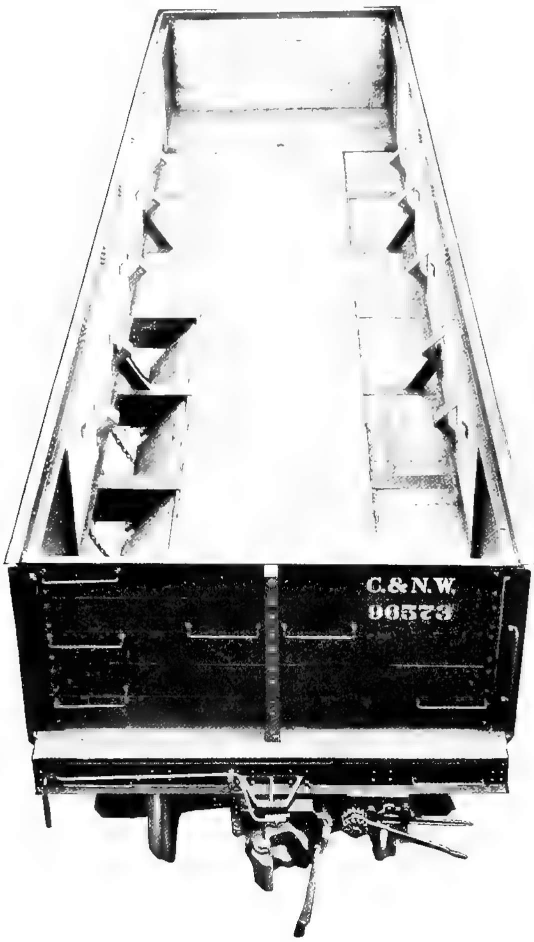


Fig. 42—Car Shown in Fig. 44, with Drop Bottom Arranged for Use as Coal Car.

Fig. 43—Car Shown in Fig. 44, Arranged for Use as a Center Dumping Ballast Car.

(See Figs. 333 334 for General Drawings.)

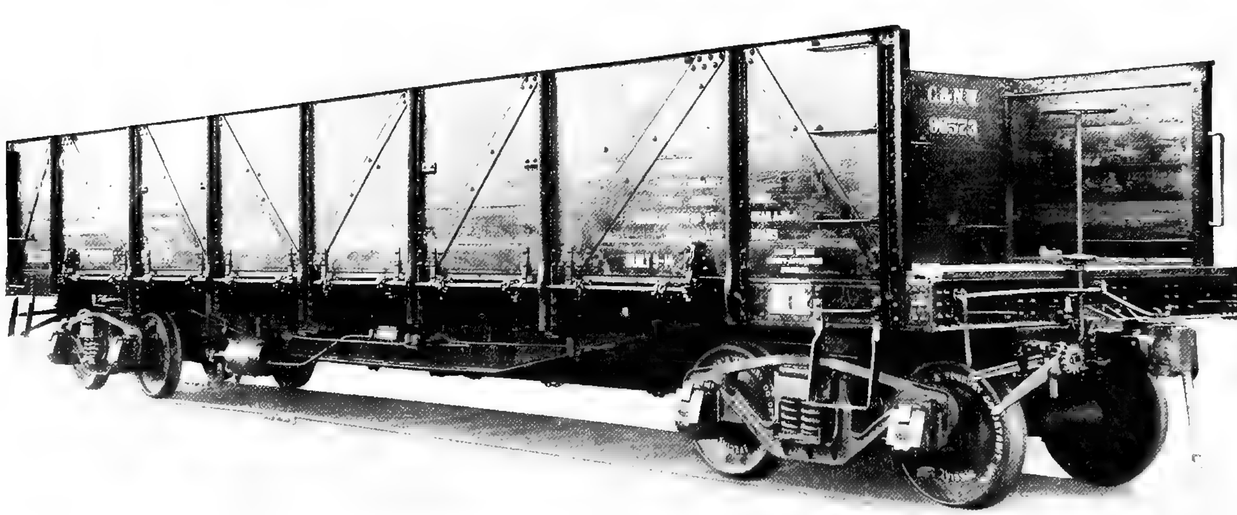


Fig. 44—Steel Frame 55-Ton Capacity Convertible Gondola and Ballast Car, Shown Also in Figs. 42 and 43. Weight, 44,000 lbs.; Inside Length, 30 ft. or 40 ft. Car as Shown Arranged for Center Dumping of Ballast, with Ends Set In. Builder, Rodger Ballast Car Co.

Fig. 45—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 43,300 lbs.; Inside Length, 40 ft.; Inside Width, 9 ft. 6 in.; Inside Height, 4 ft. 3 in. Builder, National Dump Car Co.

(See Figs. 315-316 for General Drawings.)

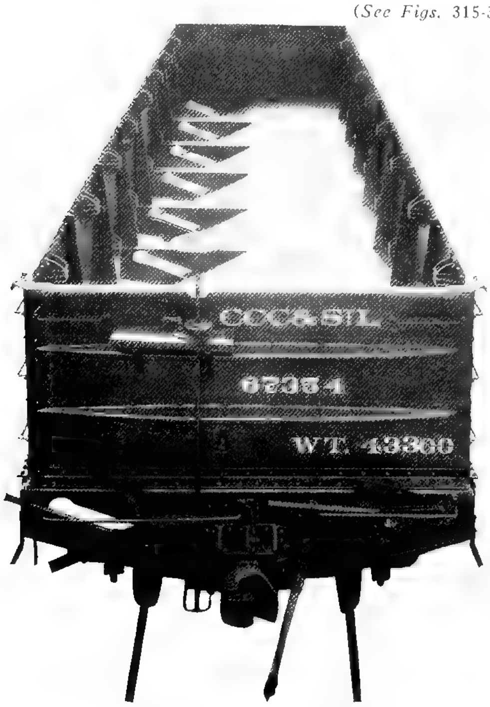


Fig. 46—Drop-Bottom Gondola Car with Doors Open on One Side.

Fig. 47—Drop-Bottom Gondola Car with all Doors Open. Builder, National Dump Car Co.

(See also Fig. 45.)

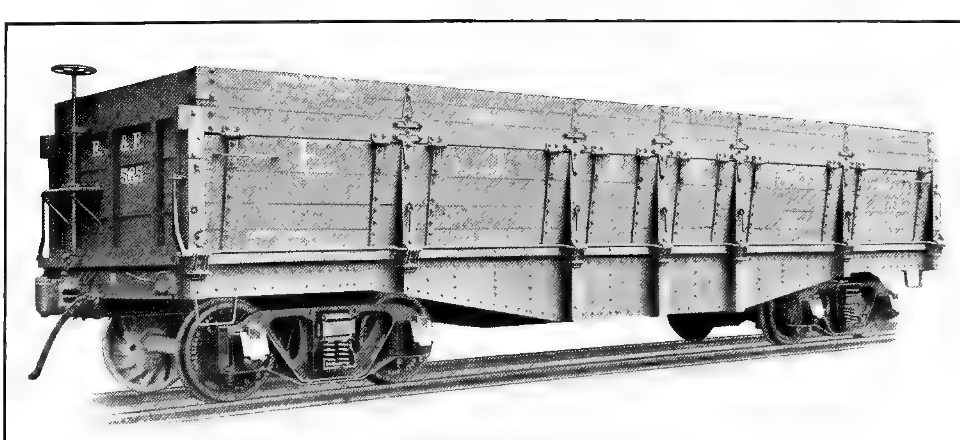


Fig. 48—Steel Underframe 50-Ton Capacity Side-Dump Gondola Car. Weight, 41,600 lbs.; Inside Length, 33 ft. 5 in.; Inside Width, 8 ft. 6 in.; Inside Height, 4 ft. 8 in. Builder, American Car & Foundry Co.

Fig. 49—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 40,300 lbs.; Inside Length, 40 ft. 4 in.; Inside Width, 9 ft. 3 in.; Inside Height, 4 ft. 6½ in. Capacity, Level Full, Cubic Feet, 1,693. Builder, Ralston Steel Car Co.

Fig. 50—All-Steel 50-Ton Capacity Side Dump Hopper Bottom Gondola Car with Air Operating Device. Weight, 47,800 lbs.; Inside Length, 30 ft. 1 in.; Inside Width, 8 ft. 6½ in. Capacity, Level Full, Cubic Feet, 980. Builder, Pressed Steel Car Co.

Fig. 51—All-Steel 50-Ton Capacity Drop-Bottom Goidola Car. Weight, 39,300 lbs.; Inside Length, 40 ft.; Inside Width, 9 ft. 6 in.; Inside Height, 4 ft. 7 in. Capacity, Level Full, Cubic Feet, 1,742 . Builder, National Dump Car Co.

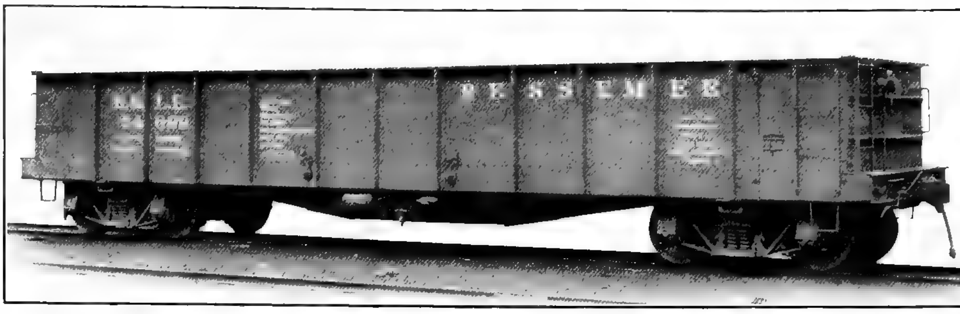


Fig. 52—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 44,600 lbs.; Inside Length, 41 ft.; Inside Width, 9 ft. 2 in.; Inside Height, 4 ft. 2 in. Builder, Pressed Steel Car Co.

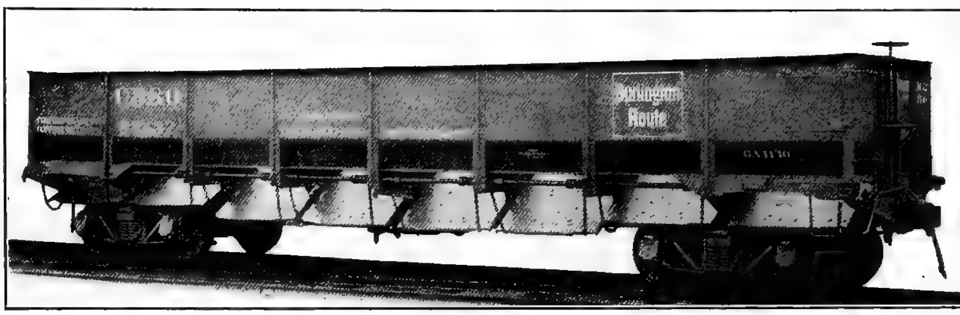


Fig. 53—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 40,300 lbs.; Inside Length, 40 ft.; Inside Width, 9 ft. 6¾ in.; Inside Height, 4 ft. 2 in. Builder, Pressed Steel Car Co.

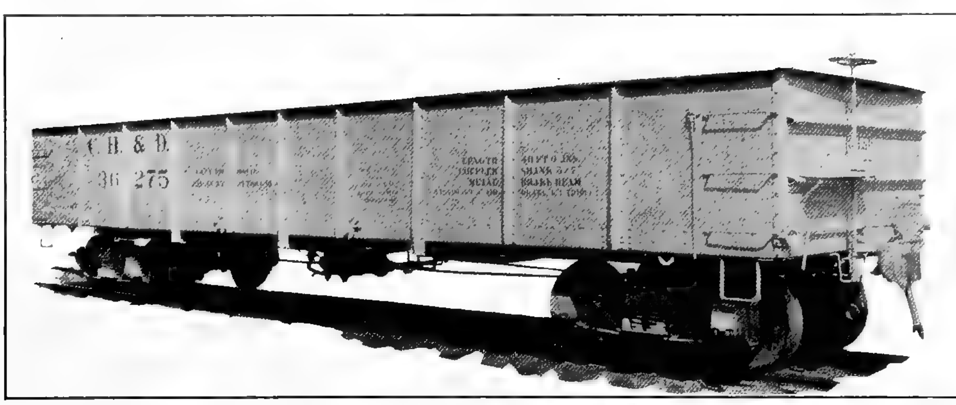


Fig. 54—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 37,700 lbs.; Inside Length, 40 ft.; Inside Width, 9 ft. 7 in.; Inside Height, 4 ft. 2 in. Builder, Cambria Steel Co.

(*See Figs.* 319-321 *for General Drawings.*)

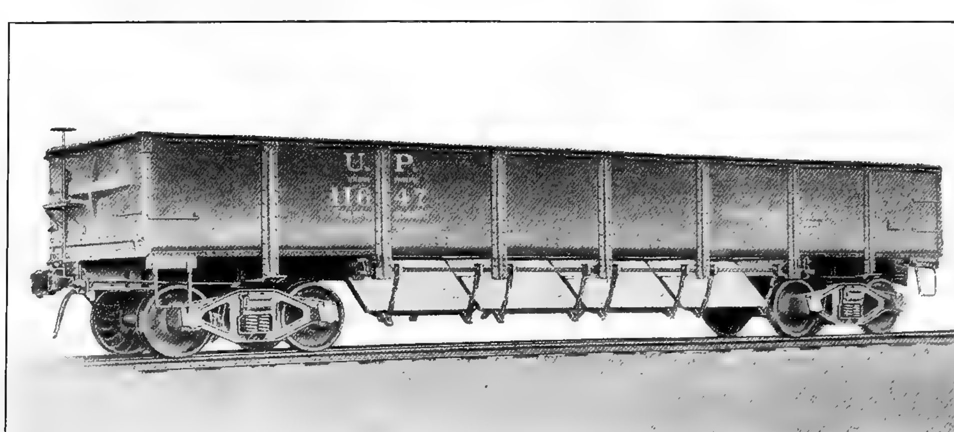


Fig. 55—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 39,000 lbs.; Inside Length, 40 ft. 4 in.; Inside Width, 9 ft. 5 in.; Inside Height, 4 ft. 6 in. Builder, The Bettendorf Co.

(*See Figs.* 317-318 *for General Drawings.*)

Fig. 56—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 43,200 lbs.; Inside Length, 40 ft.; Inside Width, 9 ft. 4 in.; Inside Height, 4 ft. 6 in. Builder, Pressed Steel Car Co.

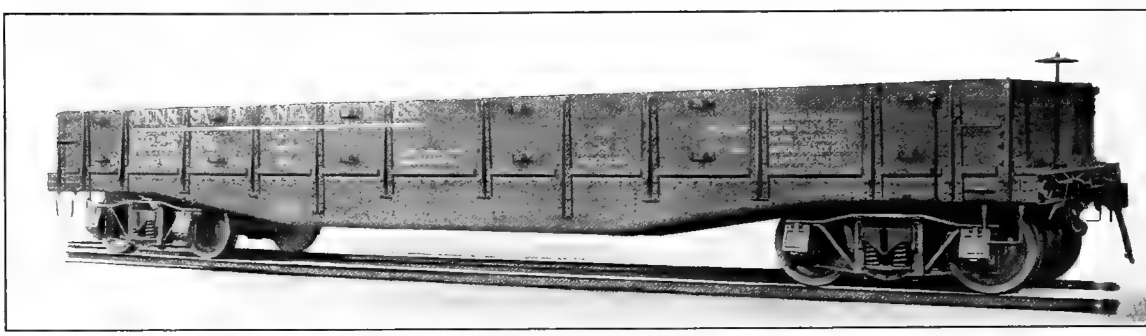


Fig. 57—Steel Frame 50-Ton Capacity Solid Bottom Gondola Car with Drop Ends. Weight, 52,000 lbs.; Inside Length, 40 ft. 8 in.; Inside Width, 8 ft. 9¼ in.; Inside Height, 2 ft. 6¼ in.; Capacity Level Full, Cubic Feet, 897. Builder, American Car & Foundry Co.

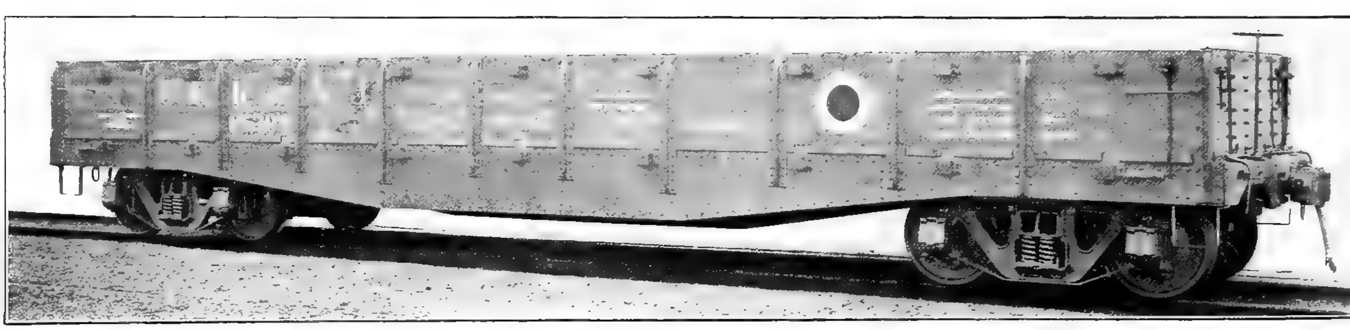


Fig. 58—Steel Underframe 50-Ton Capacity Gondola Car with Drop Ends. Weight, 44,100 lbs.; Inside Length, 40 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 2 ft. 6 in. Builder, American Car & Foundry Co.

(See Figs. 322-323 for General Drawings.)

Fig. 59—All-Steel 90-Ton Capacity Gondola Car with Drop-Bottom Doors. Weight, 65,200 lbs.; Inside Length, 45 ft. 6 in.; Inside Width, 9 ft. 6 in.; Inside Height, 6 ft. 6 in. Builder, Norfolk & Western Railway.

(See Fig. 328 for General Drawings.)

Fig. 60—All-Steel 40-Ton Capacity Two-Way Extension Side Dump Car, Operated by Hand or Compressed Air. Capacity, 20 Cubic Yards. Builder, Clark Car Company.

Fig. 61—Open Position of All-Steel 40-Ton Capacity Two-Way Side Dump Car, Shown in Fig. 60.

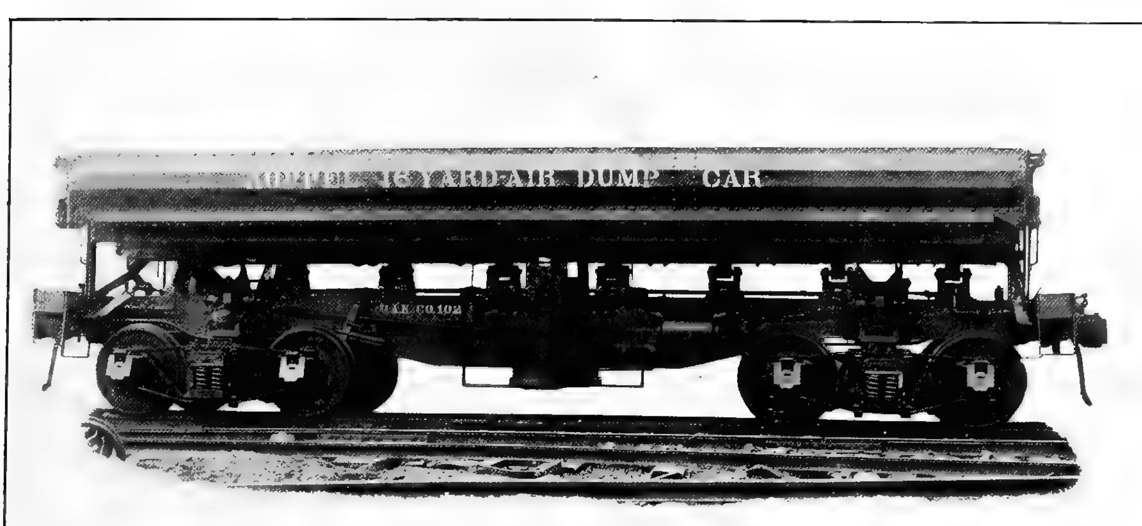


Fig. 62—All-Steel, 16 Cubic Yard Capacity, Air-Operated Side Dump Car. Builder, Orenstein-Arthur Koppel Company.

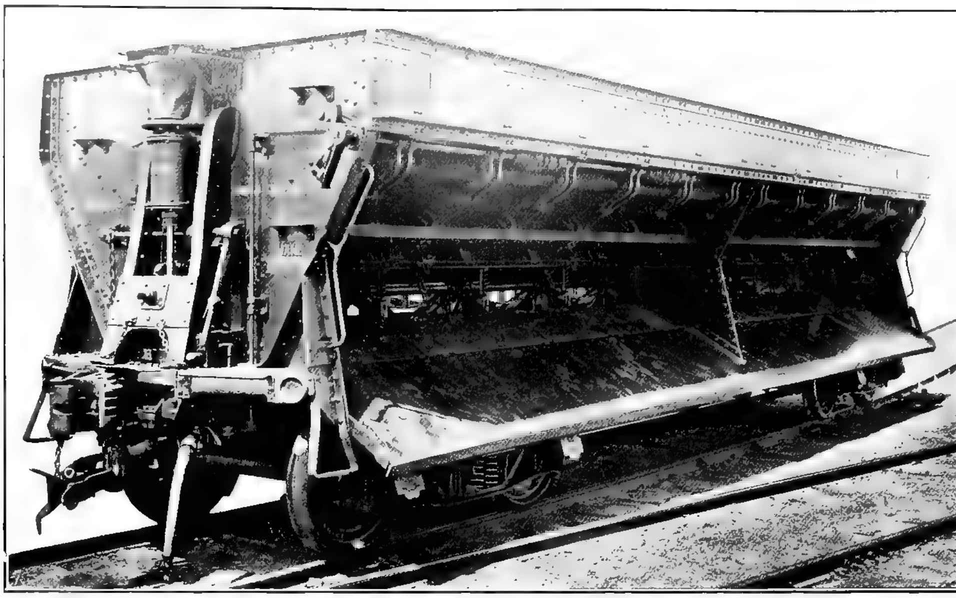


Fig. 63—All-Steel Air or Hand Operated Side or Center Dump Car of 40 Tons Capacity. Weight, 50,000 lbs. Builder, Goodwin Car Co.

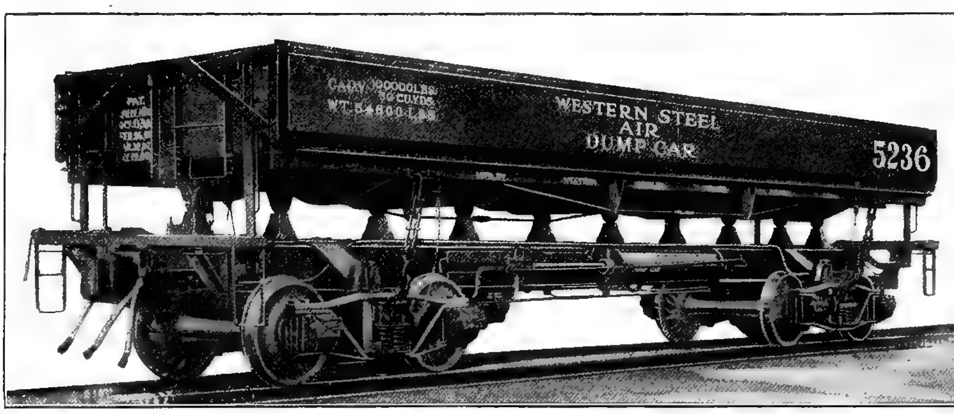


Fig. 63A—All-Steel Air-Operated 50-Ton Capacity Dump Car. Weight, 54,600 lbs.; Inside Length, 34 ft.; Capacity, 30 Cubic Yards. Builder, Western Wheeled Scraper Co.

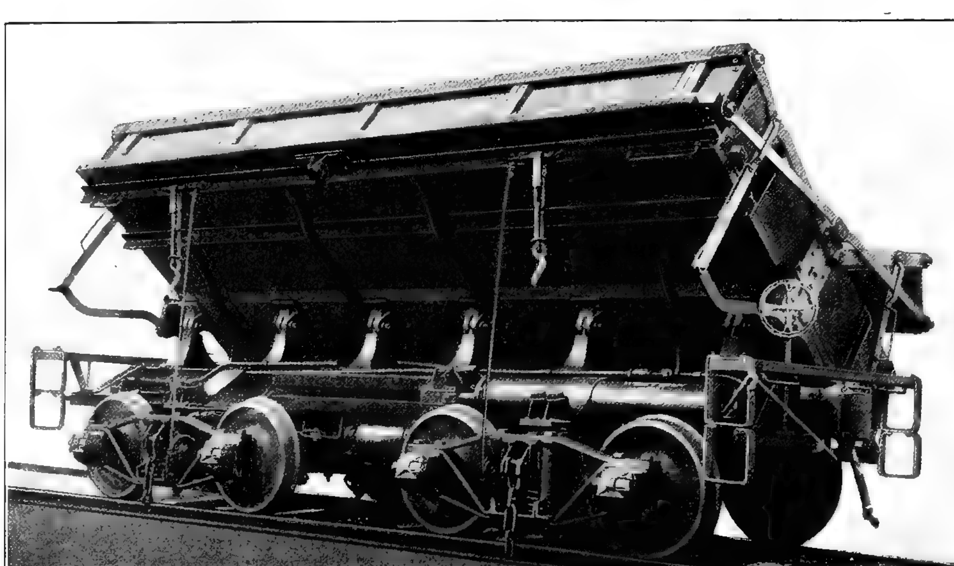


Fig. 64—Dumping Position of Western Air-Operated Dump Car. Builder, Western Wheeled Scraper Co.

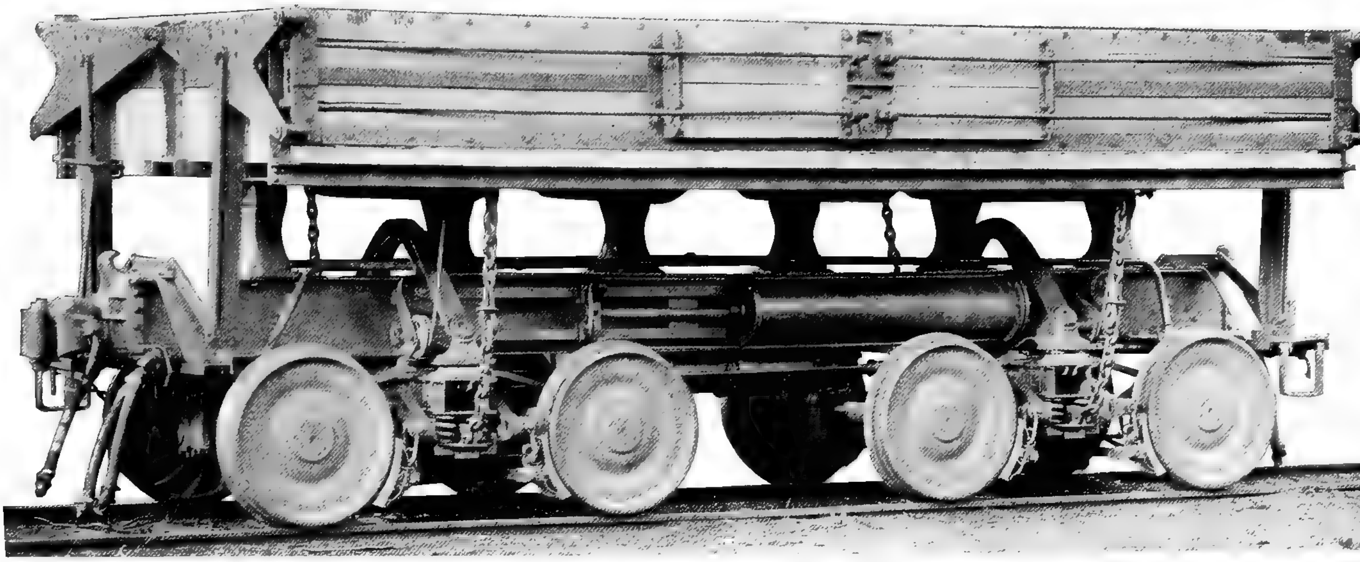


Fig. 65—Steel Underframe 30-Ton Capacity Two-Way Side Dump Car. Weight, 34,000 lbs.; Inside Length, 19 ft. 4 in.; Inside Width, 8 ft. 8 in.; Inside Height, 2 ft. The Dumping Mechanism is Operated by the Cylinder Shown, Using Compressed Air. The Journal Boxes are Placed Inside the Wheels to Avoid Injury when the Load is Discharged. The Chains Hold the Car Body in Position During Transit. Builder, Fitz-Hugh, Luther Co.

Fig. 66—Dumping Position of the Two-Way Side Dump Car Shown in Fig. 60. The Dumping Angle is 49 Degrees. The Body Bolsters, of Cast Steel, Have Cast Integral with Them Center Plates, Side Bearings and Spring Pockets. The Latter Contain Coil Springs Which Absorb the Shock as the Body Dumps.

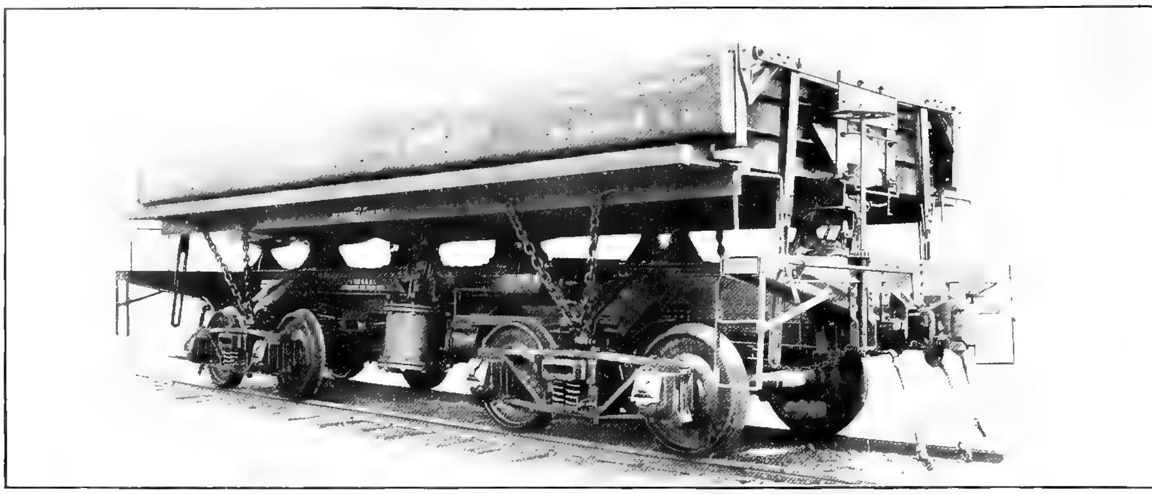


Fig. 67—All-Steel 40-Ton Capacity Air-Operated Side Dump Car. Weight, 46,600 lbs.; Capacity, 16 Cubic Yards; Inside Length, 26 ft.; Inside Width, 8 ft. 4 in. Builder, The Kilbourne & Jacobs Company.

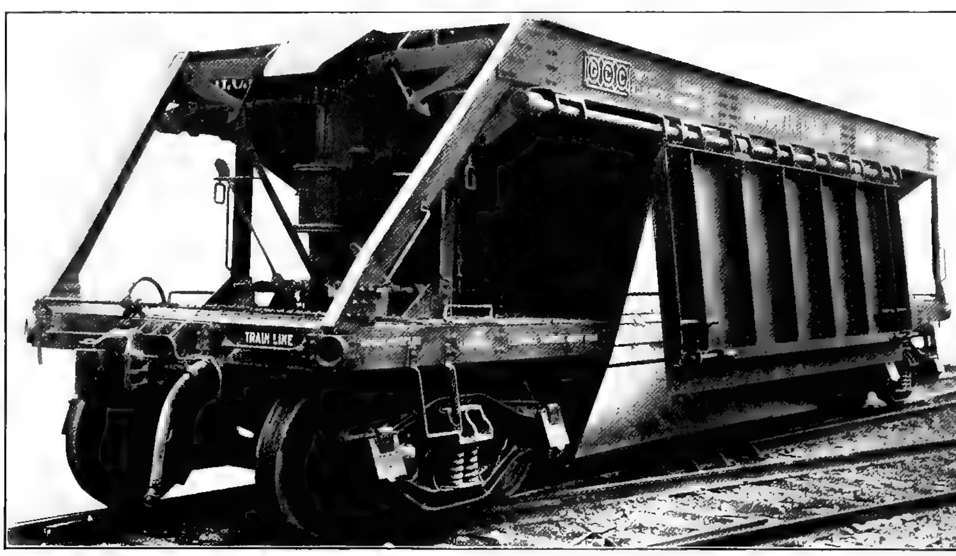


Fig. 68—All-Steel 50-Ton Capacity Air-Operated Side or Center Dump Car. Weight, 53,000 lbs.; Inside Length, 25 ft.; Capacity, 30 Cubic Yards. Builder Goodwin Car Co.

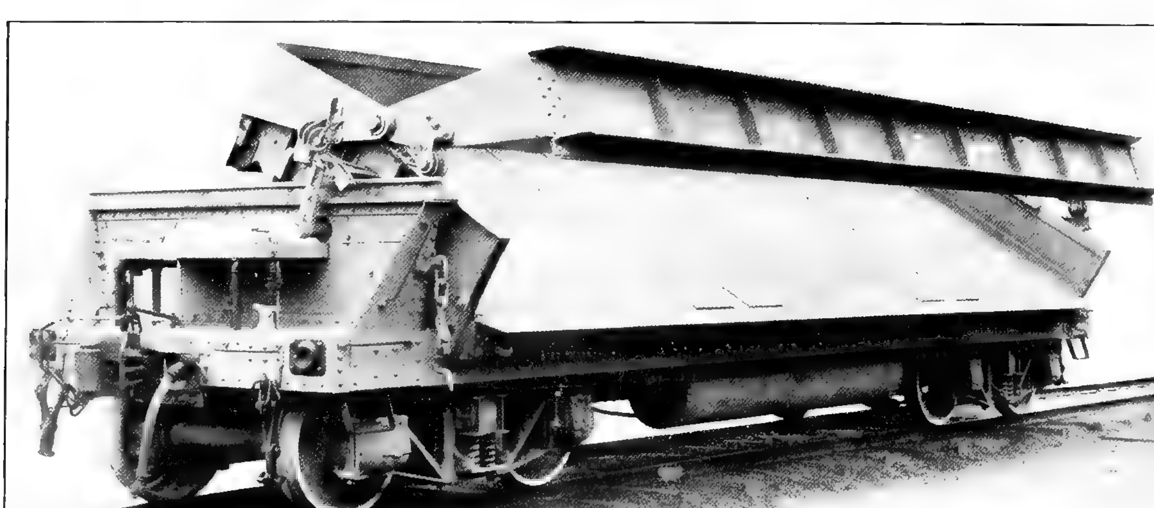


Fig. 69—All-Steel Air-Operated Side Dump Car. Load Limit, 77,000 lbs. Builder, Ralston Steel Car Co.

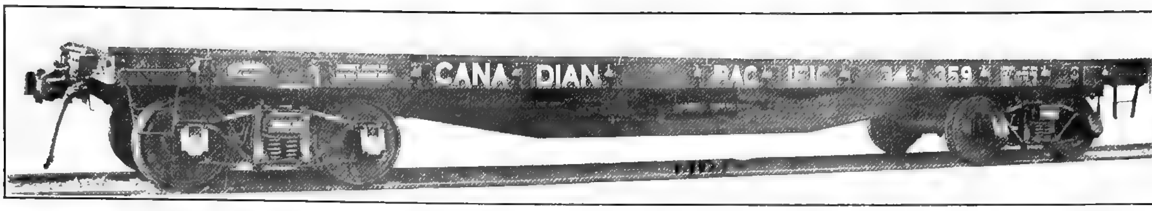


Fig. 70—Steel Frame 40-Ton Capacity Flat Car. Weight, 33,100 lbs.; Length of Platform, 41 ft. 6 in.; Width of Platform, 9 ft.; Height, Rail to Top of Platform, 4 ft. 2¾ in. Builder, Canadian Car & Foundry Co.

(See Fig. 335 for General Drawings.)

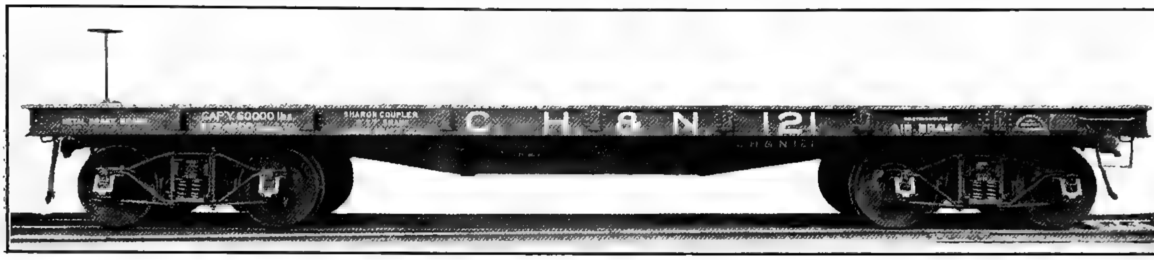


Fig. 71—Steel Frame 30-Ton Capacity Flat Car. Weight, 24,200 lbs. Builder, The Barney & Smith Car Co.

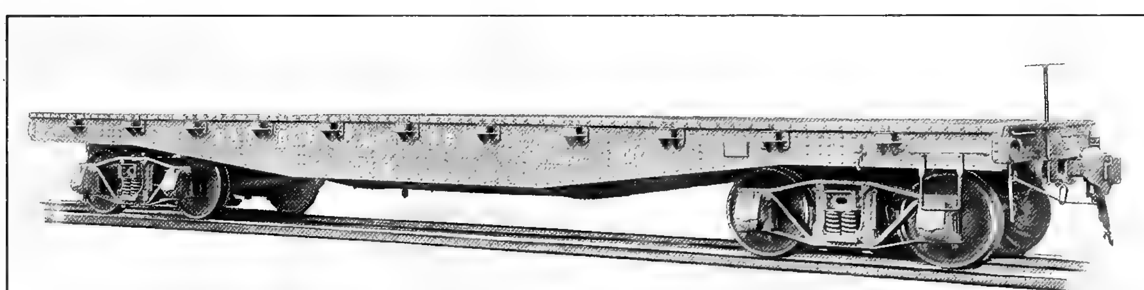


Fig. 72—Steel Frame 50-Ton Capacity Flat Car. Weight, 37,900 lbs.; Length of Platform, 34 ft. 2 in.; Width of Platform, 8 ft. 10 in.; Height, Rail to Top of Platform, 4 ft. 2 in. Builder, American Car & Foundry Co.

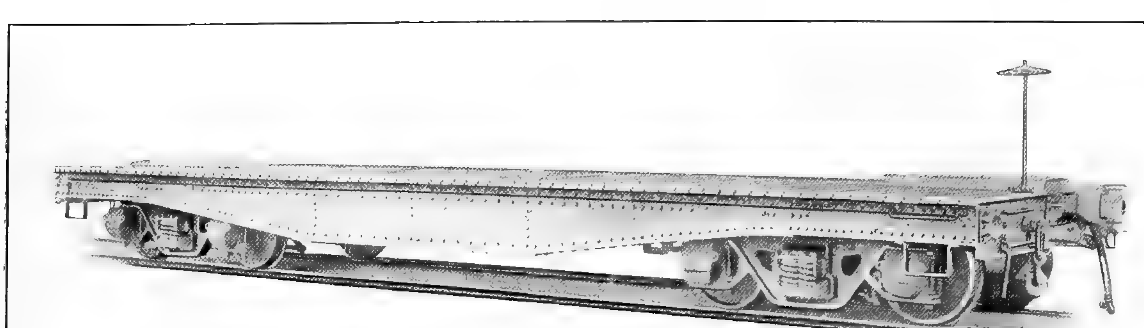


Fig. 73—Steel Frame 75-Ton Capacity Flat Car. Weight, 44,000 lbs.; Length of Platform, 34 ft. 7 in.; Width of Platform, 10 ft.; Height, Rail to Top of Platform, 3 ft. 2 in. Builder, American Car & Foundry Co.

Fig. 74—Steel Frame 100-Ton Capacity Four-Truck Flat Car. Weight, 90,000 lbs.; Length of Platform, 70 ft. 7 in.; Width of Platform, 8 ft. 6 in. Builder, McGuire-Cummings Manufacturing Co.

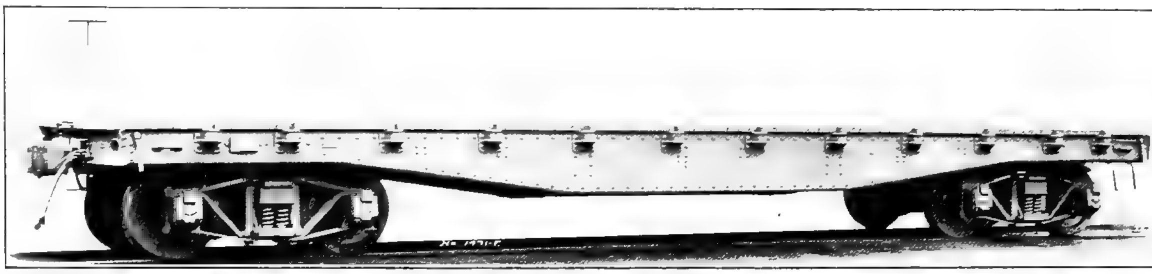


Fig. 75—Steel Frame 50-Ton Capacity Flat Car. Weight, 39,500 lbs.; Length of Platform, 40 ft.; Height, Rail to Top of Platform, 4 ft. Builder, Pressed Steel Car Co.

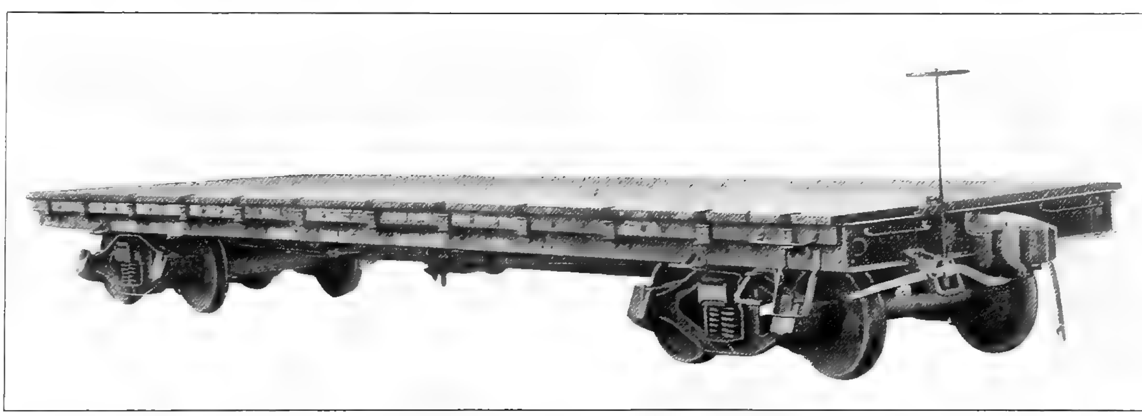


Fig. 76—Steel Frame 50-Ton Capacity Flat Car. Weight, 32,100 lbs.; Length of Platform, 41 ft. 2 in.; Width of Platform, 9 ft. 4½ in.; Height, Rail to Top of Platform, 3 ft. 11 in. Builder, The Bettendorf Co.

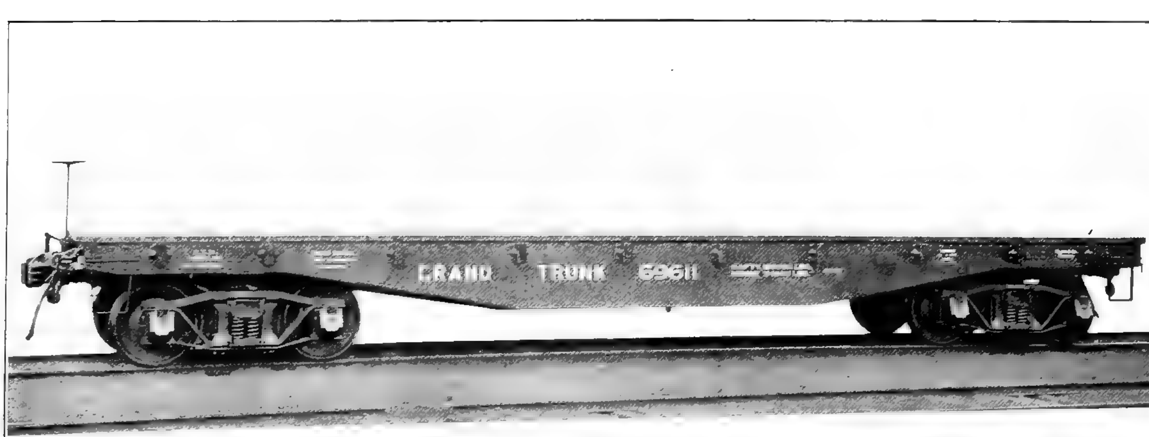


Fig. 77—Steel Frame 50-Ton Capacity Flat Car. Weight, 34,600 lbs.; Length of Platform, 40 ft. 6 in.; Width of Platform, 9 ft.; Height, Rail to Top of Platform, 4 ft. 2½ in. Builder, Western Steel Car & Foundry Co.

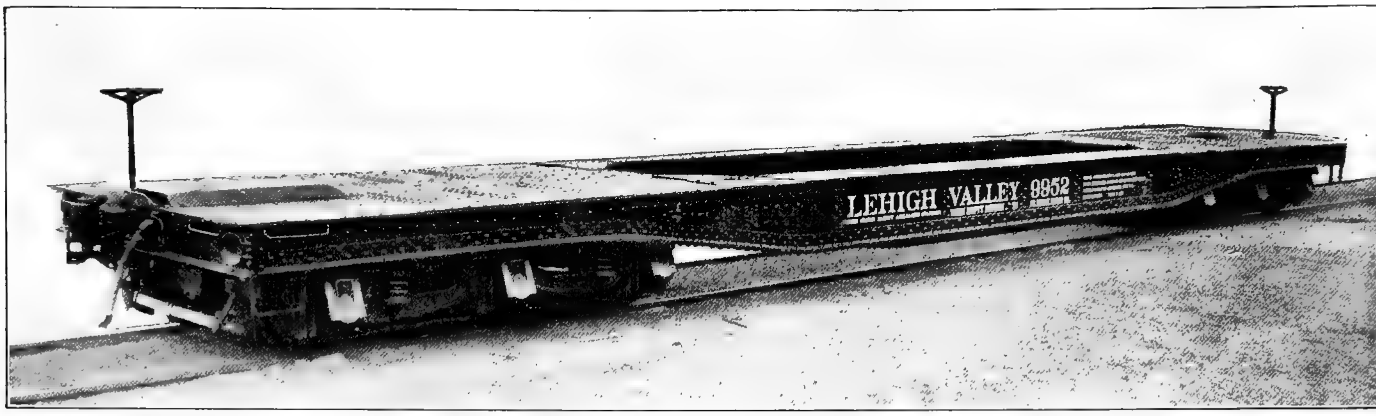


Fig. 78—All Steel 110-Ton Capacity Well Flat Car. Weight, 91,900 lbs.; Length of Platform, 55 ft. 7 in.; Width of Platform, 9 ft. 10 in.; Height, Rail to Top of Platform, 3 ft. 2 in.; Well Opening, 26 ft. 2 in. by 6 ft. 1 in. Builder, Lehigh Valley Railroad.

(See Fig. 337 for General Drawings.)

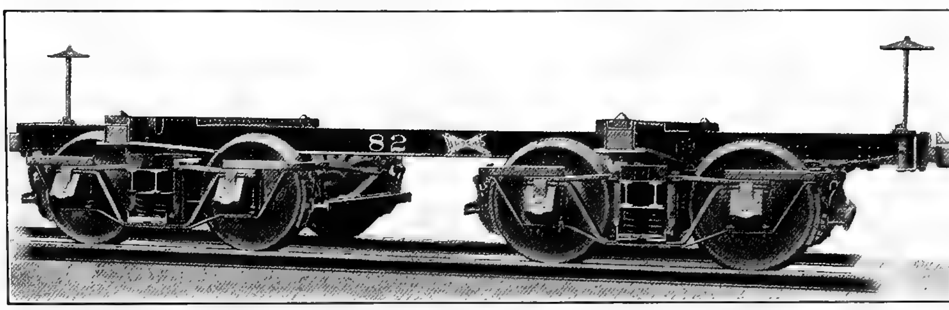


Fig. 79—Steel Frame 30-Ton Capacity Logging Car. Weight, 15,000 lbs. Builder, American Car & Foundry Co.

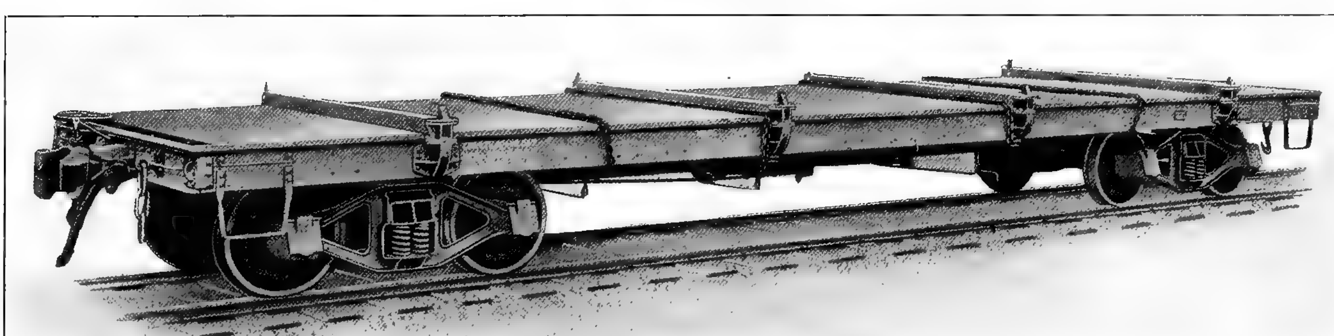


Fig. 80—Steel Frame 40-Ton Capacity Logging Car. Weight, 31,500 lbs.; Length of Platform, 39 ft. 9 in. Builder, The Bettendorf Co.

Fig. 81—Steel Frame Tank Car, Capacity, 8,000 Imperial Gallons or 40 Tons. Weight, 44,900 lbs.; Length of Tank, 33 ft. 6 in. Builder, Canadian Car & Foundry Co.

(See Fig. 341 for General Drawings.)

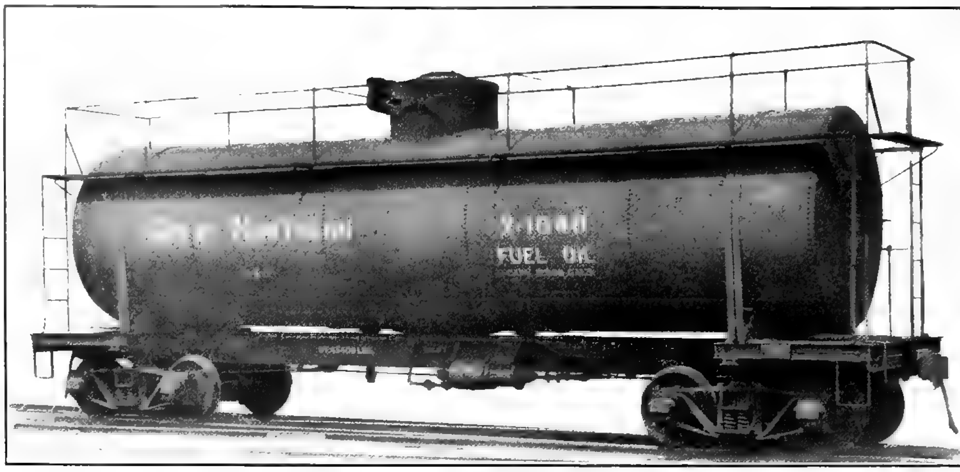


Fig. 82—Steel Tank Car. Capacity, 12,000 U. S. Gallons; Weight, 45,400 lbs. Builder, Pressed Steel Car Co.

Fig. 83—Steel Tank Car with Three Compartments. Capacity, 10,000 U. S. Gallons or 80,000 lbs. Builder, McGuire-Cummings Manufacturing Co.

Fig. 84—Steel Tank Car. Capacity, 14,600 U. S. Gallons; Weight, 45,600 lbs. Builder, Chicago Steel Car Co.

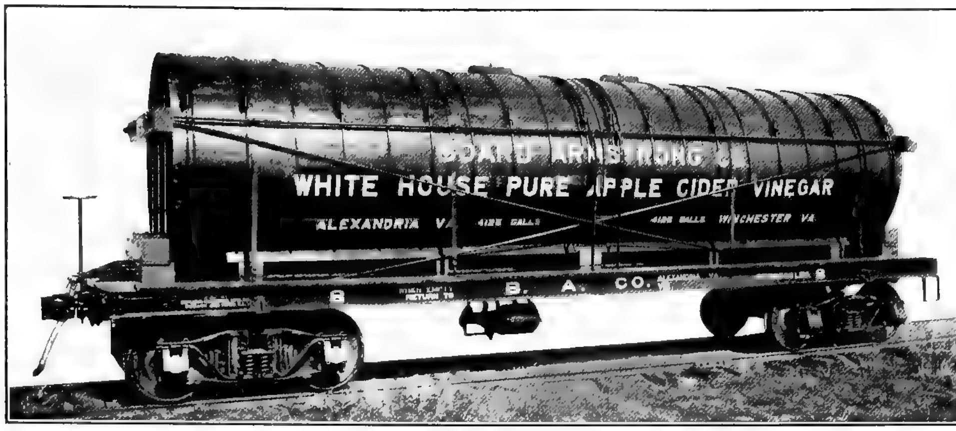


Fig. 85—Steel Frame Tank Car with Wooden Tank for Vinegar Transportation. Capacity, 8,250 U. S. Gallons; Weight, 39,000 lbs. Builder, McGuire-Cummings Manufacturing Co.

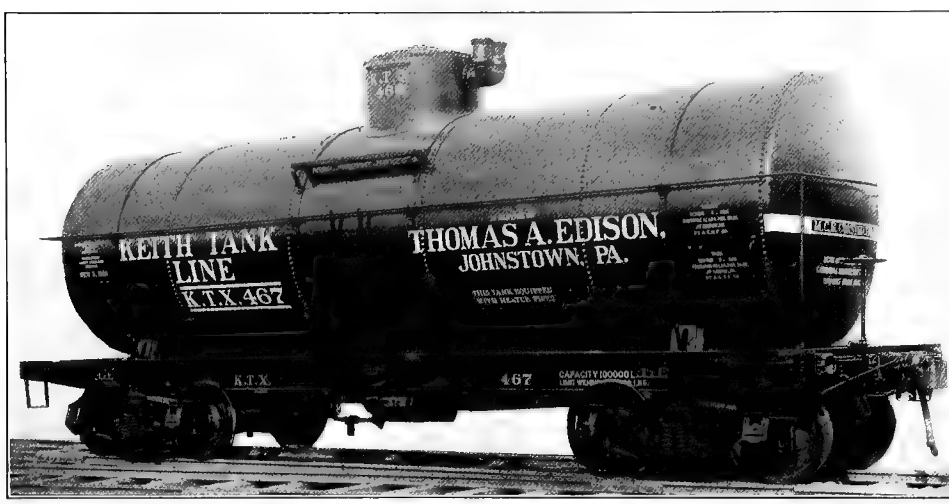


Fig. 86—Steel Tank Car. Capacity, 12,000 U. S. Gallons or 100,000 lbs. Builder, American Car & Foundry Co.

Fig. 87—Steel Tank Car. Capacity, 8,000 U. S. Gallons or 80,000 lbs.; Weight, 35,300 lbs. Builder, The Kennicott Co.

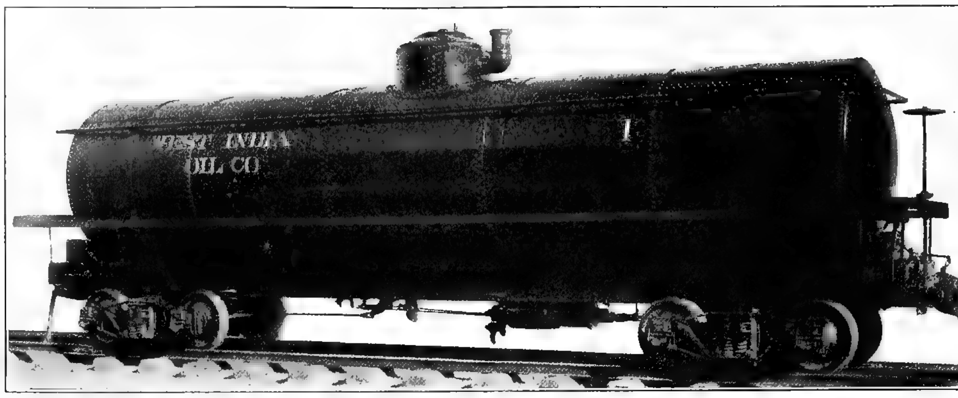


Fig. 88—Steel Tank Car. Builder, The Gregg Company, Limited.

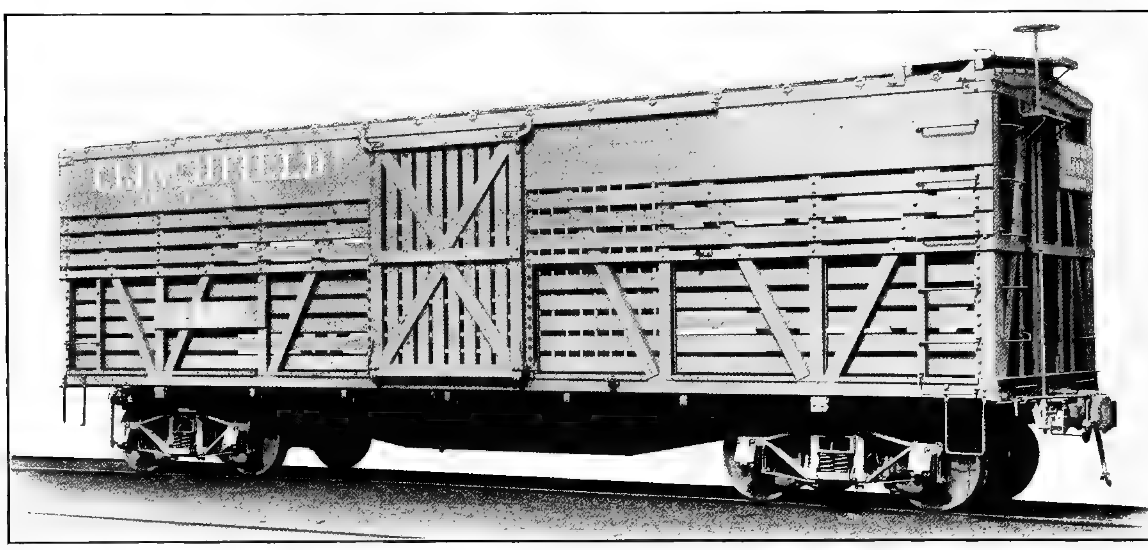


Fig. 89—Steel Underframe 30-Ton Capacity Stock Car. Weight, 34,300 lbs.; Inside Length, 36 ft.; Inside Width, 8 ft. 5½ in.; Inside Height, 8 ft. 0½ in. Builder, Pressed Steel Car Co.

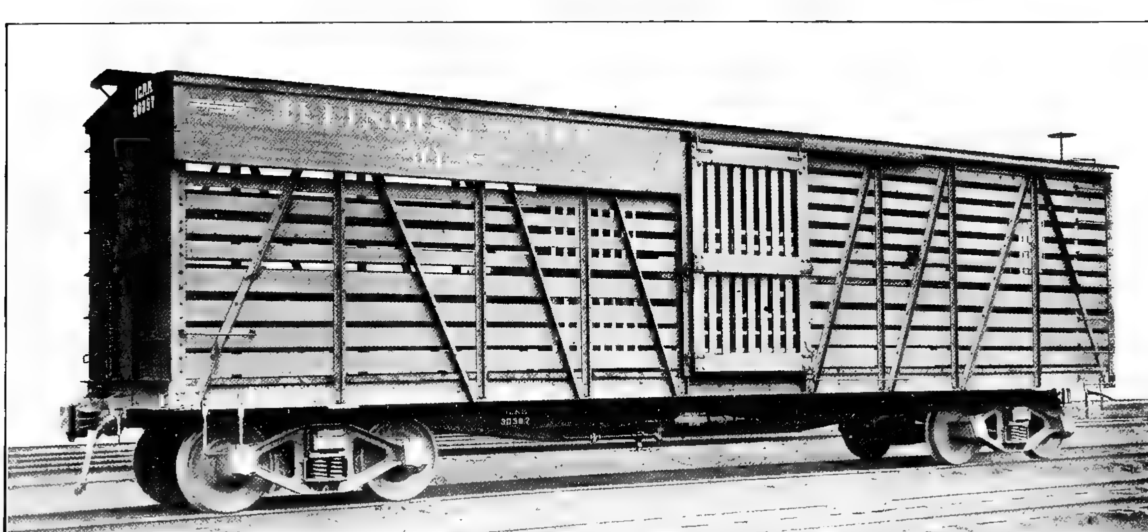


Fig. 90—Steel Frame 40-Ton Capacity Stock Car. Weight, 39,200.; Inside Length, 40 ft. 6 in.; Inside Width, 8 ft. 10 in.; Inside Height, 8 ft. Builder, American Car & Foundry Co.

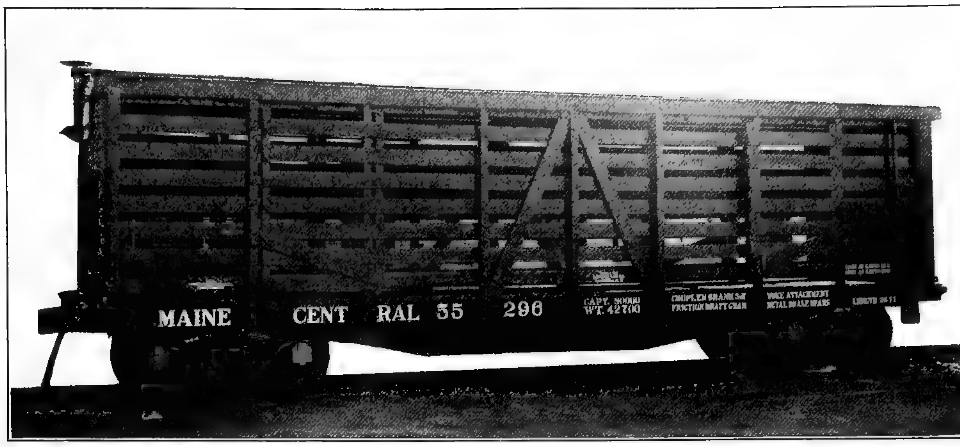


Fig. 91—Steel Underframe 40-Ton Capacity Car with Wood and Lumber Rack. Inside Length, 38 ft. 1 in.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 1 in. Builder, Laconia Car Co.

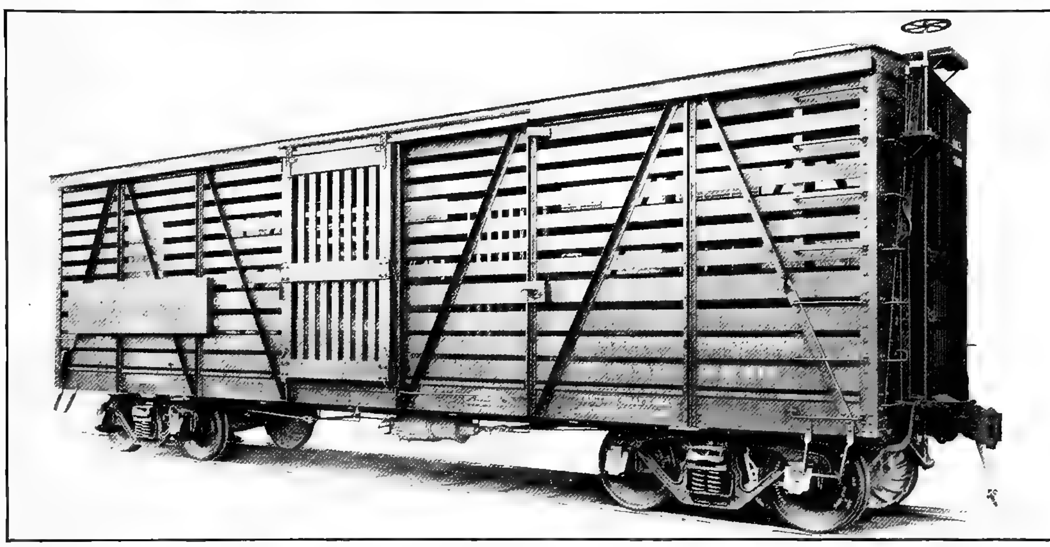


Fig. 92—Steel Frame 40-Ton Capacity Stock Car. Weight, 35,600 lbs.; Inside Length, 36 ft. 6 in.; Inside Width, 8 ft. 10 in.; Inside Height, 8 ft. Builder, Haskell & Barker Car Co.

Fig. 93—Steel Underframe 30-Ton Capacity Drop Bottom General Service Car. Weight, 40,000 lbs.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, Ralston Steel Car Co.

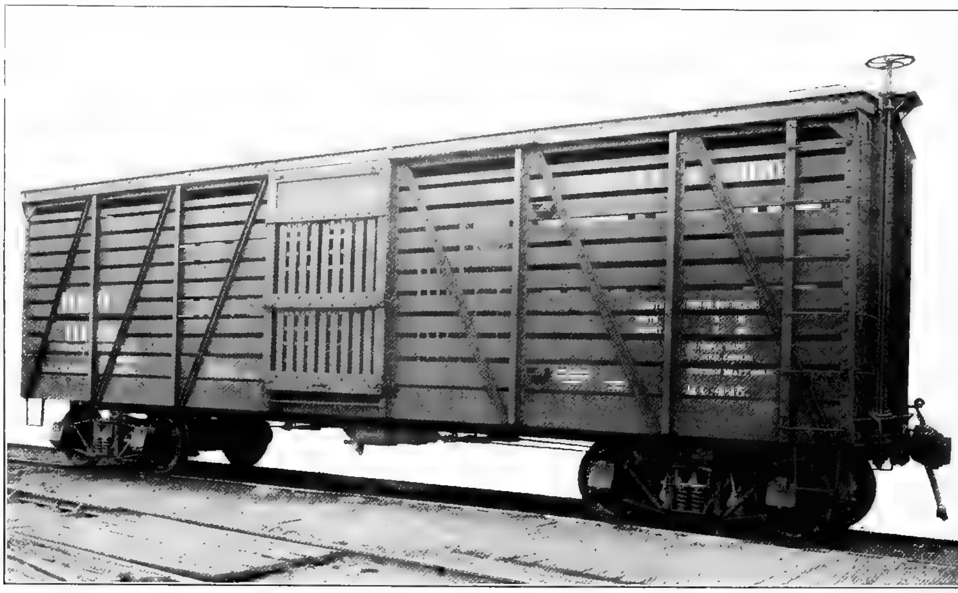


Fig. 94—Steel Frame 40-Ton Capacity Stock Car, Mather Patent. Weight, 36,600 lbs.; Inside Length, 35 ft. 10 in.; Inside Width, 8 ft. 5 in.; Inside Height, 7 ft. 10 in. Builder, Haskell & Barker Car Co.

(See Figs. 346 and 347 for General Drawings.)

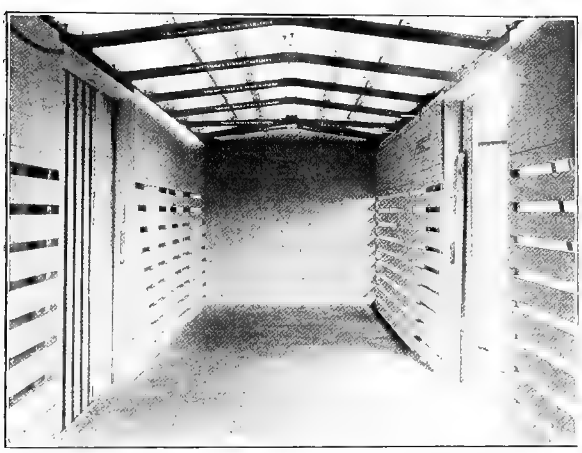


Fig. 95—Interior of Car in Fig. 97, as Stock Car.

Fig. 96—Interior of Car in Fig. 97, as Box Car.

Fig. 97—Steel Frame 40-Ton Capacity Convertible Stock and Box Car. Interior Views Shown in Figs. 95 and 96. Weight ,40,800 lbs.; Inside Length, 40 ft.; Inside Width, 8 ft.; Inside Height, 8 ft. Builder, St. Louis & San Francisco Railroad.

Fig. 98—Steel Underframe 40-Ton Capacity Stock Car. Weight, 39,500 lbs.; Inside Length, 40 ft. 6 in.; Inside Width, 8 ft. 7½ in.; Inside Height, 7 ft. 9½ in. Builder, Whipple Car Co.

Fig. 99—Wooden Poultry Car with Clere-story. Builder, Wason Manufacturing Co.

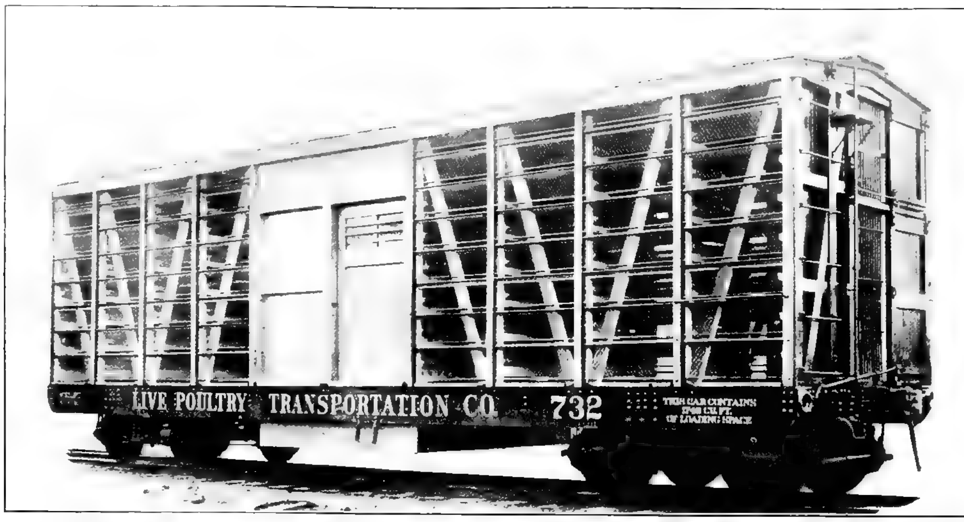


Fig. 100—Steel Underframe 10-Ton Capacity Poultry Car. Weight, 43,000 lbs.; Inside Length, 36 ft.; Number of Coops, 128. Builder, American Car & Foundry Co.

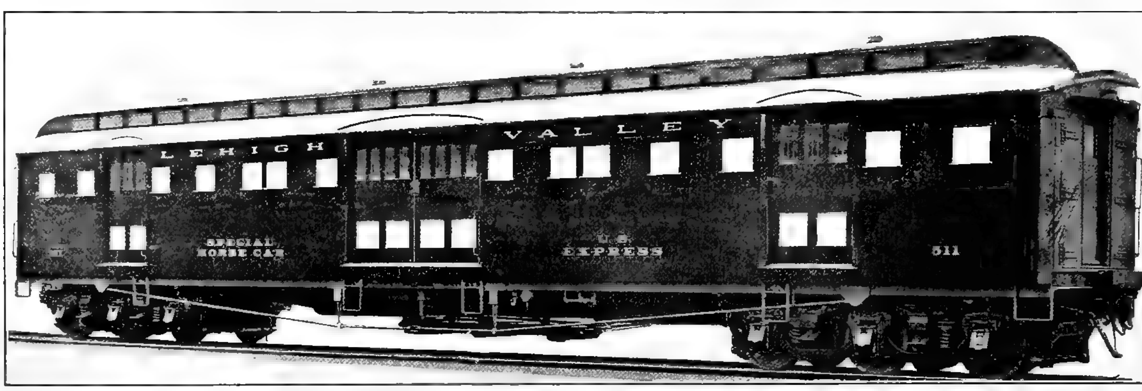


Fig. 101—Steel Underframe Express Car for the Transportation of Horses. Builder, The Harlan & Hollingsworth Corporation.

Fig. 102—Steel Underframe Car for the Transportation of Horses. Builder, Barney & Smith Car Co.

Fig. 103—Wooden Express Car for the Transportation of Horses. Builder, The Wason Manufacturing Co.

Fig. 104—Interior View of Car Shown in Fig. 103 with Stall Partitions in Place.

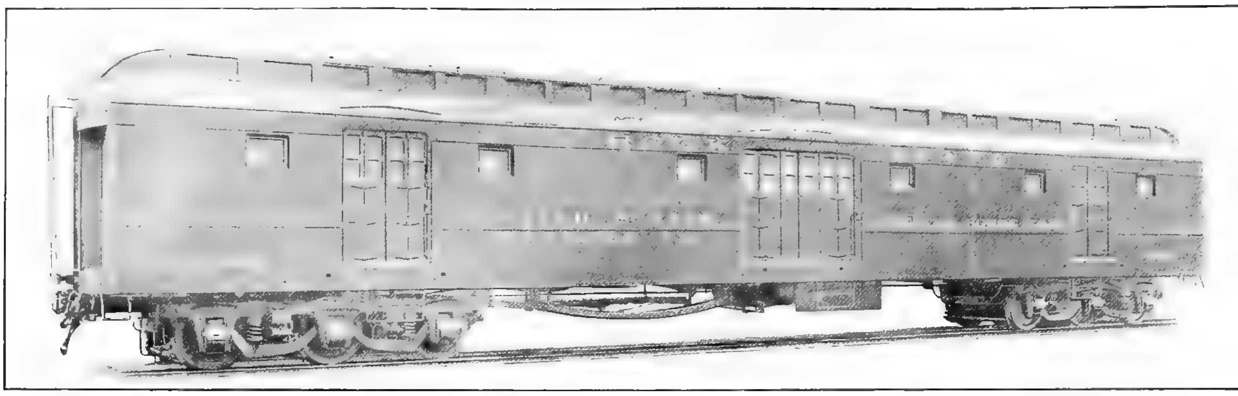


Fig. 105—Steel Express Car for the Transportation of Horses. Weight, 126,000 lbs.; Length of Body Outside, 70 ft. Builder, American Car & Foundry Co.

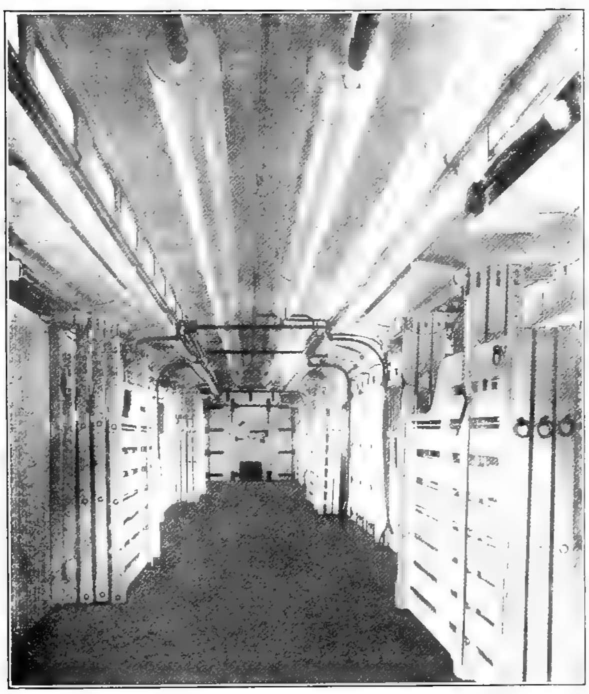


Fig. 106—Interior View of Car Shown in Fig 105, Showing Stall Partitions Folded.

Fig. 107—Interior View of Car Shown in Fig. 105, Showing Stall Partitions as Arranged when Car is Loaded.

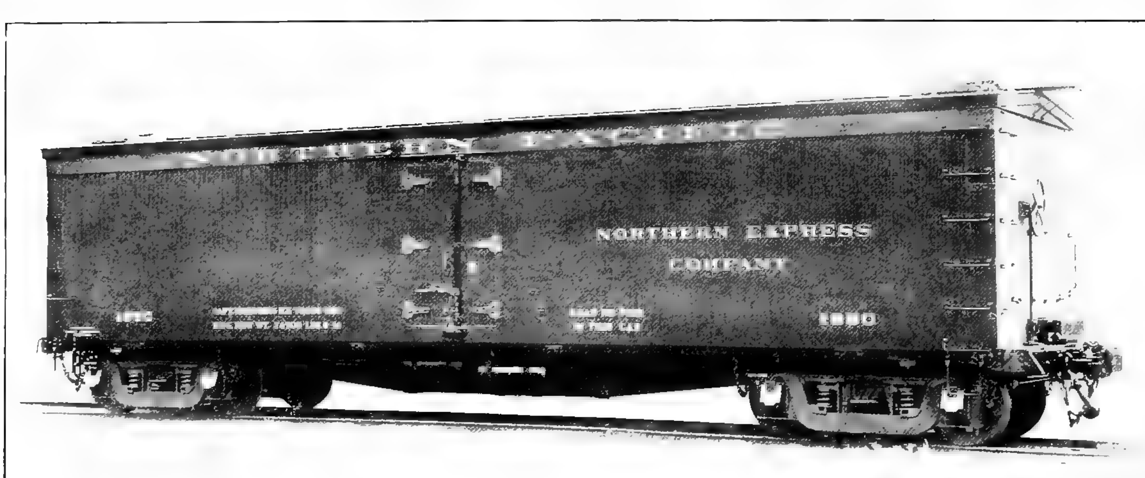


Fig. 108—Steel Underframe 35-Ton Capacity Express Refrigerator Car. Inside Length, 41 ft. 2 in.; Inside Width, 8 ft. 10 in.; Inside Height, 6 ft. 11 in. Builder, Pressed Steel Car Co.

(See Figs. 351-352 for General Drawings.)

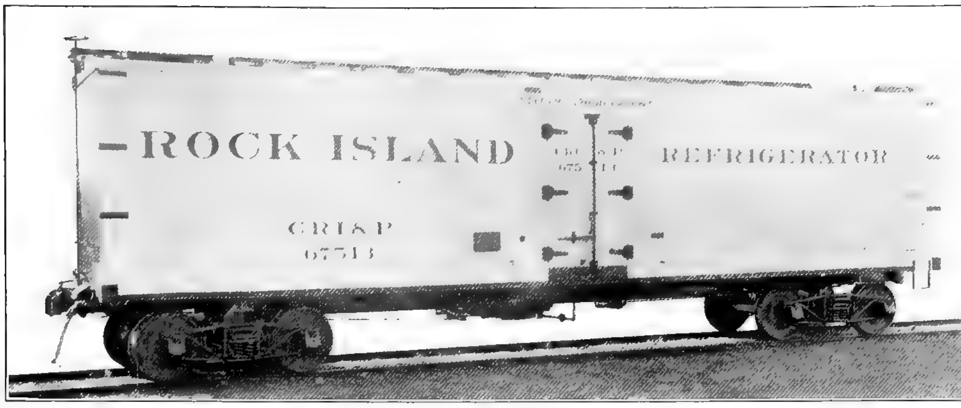


Fig. 109—Steel Underframe 30-Ton Capacity Refrigerator Car. Weight, 47,400 lbs.; Inside Length, 33 ft. 2 in.; Inside Width, 8 ft. 2 in.; Inside Height, 7 ft. 6 in. Builder, Milwaukee Refrigerator Transit & Car Co.

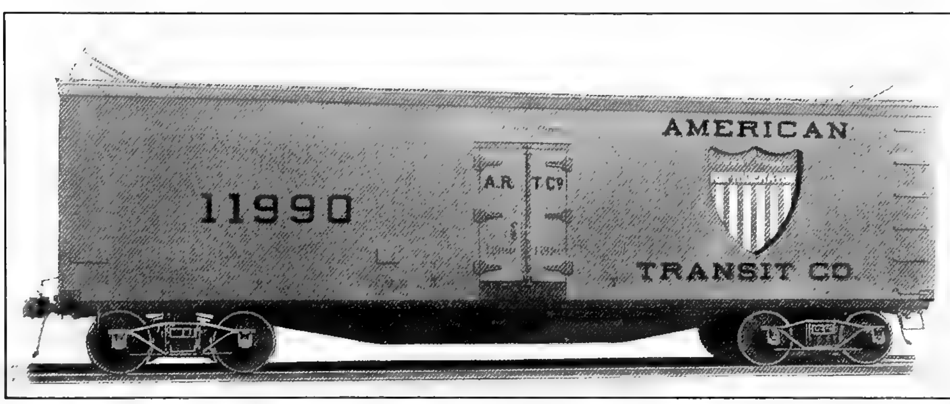


Fig 110—Steel Underframe 30-Ton Capacity Refrigerator Car. Weight, 49,800 lbs.; Inside Length, 32 ft. 10 in.; Inside Width, 8 ft. 3⅝ in.; Inside Height, 7 ft. 6 in. Builder, American Car & Foundry Co.

(See Figs. 354 and 356 for General Drawings.)

Fig. 111—Steel Underframe 35-Ton Capacity Box Car with Heater Equipment. Weight, 51,000 lbs.; Inside Length, 34 ft. 9 in.; Inside Width, 8 ft.; Inside Height, 7 ft. 6 in. Builder, Laconia Car Co.

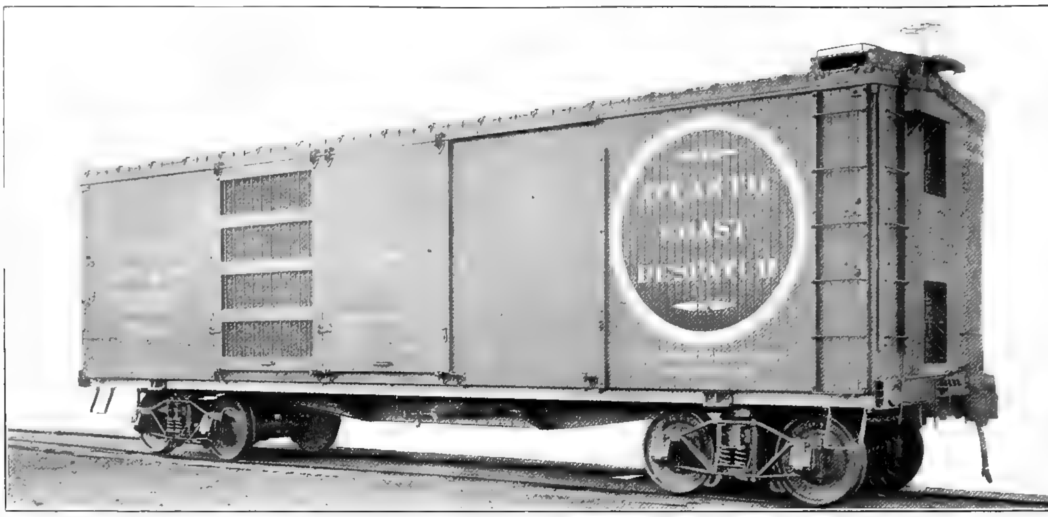


Fig. 112—Steel Underframe 30-Ton Capacity Ventilated Box Car. Weight, 39,700 lbs.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, American Car & Foundry Co.

Fig. 113—Wooden 30-Ton Capacity Refrigerator, Heater and Ventilator Car, Moore System. Weight, 43,300 lbs.; Inside Length, 34 ft. 6 in.; Inside Width, 8 ft. 4 in.; Inside Height, 7 ft. 5½ in. Builder, Refrigerator, Heater & Ventilator Car Co.

Fig. 114—45-Ton Capacity Ventilated Refrigerator Car. Weight, 60,700 lbs.; Inside Length, 32 ft. 11 in.; Inside Width, 8 ft. 4 in.; Inside Height, 7 ft. 4 in. Builder, American Car & Foundry Co.

Fig. 115—Steel Underframe 40-Ton Capacity Refrigerator Car. Weight, 55,000 lbs.; Inside Length, 33 ft.; Inside Width, 8 ft. 4 in.; Inside Height, 7 ft. 6 in.

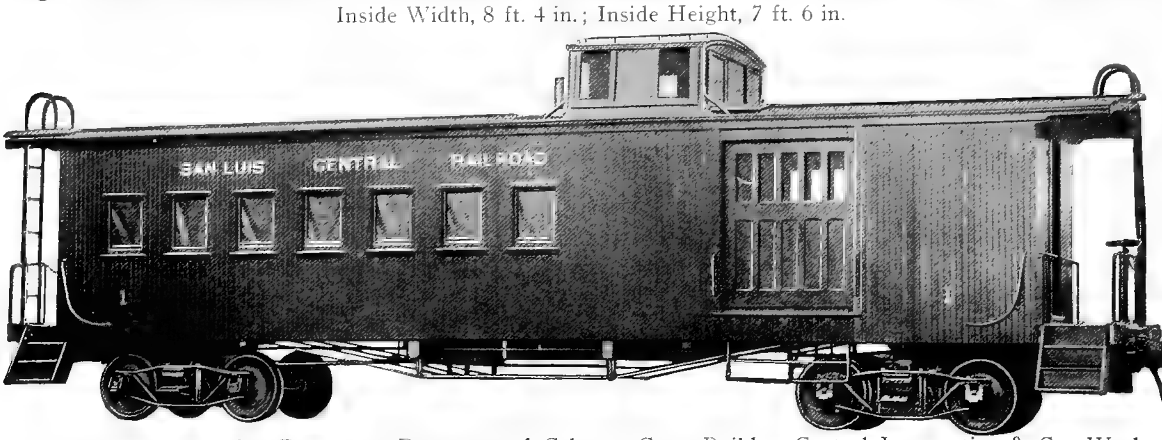


Fig. 116—Combination Passenger, Baggage and Caboose Car. Builder, Central Locomotive & Car Works.

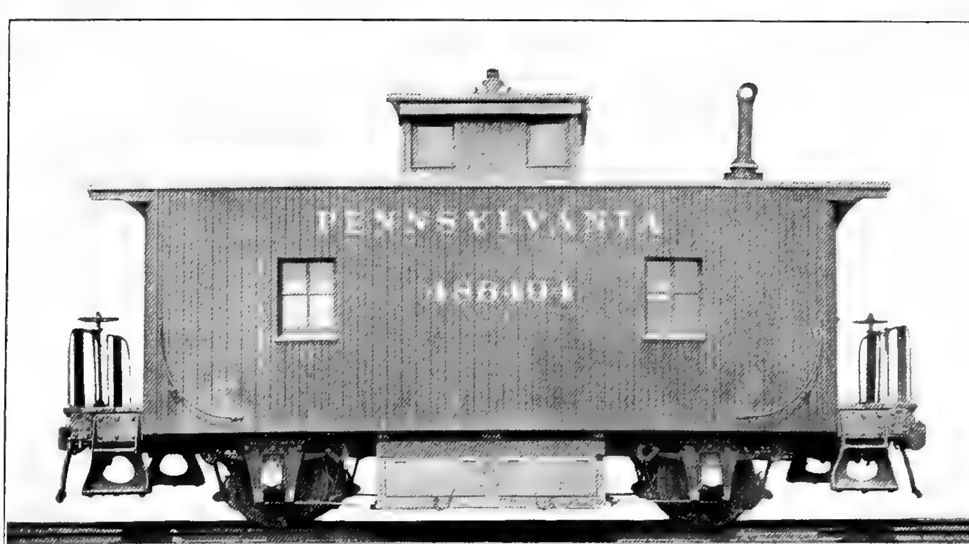


Fig. 117—Steel Underframe Four-Wheel Caboose. Weight, 28,000 lbs. Builder, Pennsylvania Railroad.

Fig. 118—Interior View of Caboose Shown in Fig. 120.

Fig. 119—Interior View of Caboose Shown in Fig. 121.

Fig. 120—All-Steel Eight-Wheel Caboose. Weight, 38,000 lbs. Interior Shown in Fig. 118. Builder, Pennsylvania Railroad.

(*See Figs. 367-370 for General Drawings.*)

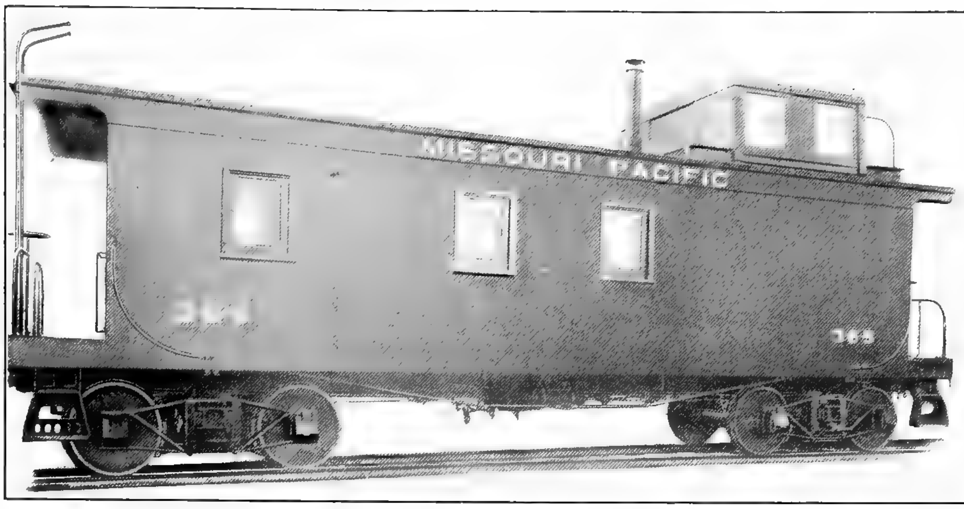


Fig. 121—Steel Underframe Eight-Wheel Caboose. Builder, American Car & Foundry Co.
(See Fig. 364 for General Drawings.)

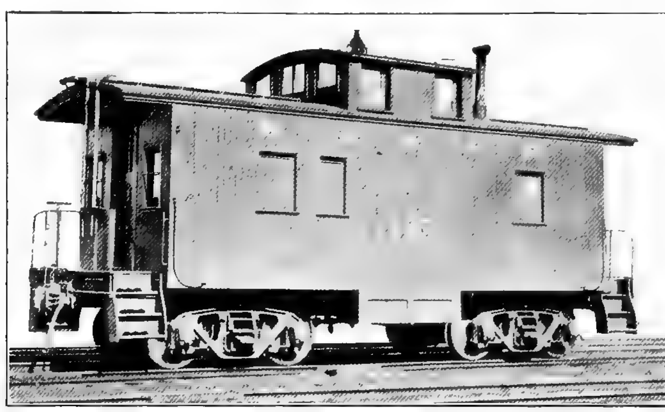


Fig. 122—Steel Frame Eight-Wheel Caboose. Weight, 37,900 lbs. Builder, Buffalo, Rochester & Pittsburgh Railway.
(See Fig. 366 for General Drawings.)

Fig. 123—Steel Underframe Eight-Wheel Caboose. Weight, 36,000 lbs. Builder, Russel Car & Snow Plow Co.
(See Fig. 363 for General Drawings.)

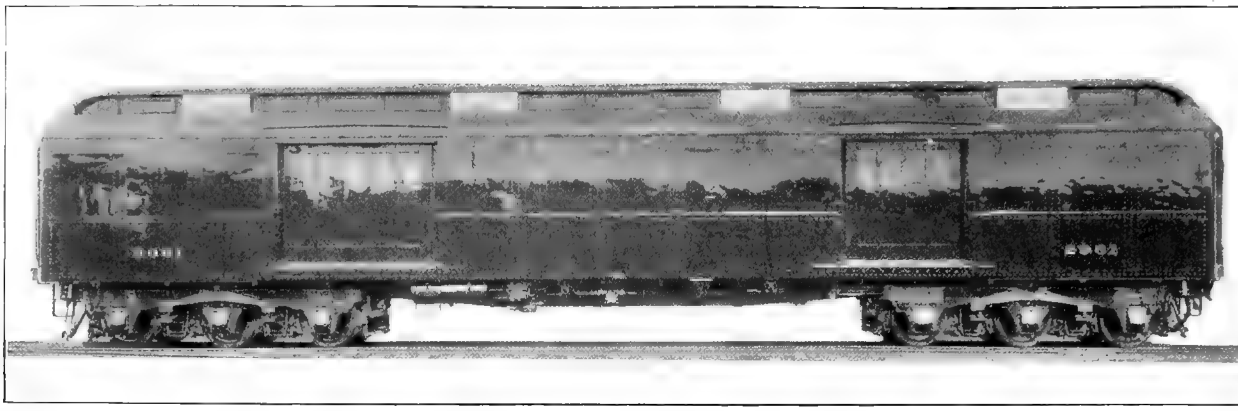


Fig. 124—Steel Baggage Car. Weight, 123,300 lbs.; Weight of Trucks, 46,000 lbs.; Length Over Buffers, 64 ft. $7\frac{3}{4}$ in. Builder, The Barney & Smith Car Co.

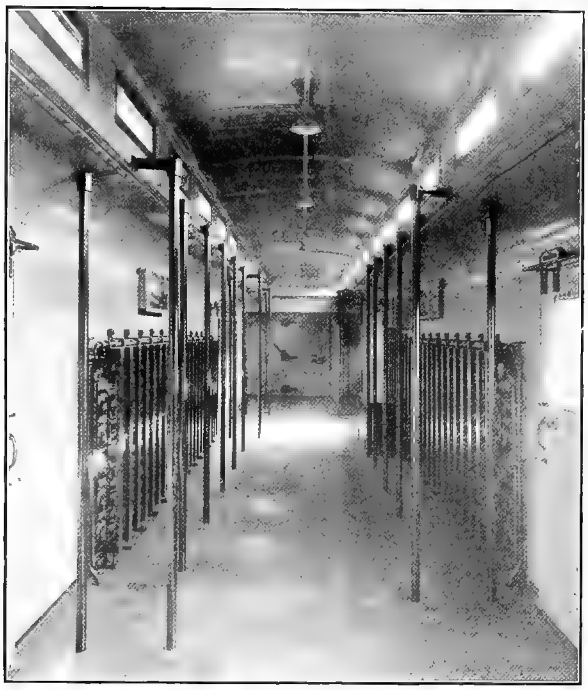


Fig. 125—Interior View of Steel Baggage Car Shown in Fig. 124.

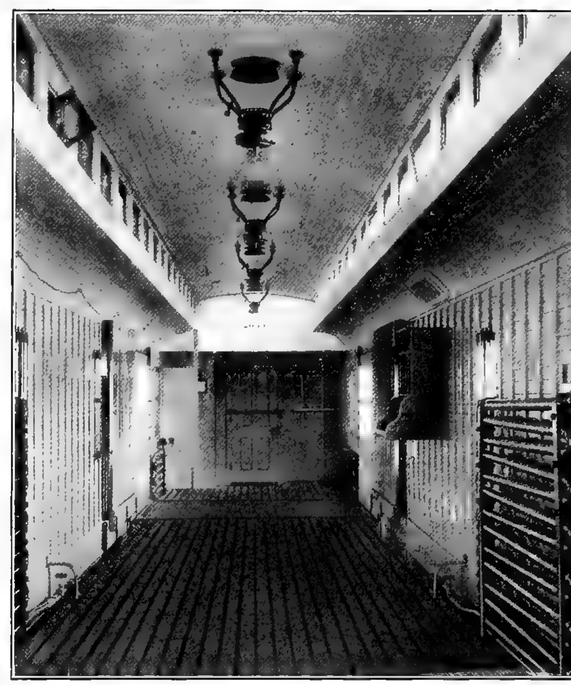


Fig. 126—Interior View of Steel Express Car Shown in Fig. 127.

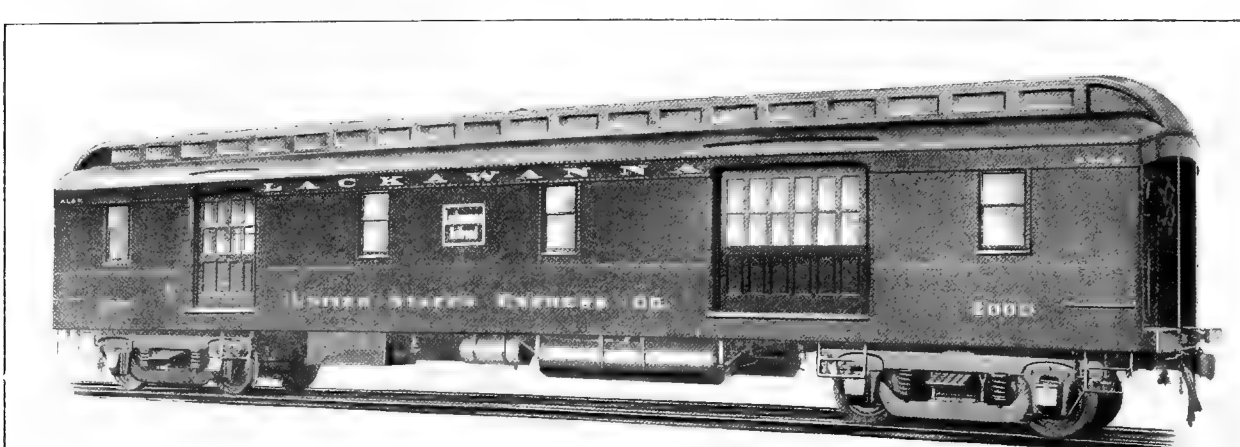


Fig. 127—Steel Express Car. Weight, 94,300 lbs.; Length Over End Sills, 60 ft. 9 in. Builder, American Car & Foundry Co.

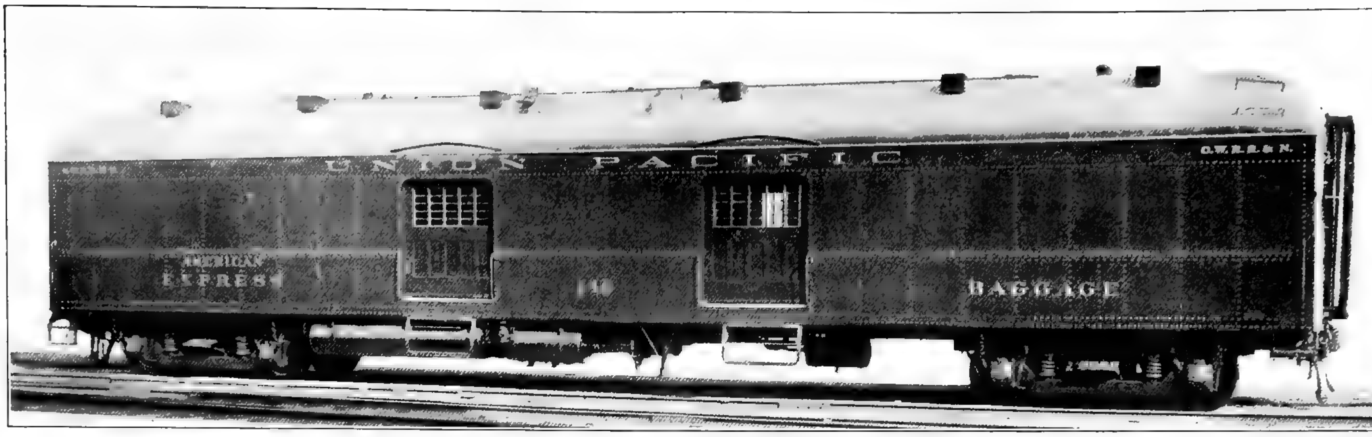


Fig. 128—Steel Baggage and Express Car. Weight, 106,000 lbs.; Length Over End Sills, 69 ft. Builder, The Pullman Co.

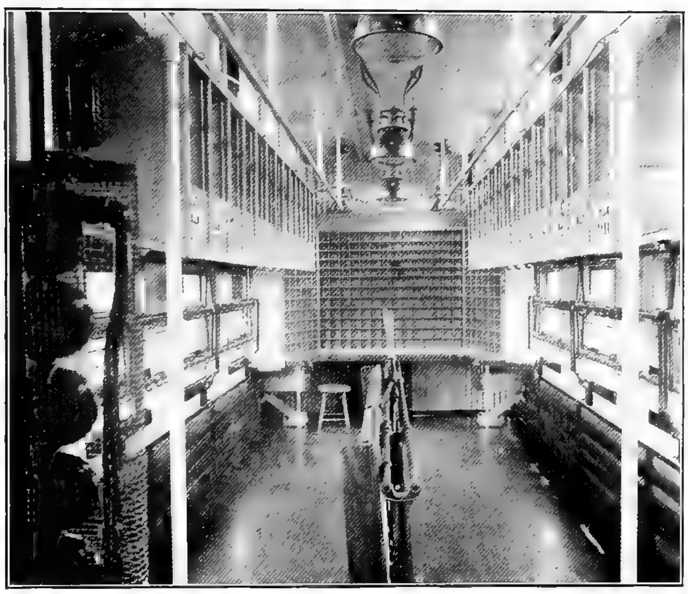


Fig. 129—Interior View of Missouri Pacific Steel Baggage and Mail Car. Builder, American Car & Foundry Co.

Fig. 130—Interior View of Mail Compartment of the Steel Baggage and Mail Car Shown in Fig. 131.

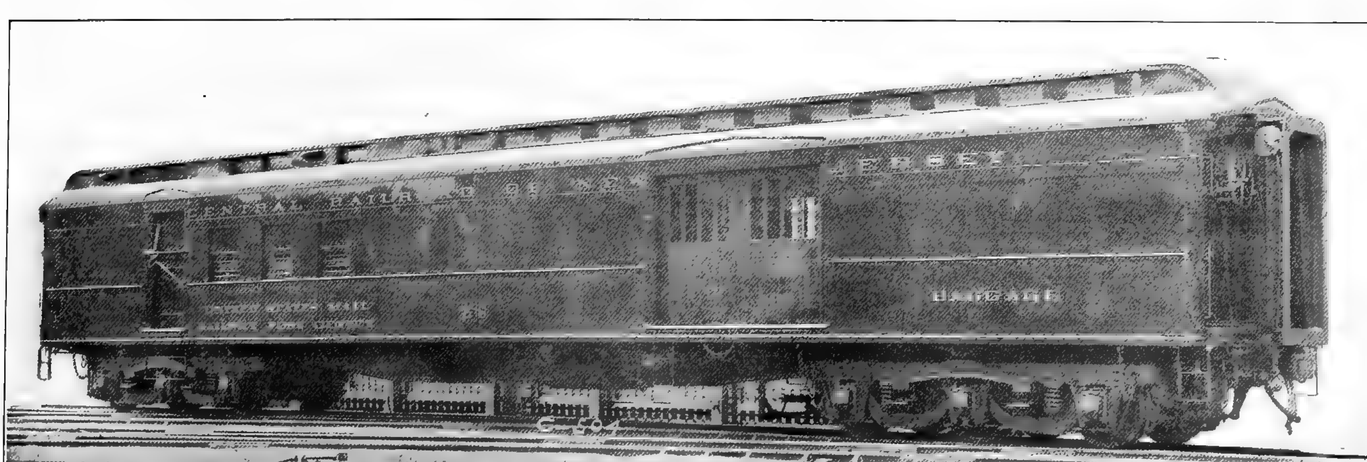


Fig. 131—Steel Baggage and Postal Car. Weight, 144,700 lbs.; Length Over End Sills, 70 ft. 10 in. Interior Shown in Fig. 130. Builder, The Harlan & Hollingsworth Corporation.

(See Figs. 372-374 for General Drawings.)

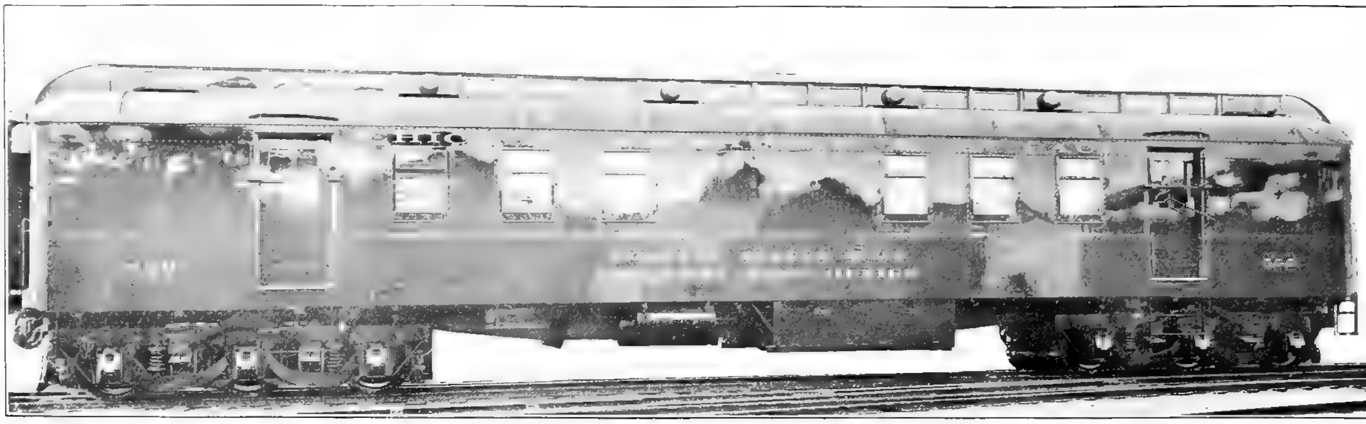


Fig. 132—Steel Postal Car. Weight, 118,600 lbs.; Length Over End Sills, 60 ft. 10½ in. Builder, American Car & Foundry Co.

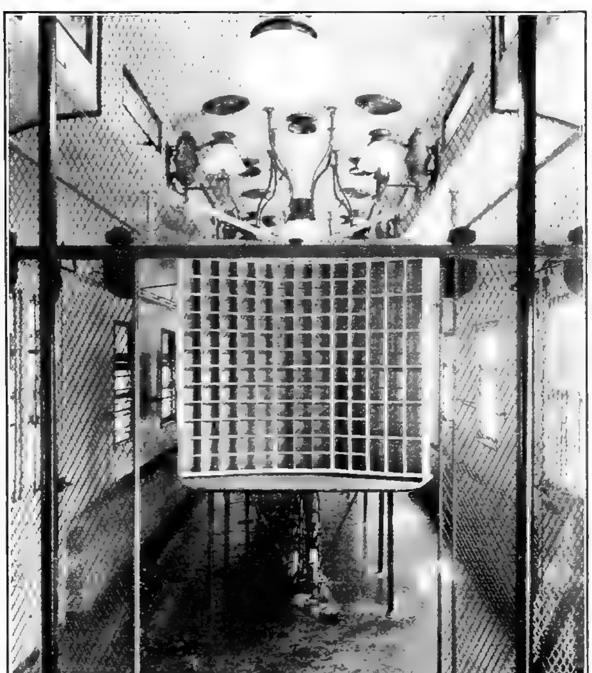


Fig. 133—Interior View of Steel Postal Car for the New York Central. Builder, The Barney & Smith Car Co.

Fig. 134—Interior View of New York Central Postal Car, Looking in Opposite Direction from That in Fig. 133.

Fig. 135—Steel Postal Car. Weight, 133,800 lbs.; Length Over Buffers, 64 ft. 5 in. Builder, Laconia Car Co.

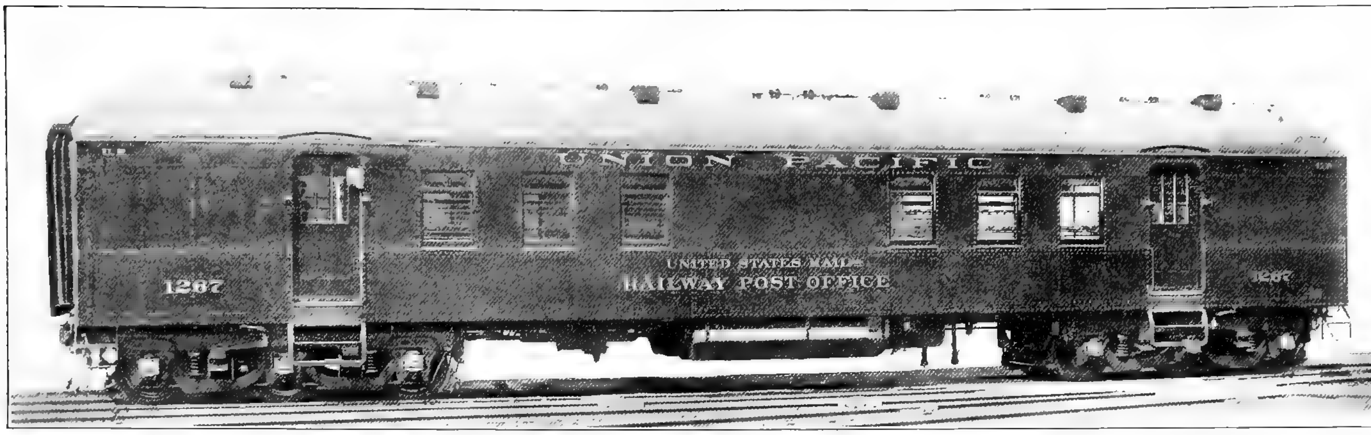


Fig. 136—Steel Postal Car. Weight, 111,600 lbs.; Length Over End Sills, 60 ft. 1 in. Builder, The Pullman Co.

Fig. 137—Interior View of Pennsylvania Railroad Steel Postal Car.

Fig. 138—Interior View of Carolina, Clinchfield & Ohio Day Coach. Builder, The Harlan & Hollingsworth Corporation.

Fig. 139—Steel Vestibuled Combination Coach, Express and Baggage Car. Weight, 144,000 lbs.; Length Over Buffers, 77 ft. 1 in. Builder, The Harlan & Hollingsworth Corporation.

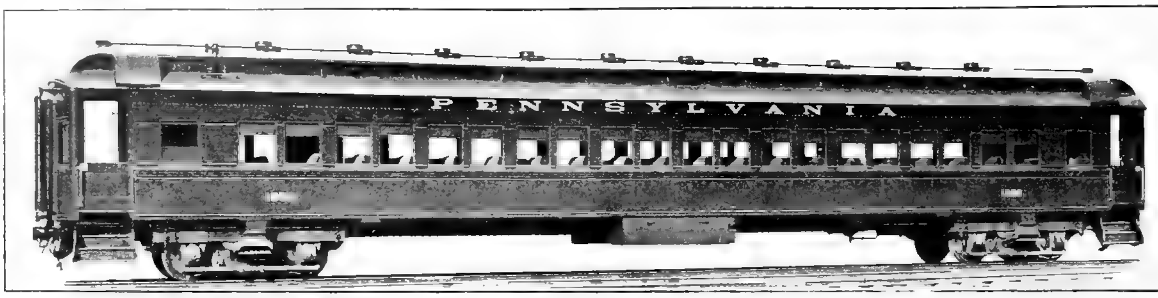


Fig. 140—Steel Vestibuled Day Coach. Weight, 116,000 lbs.; Length Over Body, 70 ft. 5¾ in. Builder, Pressed Steel Car Co.

Fig. 141—Interior View of Pennsylvania Steel Day Coach, Shown in Fig. 140.

Fig. 142—Interior View of New York, New Haven & Hartford Steel Day Coach, Shown in Fig. 143.

Fig. 143—Steel Vestibuled Day Coach. Weight, 131,000 lbs.; Length Over End Sills, 70 ft. 6 in.; Seating Capacity, 88.

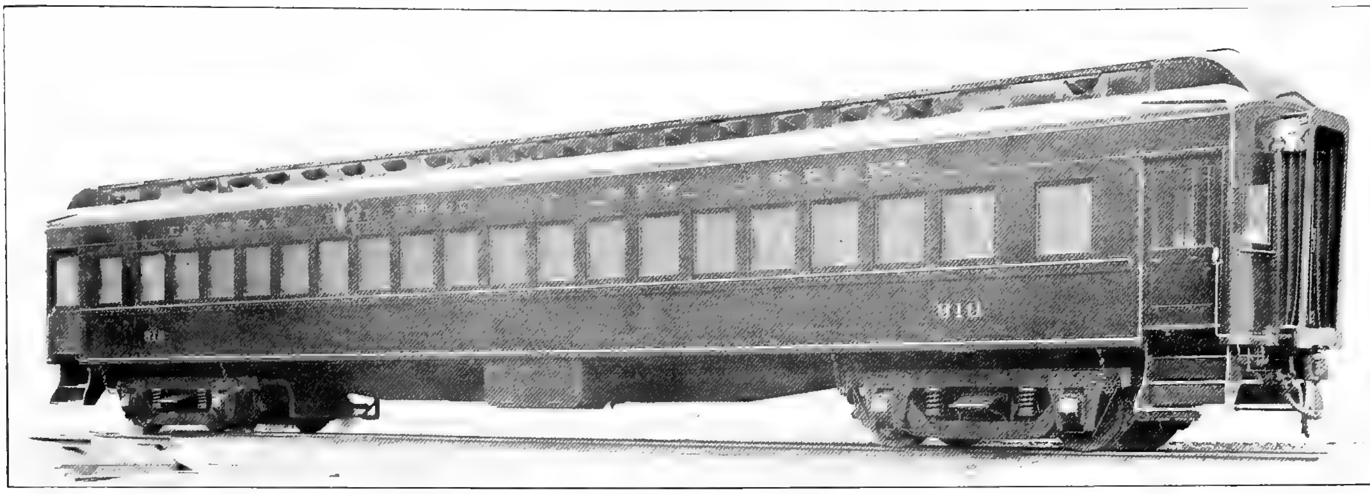


Fig. 144—Steel Vestibuled Day Coach. Weight, 115,800 lbs.; Length Over End Sills, 63 ft.; Length Over Buffers, 72 ft. 2 in.; Seating Capacity, 78. Builder, The Harlan & Hollingsworth Corporation.

(See Figs. 381-383 for General Drawings.)

Fig. 145—Interior View of Baltimore & Ohio Day Coach. Builder, American Car & Foundry Co.

Fig. 146—Interior View of Erie Railroad Suburban Coach Shown in Fig. 147.

Fig. 147—Steel Vestibuled Day Coach for Suburban Traffic. Weight, 95,400 lbs.; Length Over Buffers, 70 ft. 4 in.; Seating Capacity, 86. Builder, Pressed Steel Car Co.

Fig. 148 Steel Vestibuled Chair Car. Length Over End Sills, 70 ft.; Length Over Buffers, 78 ft. 4 in.; Seating Capacity, 68. Builder, American Car & Foundry Co.

Fig. 149—Interior View of Missouri Pacific Steel Chair Car Shown in Fig. 148.

Fig. 150 — Interior View of Grand Trunk Pacific Dining Car. Builder, Canadian Car & Foundry Co.

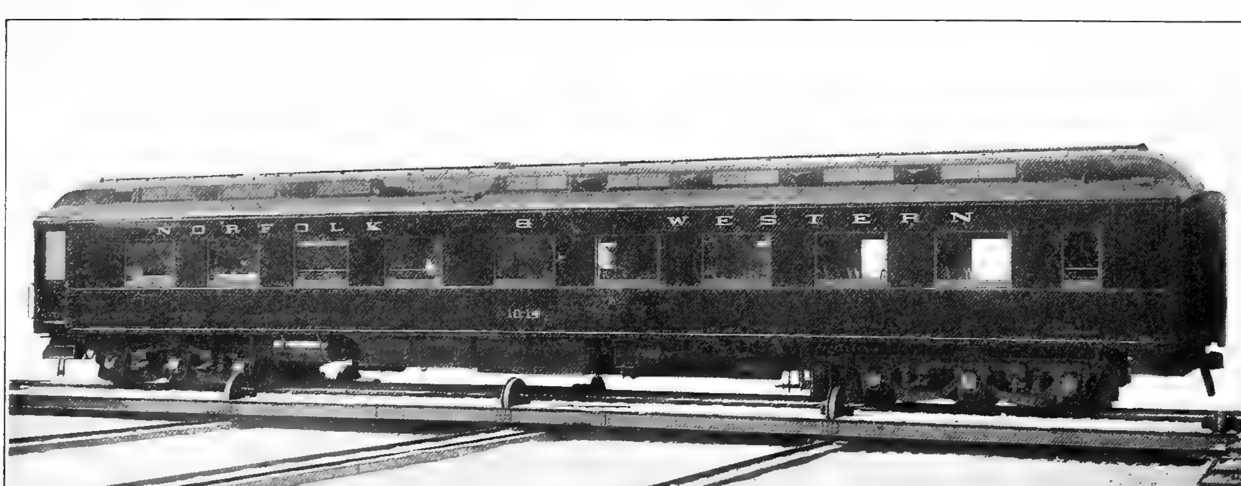


Fig. 151—Steel Vestibuled Dining Car. Weight, 155,000 lbs.; Length Over End Sills, 74 ft. 8 in. Builder, American Car & Foundry Co.

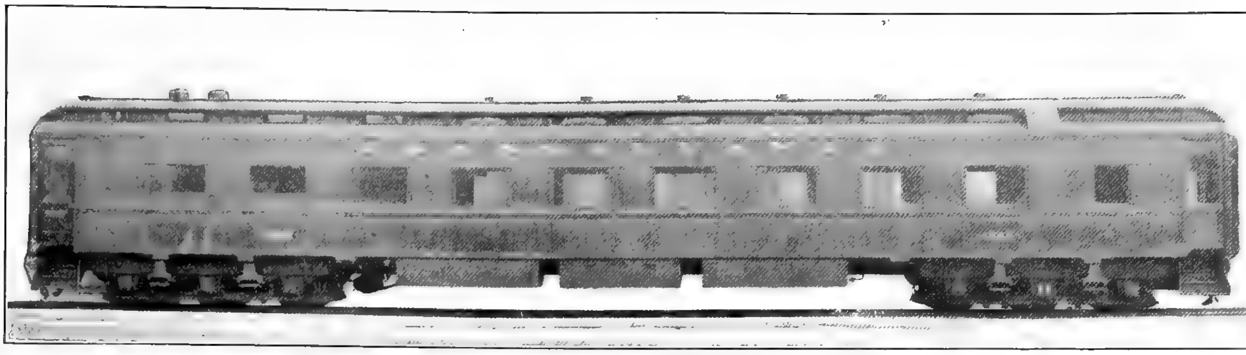


Fig. 152—Steel Vestibuled Dining Car. Weight, 155,000 lbs.; Length Over End Sills, 72 ft.

(See Figs. 384-390 for General Drawings of Pennsylvania Railroad Steel Passenger Train Cars.)

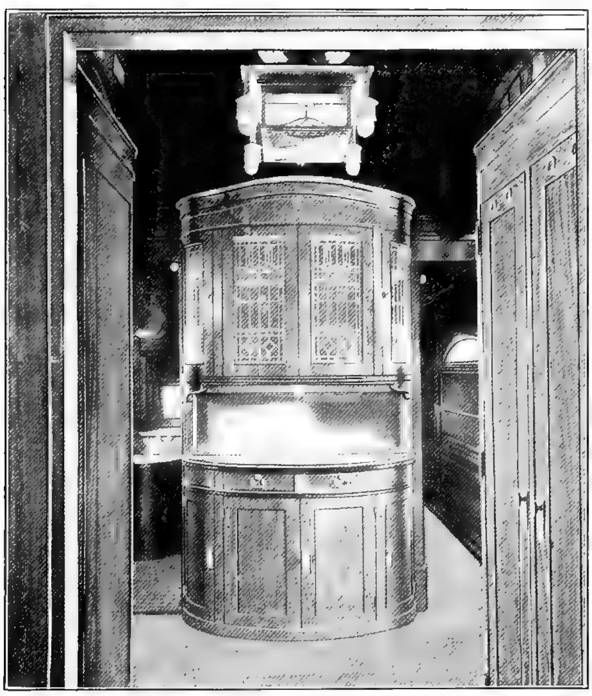


Fig. 153—Entrance from Dining Room to Pantry and Corridor.

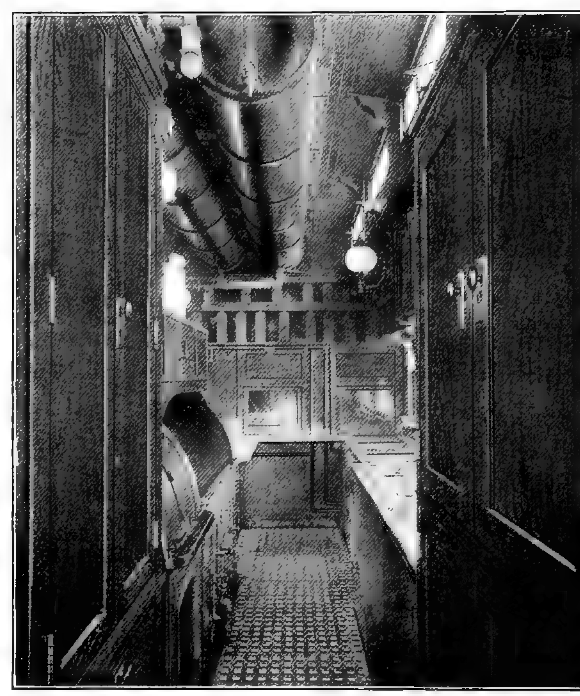


Fig. 154—Kitchen, Looking Toward Pantry.

Interior Views of St. Louis & San Francisco Dining Car Shown in Fig. 155.

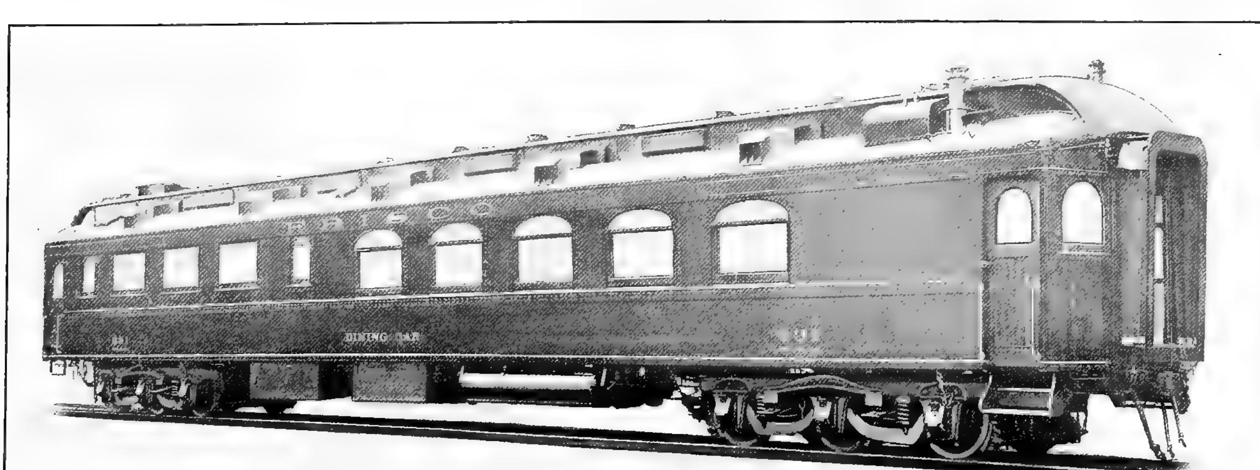


Fig. 155—Steel Vestibuled Dining Car. Interior Views Are Shown in Figs. 153 and 154. Builder, American Car & Foundry Co.

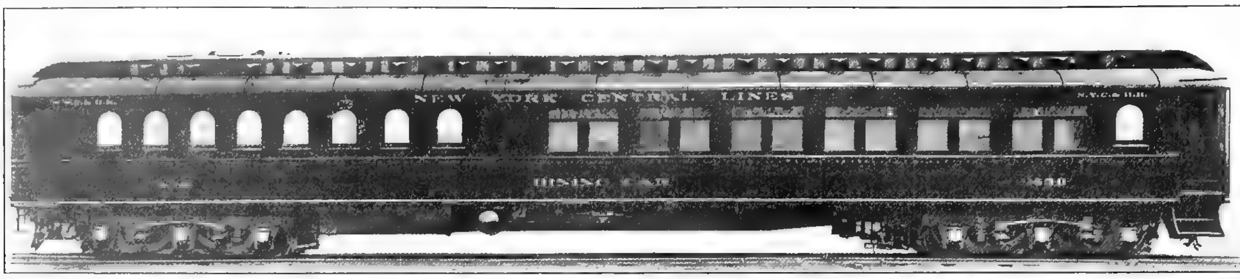


Fig. 156—Steel Vestibuled Dining Car. Weight, 152,500 lbs. Builder, The Barney & Smith Car Company.

Fig. 157—Interior View of Northern Pacific Dining Car. Builder, The Barney & Smith Car Company.

Fig. 158—Interior View of Philadelphia & Reading Dining Car, Shown in Fig. 159.

Fig. 159—Vestibuled Dining Car with Steel Frame and Ends. Weight, Complete, 175,000 lbs.; Weight of Trucks, 49,600 lbs. Builder, The Harlan & Hollingsworth Corporation.

Fig. 160—Interior View of the Steel Dining Car Shown in Fig. 162.

Fig. 161—Interior View of Union Pacific Steel Dining Car. Builder, The Pullman Co.

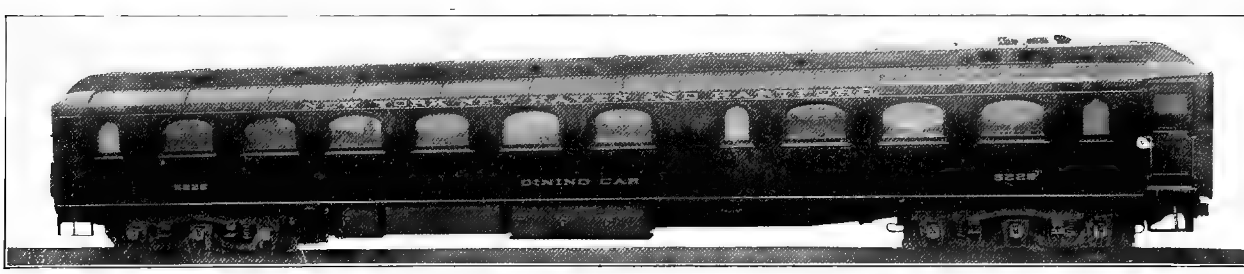


Fig. 162—Steel Vestibuled Dining Car. Builder, The Pullman Company.

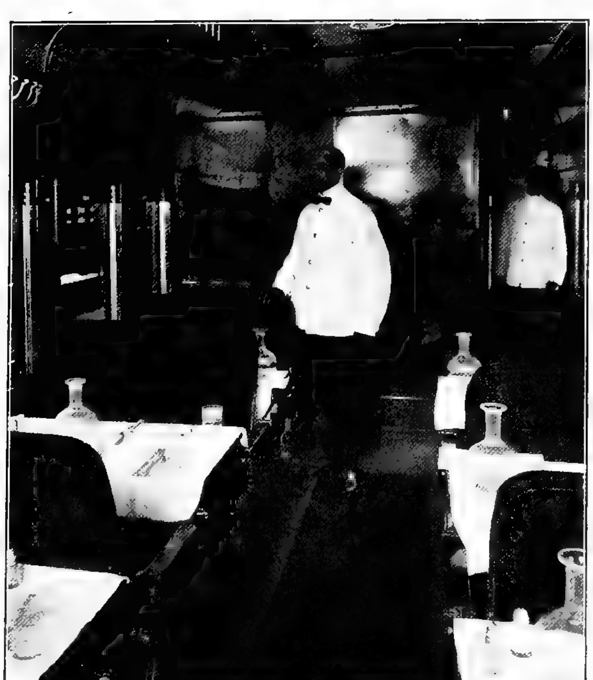


Fig. 163—Interior View of Café Coach in Use on the Pennsylvania Railroad.

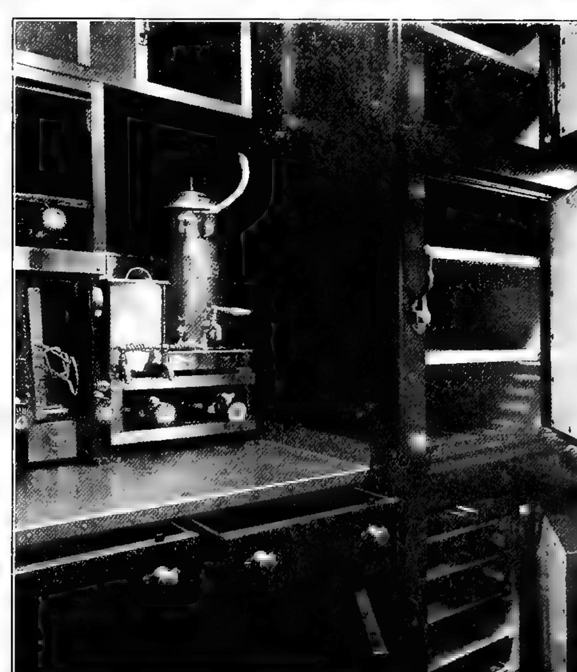


Fig. 164—Kitchen of the Café Coach on the Pennsylvania Railroad.

Fig. 165—Interior View of Chicago & North Western Lunch Counter Car.

Fig. 166—Interior View of Chicago, Rock Island & Pacific Lunch Counter Car.

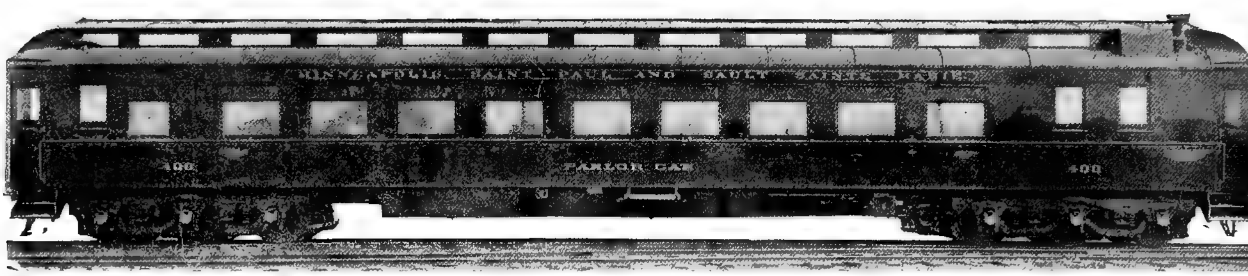


Fig. 167—Steel Vestibuled Parlor Car. Weight, 135,600 lbs.; Length Over Buffers, 80 ft. 4¾ in. Builder, The Barney & Smith Car Company.

Fig. 168—Interior View of Steel Parlor Car. Builder, The Pullman Company.

Fig. 169—Interior of Missouri Pacific Café-Parlor Car. Builder, American Car & Foundry Co.

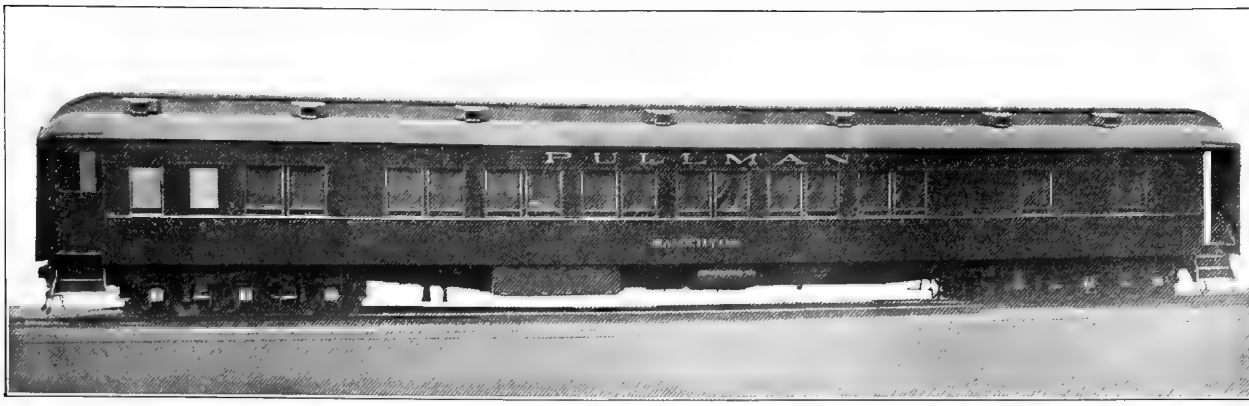


Fig. 170—Steel Vestibuled Sleeping Car. Weight, 150,000 lbs. Builder, The Pullman Company.
(See Figs. 405-413 for General Drawings of a similar Car.)

Fig. 171—Interior View of Pullman Steel Sleeping Car Shown in Fig 170.

Fig. 172—Interior View of Parlor-Café Car. Builder, Canadian Car & Foundry Company.

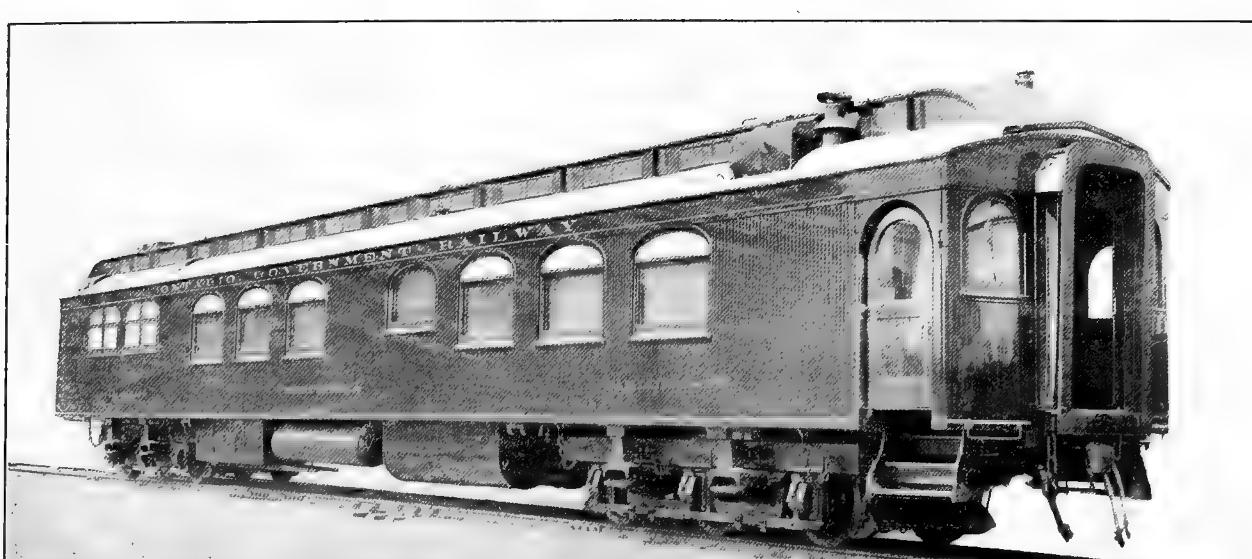


Fig. 173—Steel Frame Vestibuled Parlor-Café Car. Weight, 140,000 lbs. Builder, Canadian Car & Foundry Company.

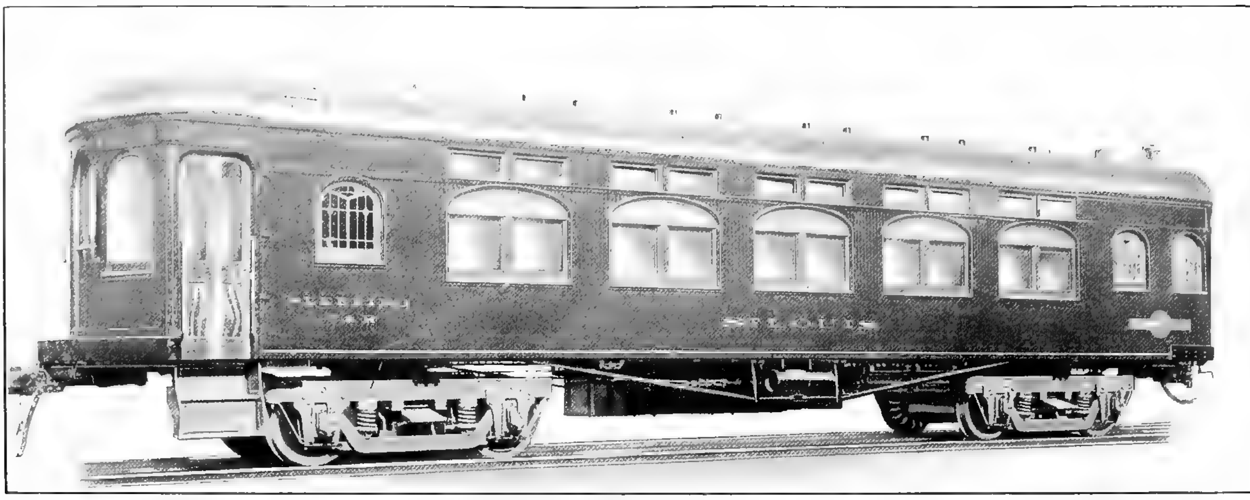


Fig. 174 -Wooden Vestibuled Sleeping Car for Electric Interurban Service. Weight, 74,600 lbs.; Length Over End Sills, 51 ft. 4 in. Builder, American Car & Foundry Company.

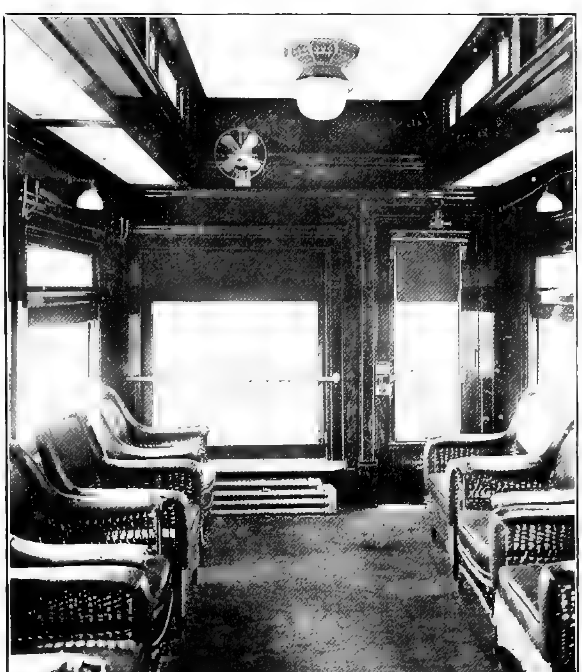


Fig 175—Observation Room of Sleeping Car Shown in Figs. 176 and 177.

Fig. 176—Interior View of Sleeping Car Shown in Figs. 175 and 177.

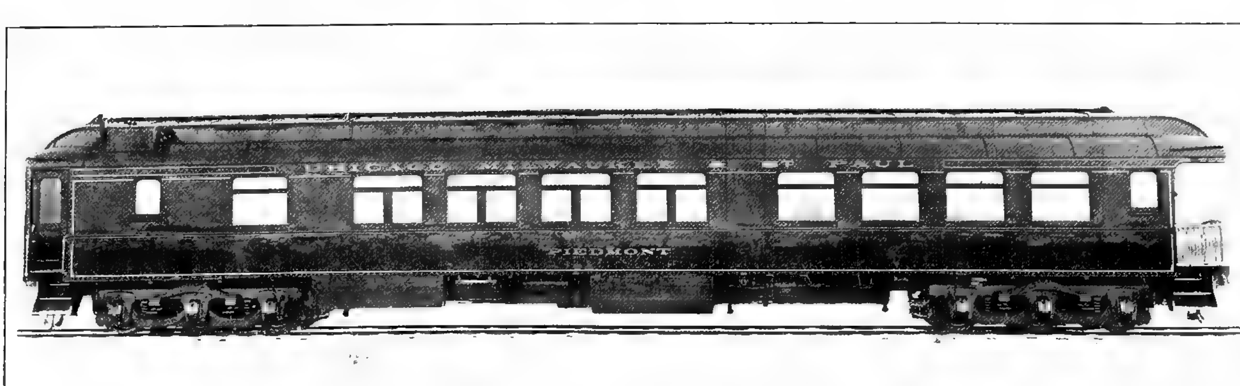


Fig. 177—Steel Observation Sleeping Car. Interior Views Shown in Figs. 175 and 176. Total Weight, 148,300 lbs.; Weight of Trucks, 40,800 lbs.; Length Over Buffers, 81 ft. 6½ in. Builder, The Barney & Smith Car Co.

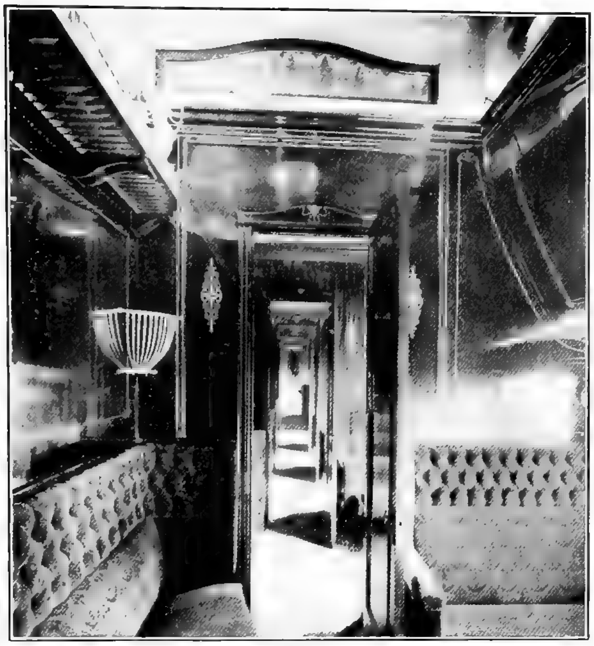


Fig. 178—View Through Compartments, Chicago, Milwaukee & St. Paul Compartment Sleeping Car. Builder, The Barney & Smith Car Co.

Fig. 179—Interior of Observation Room, Northern Pacific Observation-Buffet Car. Builder, The Barney & Smith Car Company.

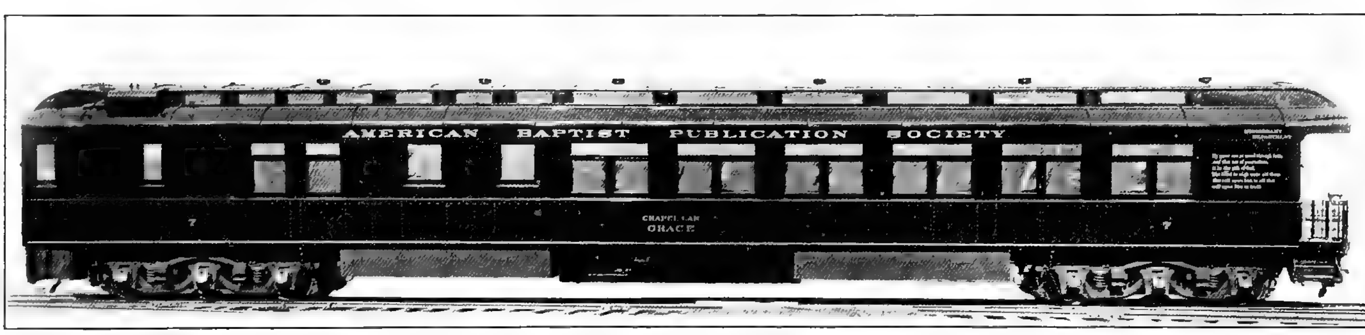


Fig. 180—Steel Chapel Car. Weight, 134,000 lbs. Builder, The Barney & Smith Car Co.

Fig. 181—Interior View of Chapel Car of the Catholic Church Extension Society. Builder, The Barney & Smith Car Co.

Fig 182—Interior of Women's Reception Room, Chicago, Burlington & Quincy Lounging Car. Builder, The Barney & Smith Car Company.

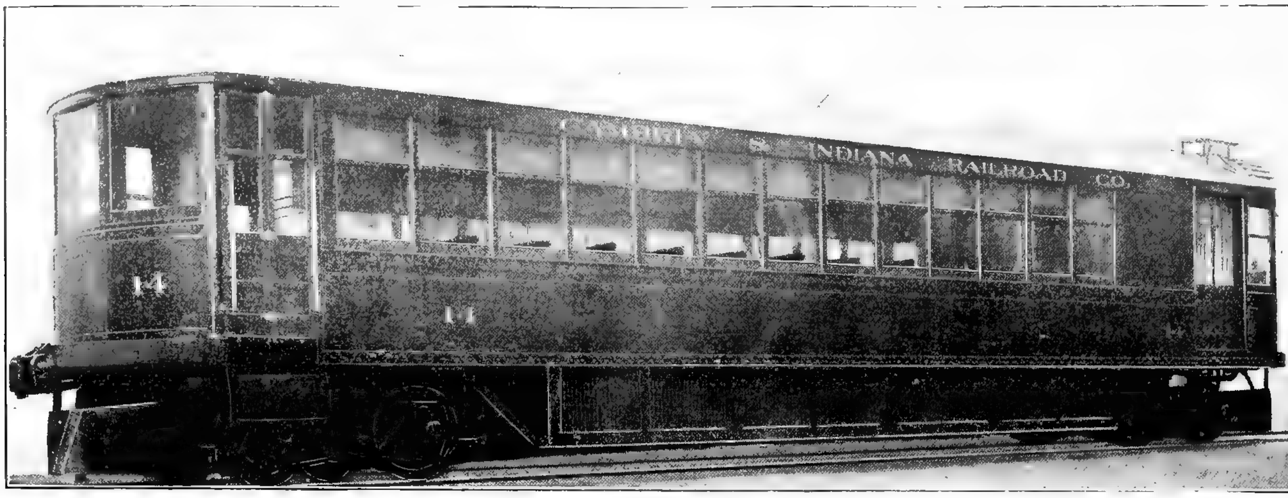


Fig. 183—Steel Vestibuled Electric Motor Car Taking Power from Storage Batteries. Weight, 59,000 lbs.; Seating Capacity, 51; Length of Passenger Compartment, 32 ft.; Length of Baggage Compartment, 12 ft. 10 in.; Equipped with Four 25 hp. Motors. Builder, Railway Storage Battery Car Co.

Fig. 184—Steel Vestibuled Electric Motor Car for Suburban Service. Weight Without Motors, 107,200 lbs.; Weight Complete, 120,000 lbs. Builder, Pressed Steel Car Company.

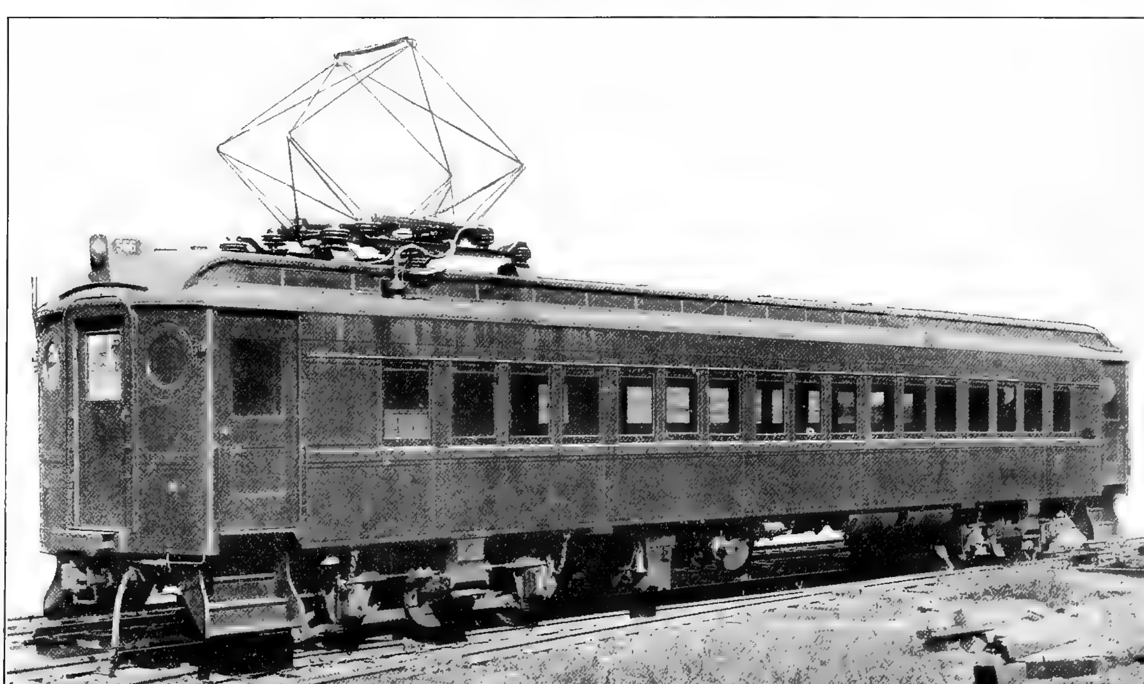


Fig. 185—Steel Vestibuled Electric Motor Car Used on the Philadelphia-Paoli Section, Pennsylvania Railroad. Weight, 117,000 lbs.; Length Over Platforms, 64 ft. 6 in.; Seating Capacity, 68. Equipped with Two 225-hp. Motors.

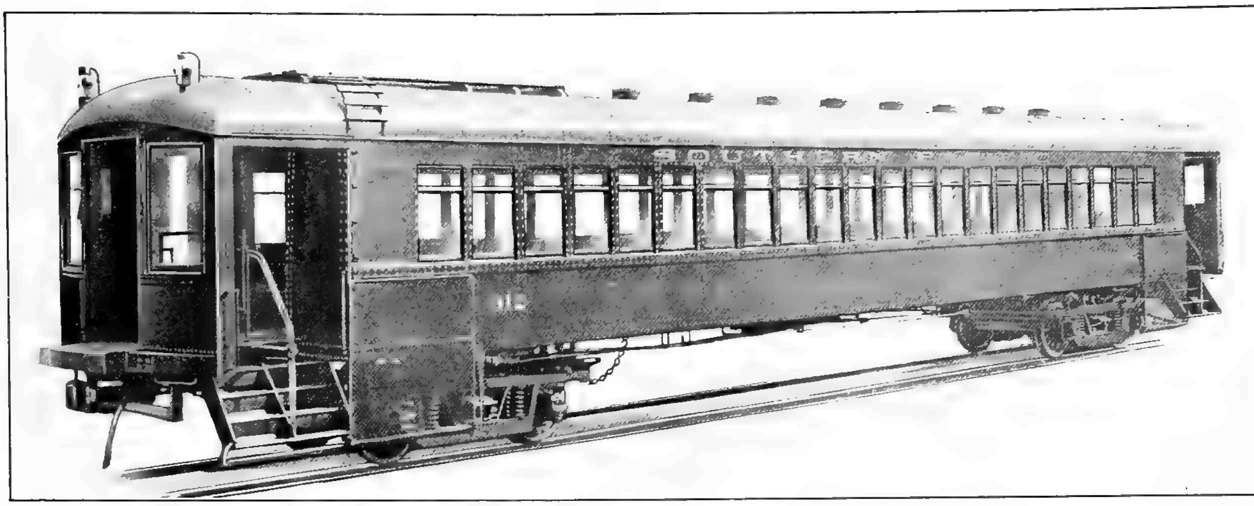


Fig. 186—Steel Vestibuled Electric Motor Car for Suburban Service. Weight, 77,600 lbs.; Length Over Buffers, 69 ft. 10 in. Builder, American Car & Foundry Company.

Fig. 187—Interior View of the Steel Suburban Car Shown in Fig. 186.

Fig. 188—Interior View of the Motor Car Shown in Fig. 189.

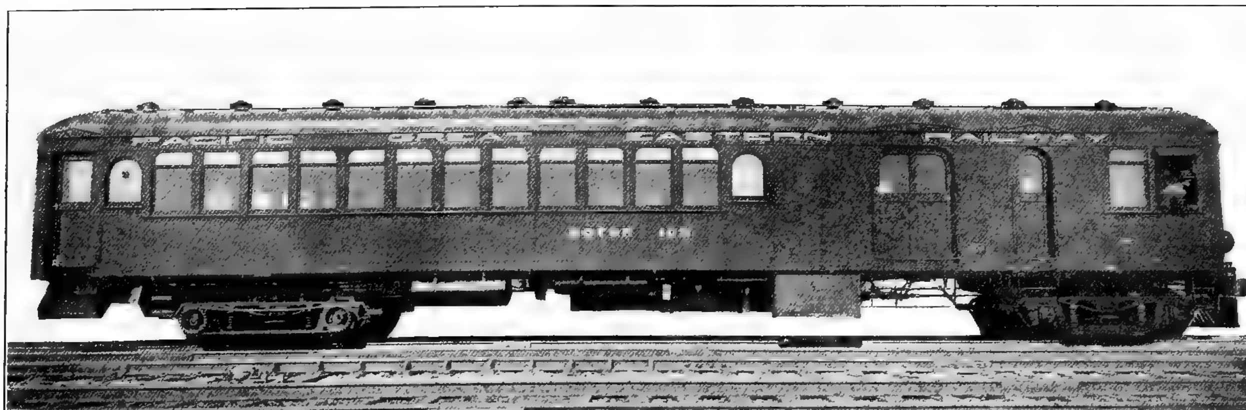


Fig. 189—Steel Gasolene Motor Car. Weight, 72,000 lbs. Builder, Hall-Scott Motor Car Co., Incorporated.

Fig. 190—Steel Gasolene Motor Car and Steel Trailer. Length of Motor Car Over All, 70 ft. Seating Capacity of Trailer, 78. Builder, McKeen Motor Car Co.

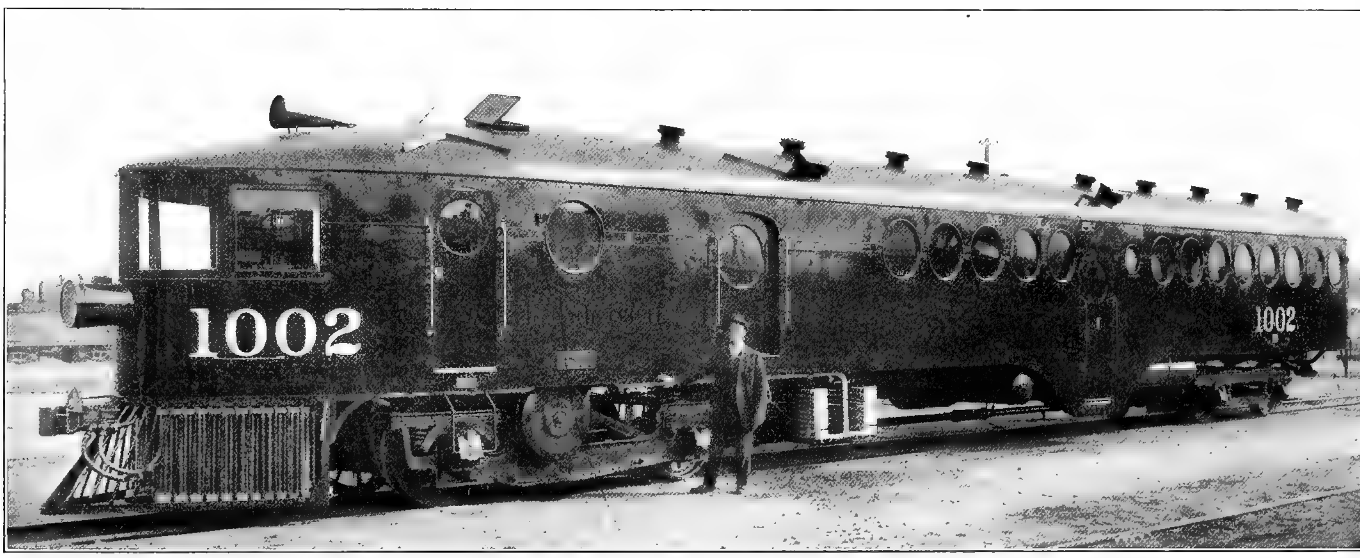


Fig. 191—Steel Gasolene Motor Car. Weight, 78,000 lbs.; Length Over End Sills, 70 ft.; Seating Capacity, 28. Builder, McKeen Motor Car Co.

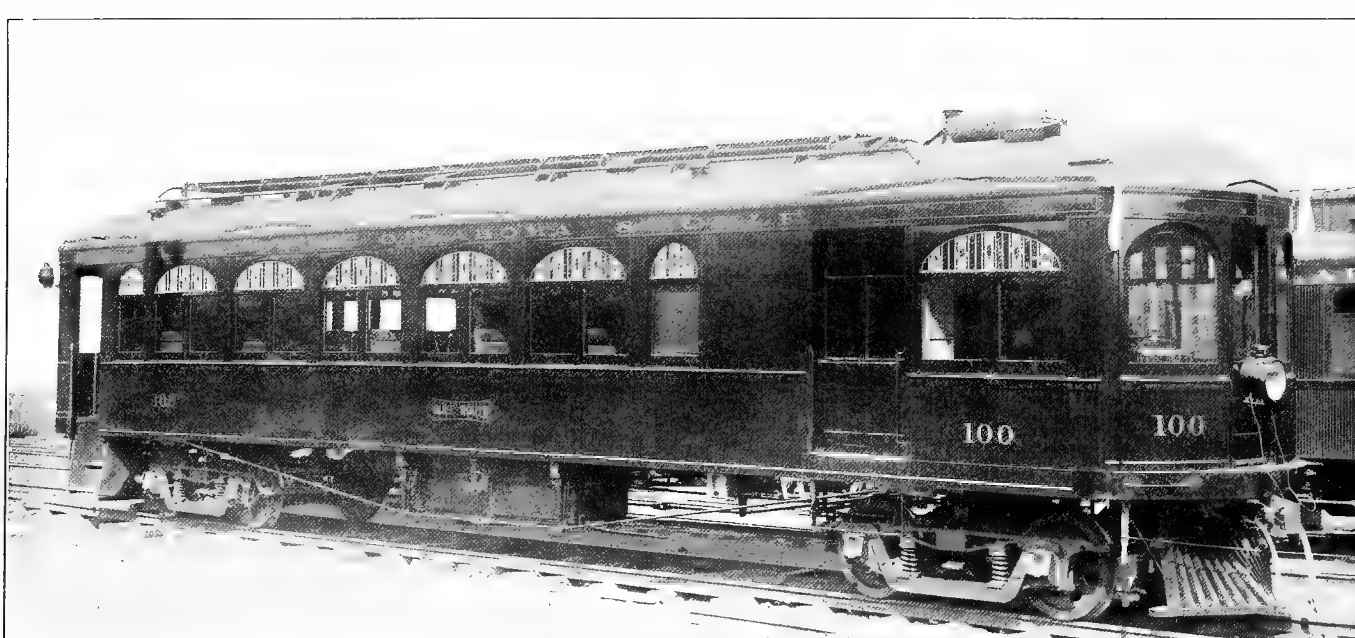


Fig. 192—Gas-Electric Motor Car. Seating Capacity, 44. Engine Rating, 90 hp. at 950 R.P.M. Builder, Drake Railway Automotrice Co.

Fig. 193—Steel Gas-Electric Motor Car. Builder, Strang Gas-Electric Car Company.

Fig. 194—Steel Gas-Electric Motor Car. Weight, 107,000 lbs.; Length Over Buffers, 70 ft. 4 in.; Seating Capacity, 86; Motor Rating, 200 hp Builder, General Electric Co.

Fig. 195—Steel Trailer Car for Summer Service with Electric Motor Cars. Weight, 63,000 lbs.; Seating Capacity, 80; Length Over End Sills, 54 ft. 4 in. Builder, Standard Steel Car Co.

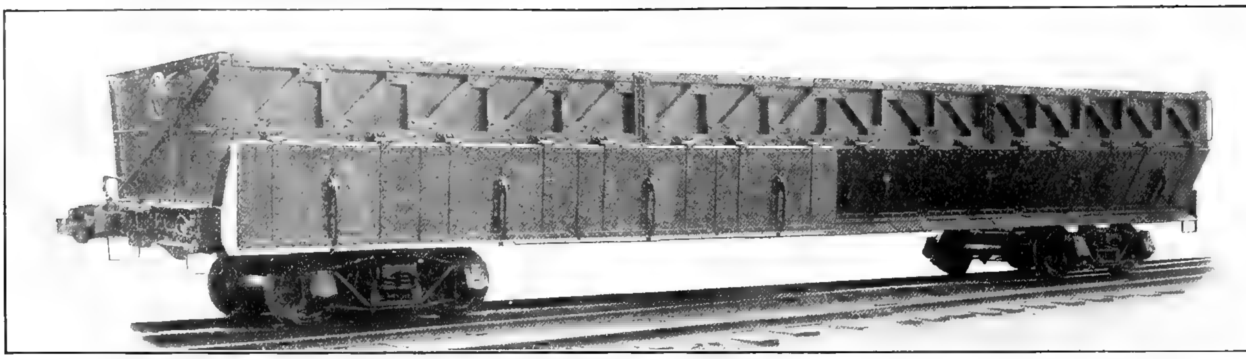


Fig. 196—Steel Car for Use in Quenching Coke. Builder, American Car & Foundry Co.

Fig. 197—Interior View of the International Correspondence Schools' Air Brake Instruction Car.

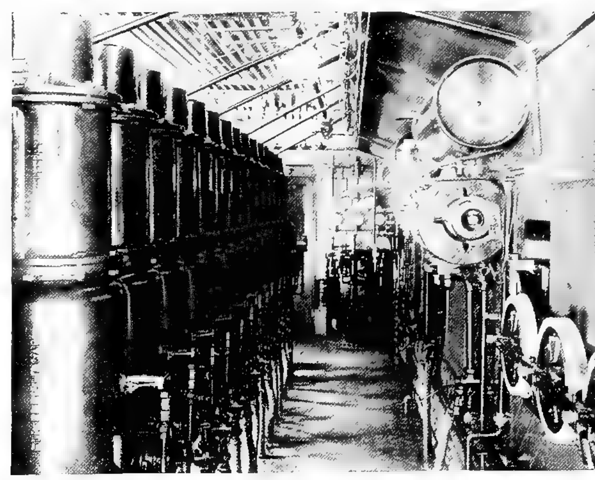


Fig. 198—Interior View of the Westinghouse Air Brake Company's Air Brake Instruction Car.

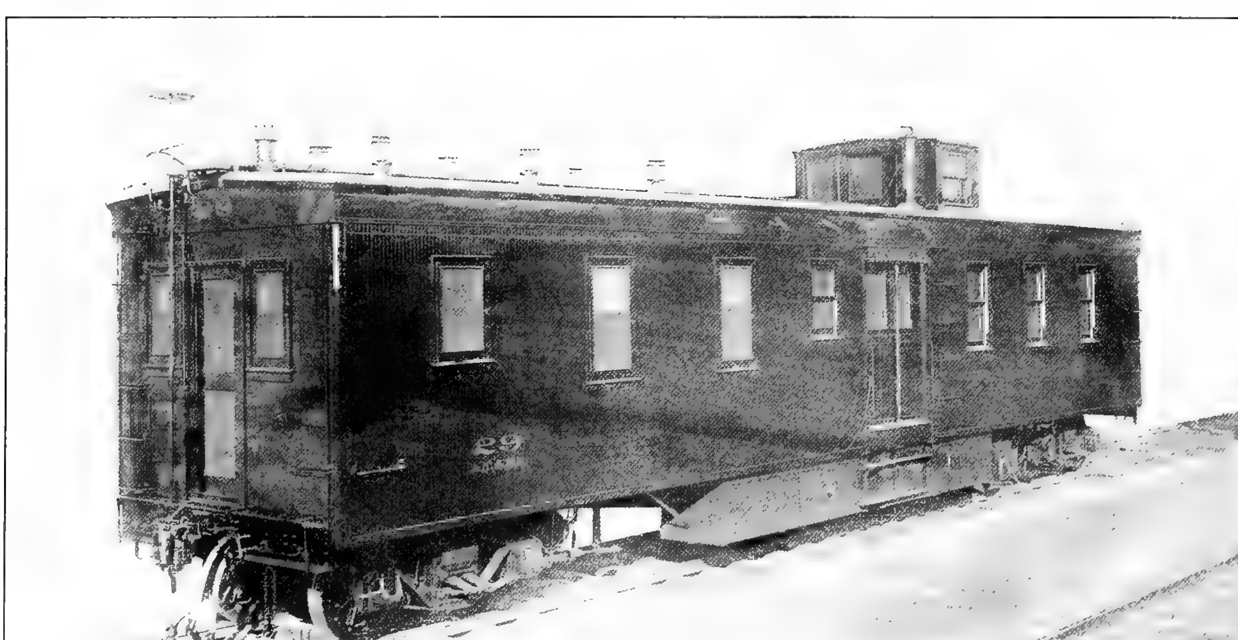


Fig. 199—Steel Frame Dynamometer Car. Weight, 91,000 lbs.; Dynamometer Capacity, 1,000,000 lbs. Builder, Atchison, Topeka & Santa Fe Railway.

(*See Figs.* 414-417 *for General Drawings.*)

Fig. 200—Steel Underframe Dynamometer Car with Separate Dynamometers for Pulling and Buffing. Weight, 114,700 lbs.; Length Over End Sills, 50 ft. 9 in. Builder, Baltimore & Ohio Railroad.

Fig. 201—Interior View of Fuel Instruction Car in Use on the Delaware, Lackawanna & Western.

Fig. 202—Electric Wrecking Crane for Use in Tunnels. Weight, 326,000 lbs.; Lifting Capacity at 17 ft. Radius, 50 Tons. Builder, Industrial Works.

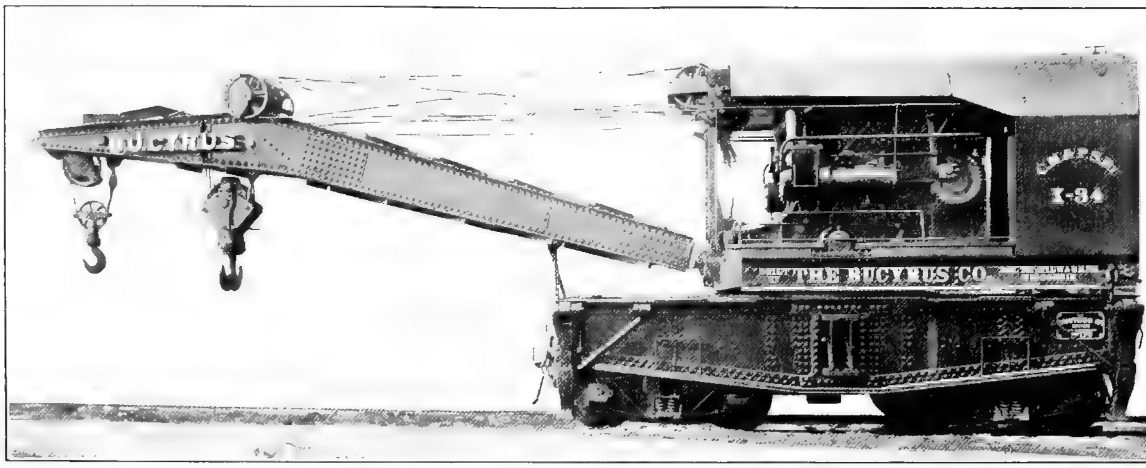


Fig. 203—Steam Wrecking Crane. Lifting Capacity, 100 Tons. Builder, The Bucyrus Company.

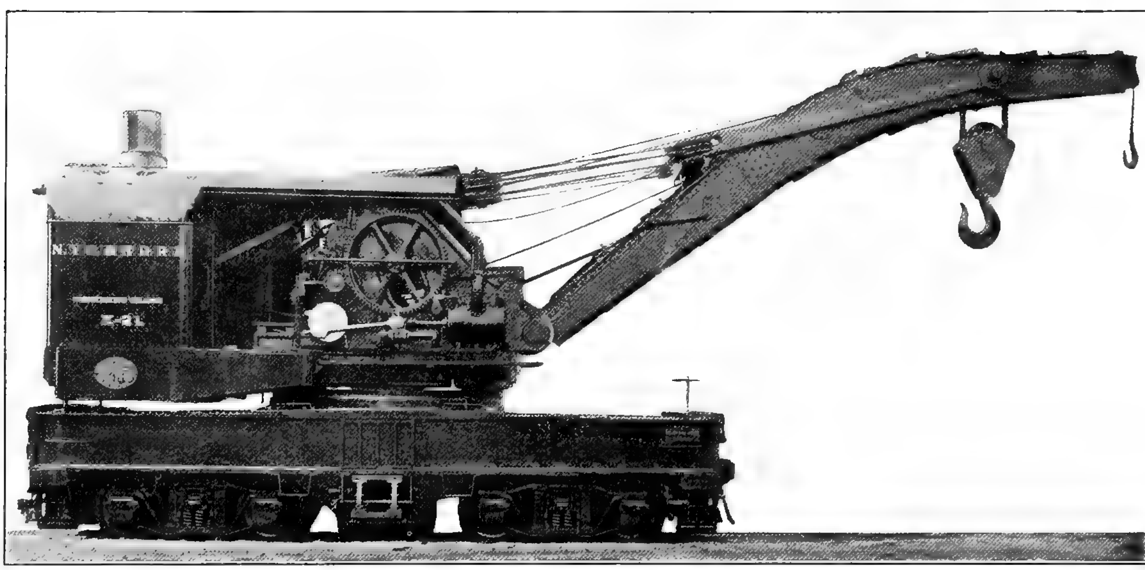


Fig. 204—Steam Wrecking Crane. Weight, 212,000 lbs.; Lifting Capacity, 120 Tons. Builder, Industrial Works.

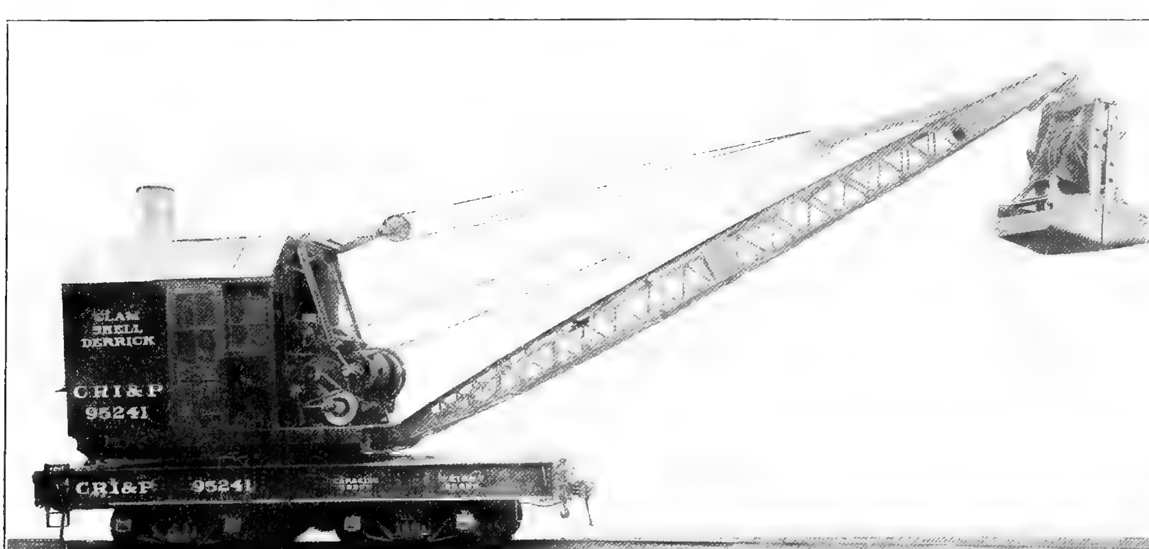


Fig. 205—Steam Crane Fitted with Clam Shell Bucket. Weight, 80,000 lbs.; Lifting Capacity, 20 Tons. Builder, McMyler Interstate Company.

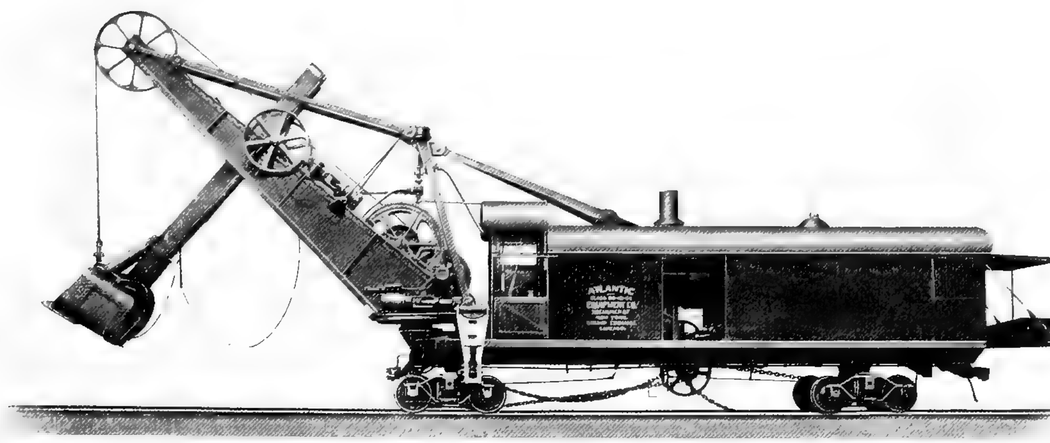


Fig. 206—Atlantic Steam Shovel. Weight in Working Order, 203,000 lbs. Builder, The Bucyrus Company.

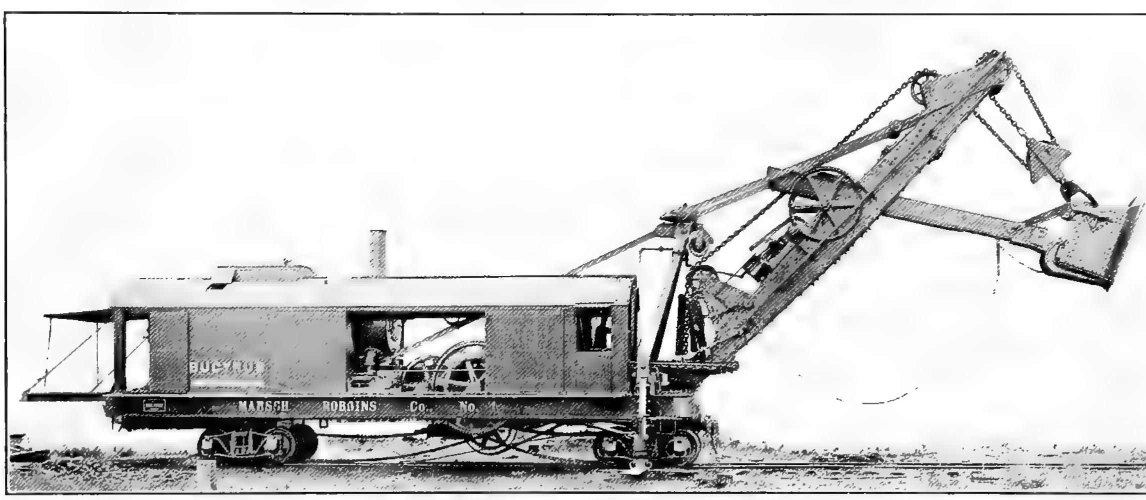


Fig. 207—Type 95-C Bucyrus Steam Shovel. Weight in Working Order, 214,000 lbs. Builder, The Bucyrus Company.

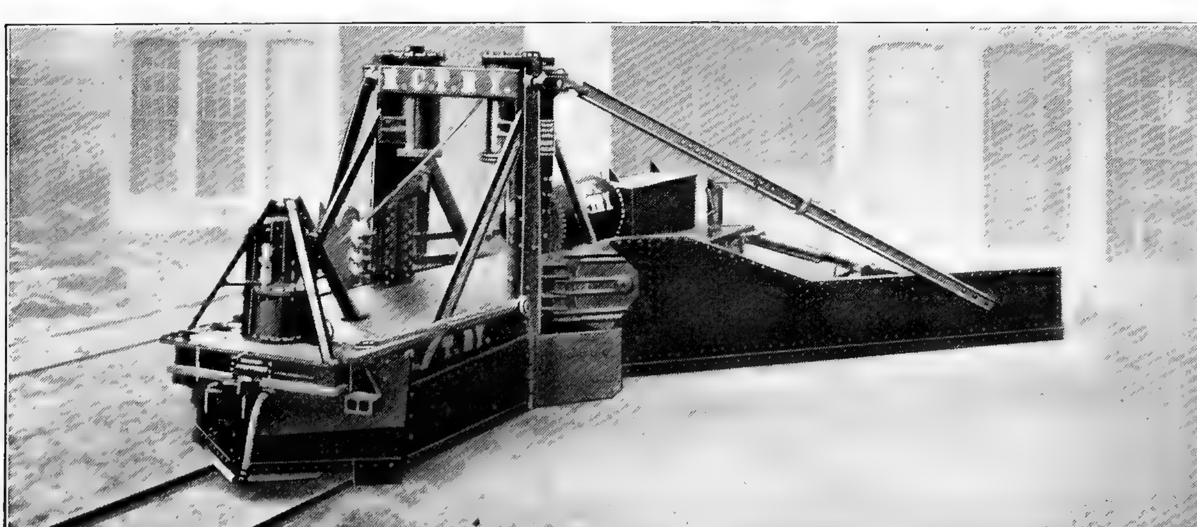


Fig. 208—Ballast Spreader. The Wings are Operated by Compressed Air. Builder, The O. F. Jordan Company.

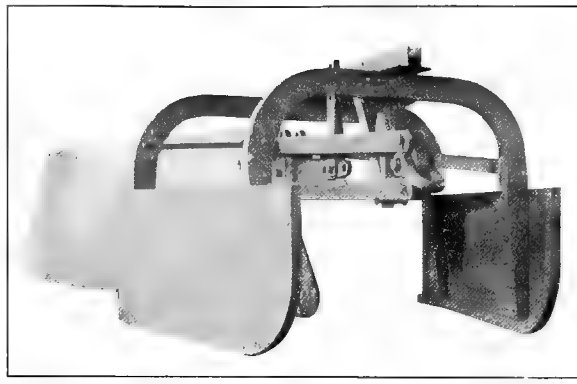


Fig. 209—Center Ballast Plow with Pilot Wings for Plowing from Tops of Cars. Builder, The Bucyrus Company.

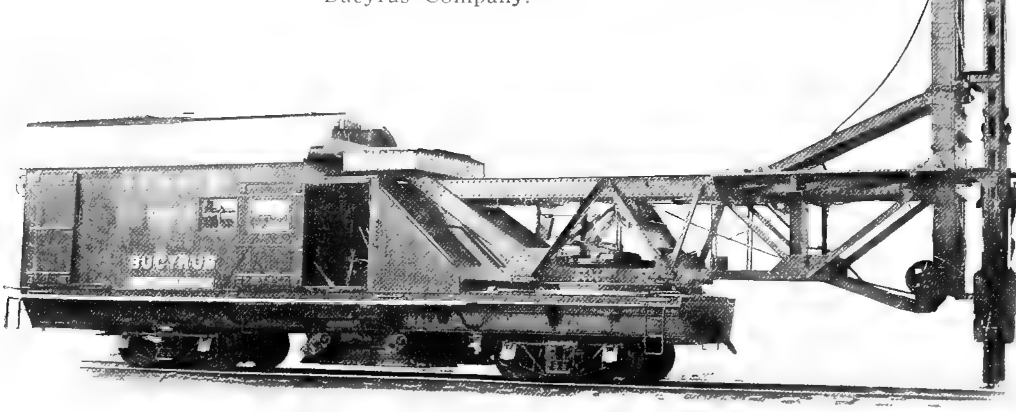


Fig. 210—Self-Propelling Steam Pile Driver. Builder, The Bucyrus Company.

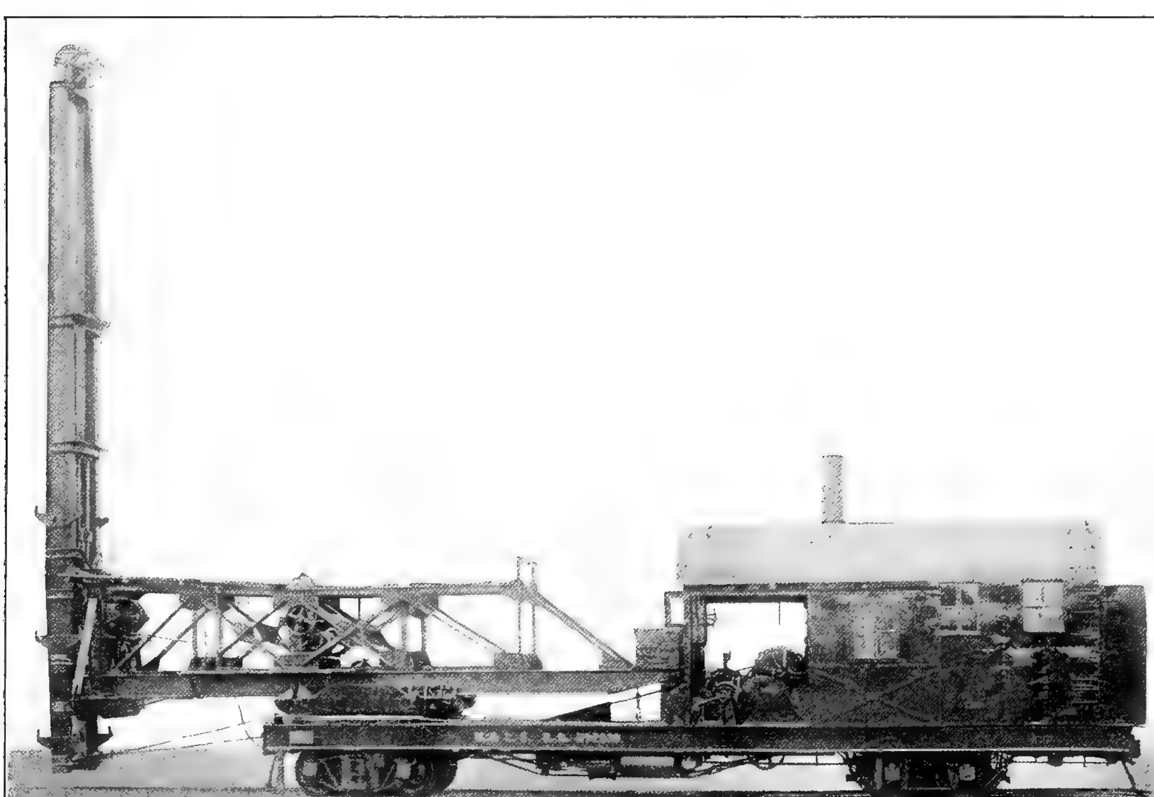


Fig. 211—Self-Propelling Steam Pile Driver. Builder, Industrial Works.

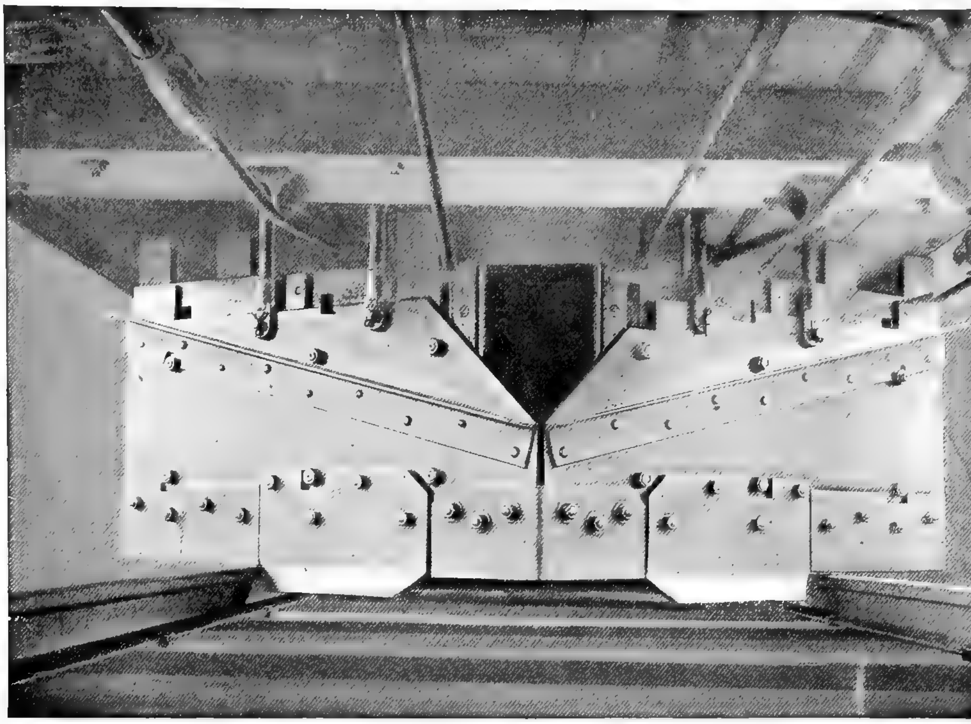


Fig. 212—Single Track Flanger Applied to Snow Plow. Builder, Russell Car & Snow Plow Company.

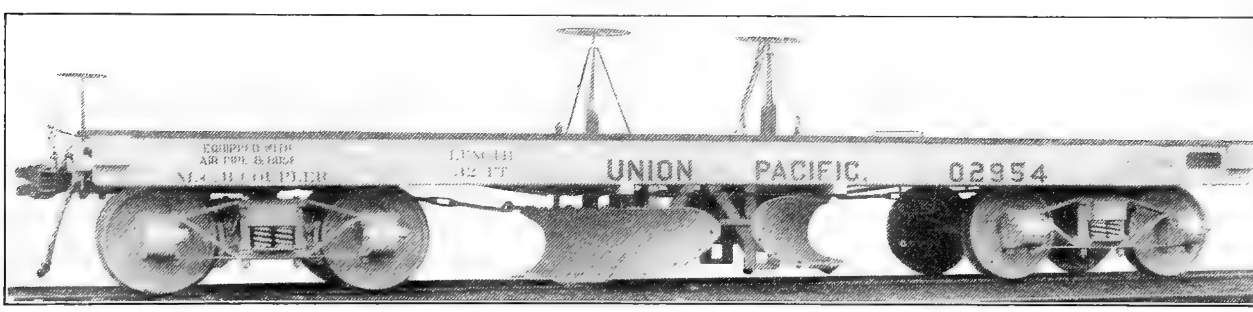


Fig. 213—Ballast Distributing Plow. Builder, Rodger Ballast Car Company.

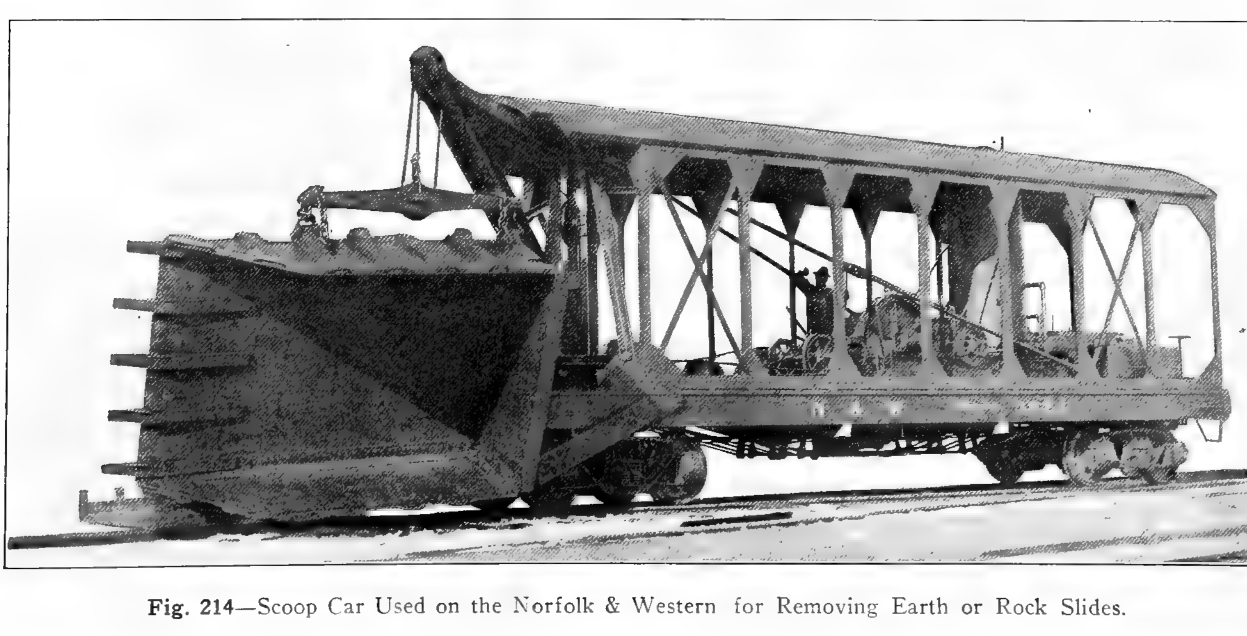


Fig. 214—Scoop Car Used on the Norfolk & Western for Removing Earth or Rock Slides.

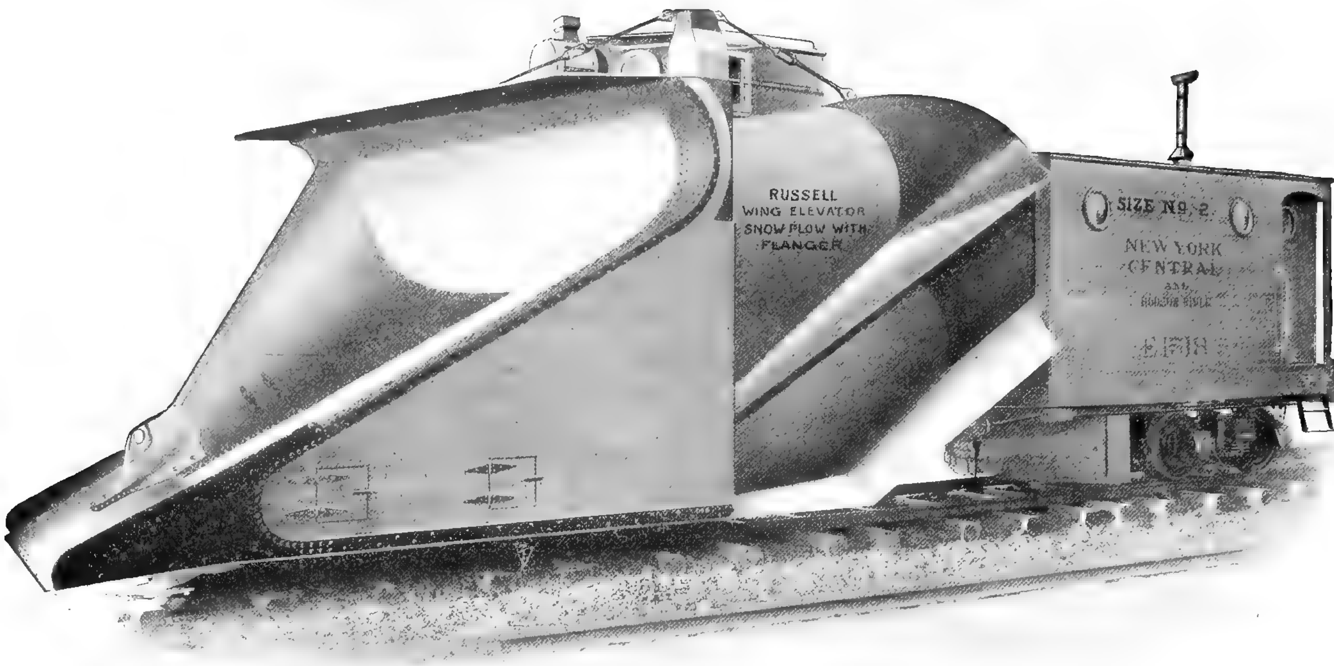


Fig. 215—Single Track Wing Elevator Snow Plow with Flanger. The Side Wings are Swung Out by Compressed Air to Increase the Width of the Cleared Area. Builder, Russell Car & Snow Plow Company.

(See Fig. 212 for Application of Flanger.)

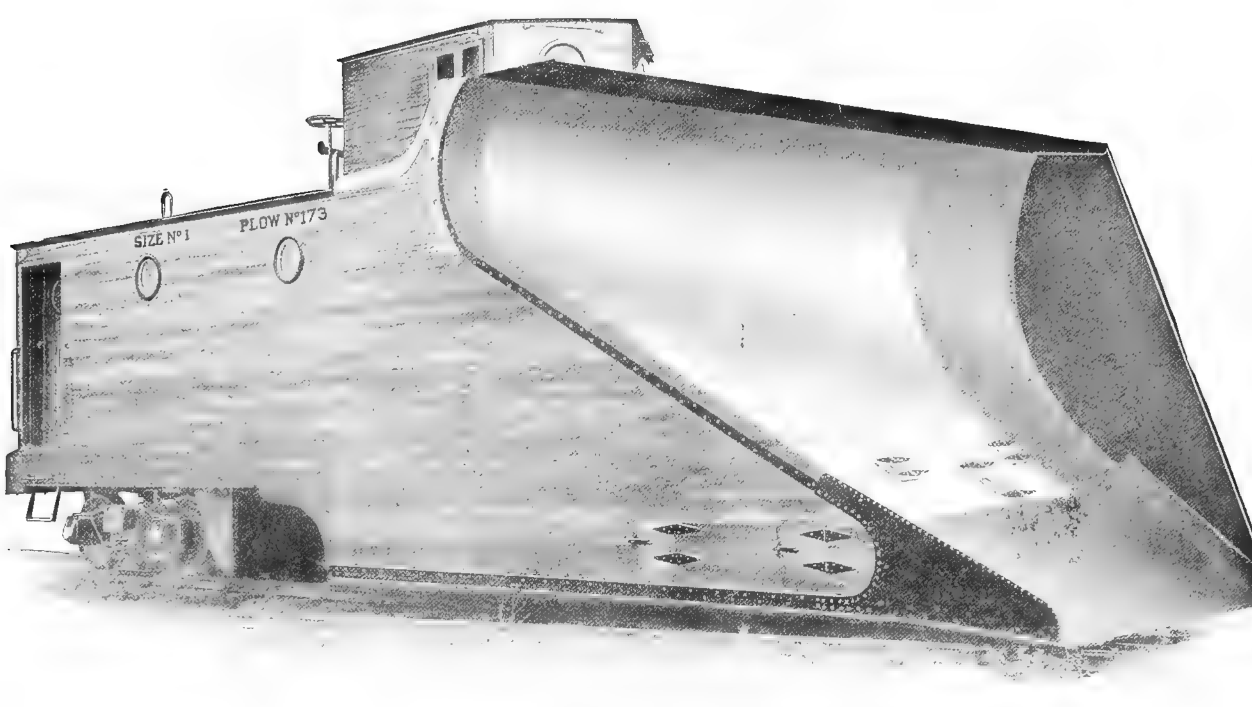


Fig. 216—Right Hand Double Track Snow Plow with Flanger. Builder, Russell Car & Snow Plow Company.

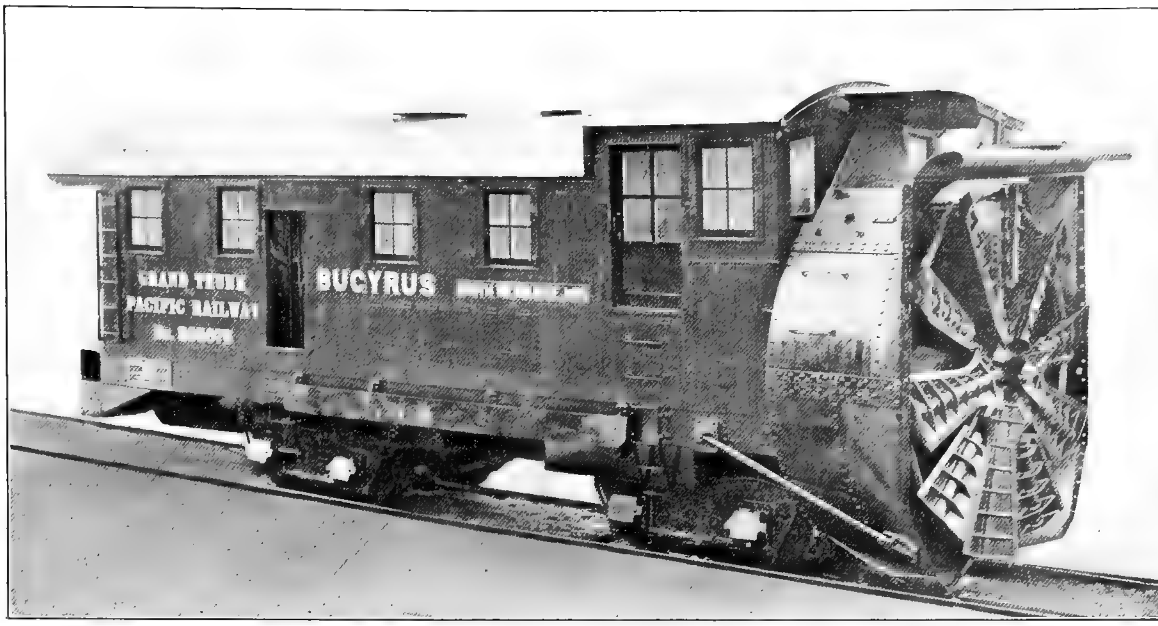


Fig. 217—Rotary Snow Plow. The Boiler is of the Locomotive Type. The Cutting Wheel is Driven by a Horizontal Steam Engine Having Two Cylinders, Each 18 in. x 26 in. Builder, The Bucyrus Company.

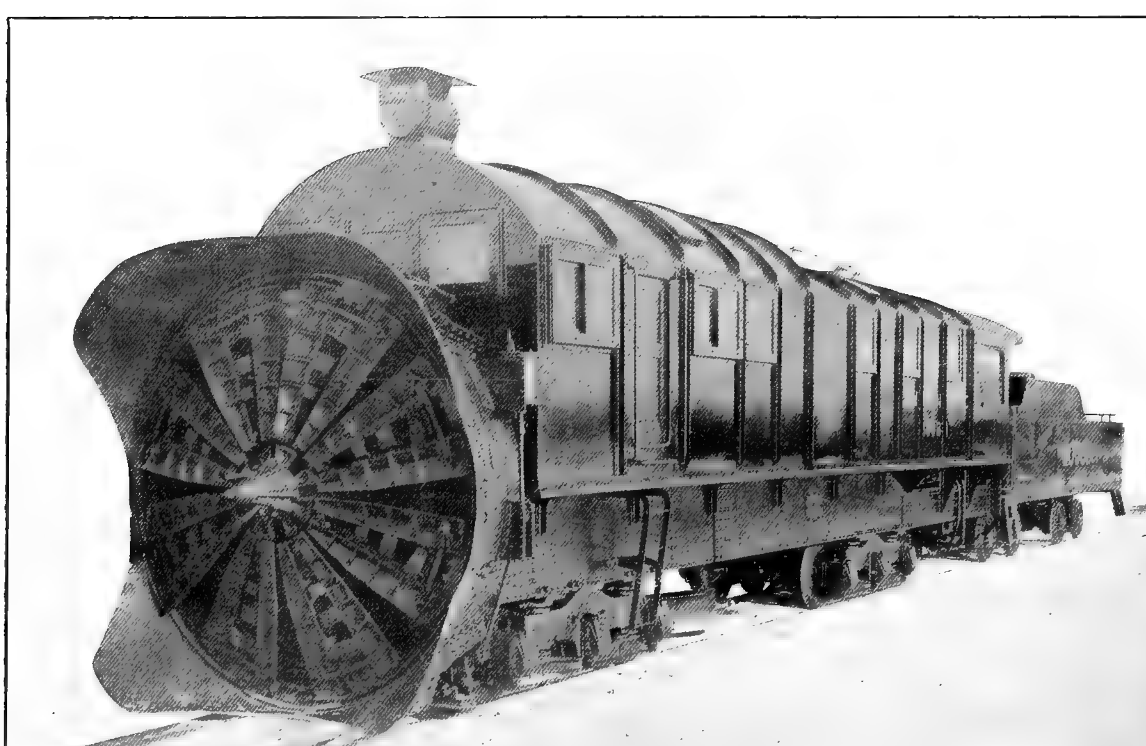


Fig. 218—Rotary Snow Plow in Use on the Canadian Pacific, Equipped with Specially Designed Six-Wheel Trucks. The Boiler is of the Locomotive Type, the Working Pressure Being 200 lbs. It has 317 2-in. Tubes and 44 sq. ft. of Grate Area. The Engine is Vertical, with Two 20 in. x 24 in. Cylinders. The Tender has a Capacity of 7,000 Imperial Gallons of Water and 10 Tons of Coal.

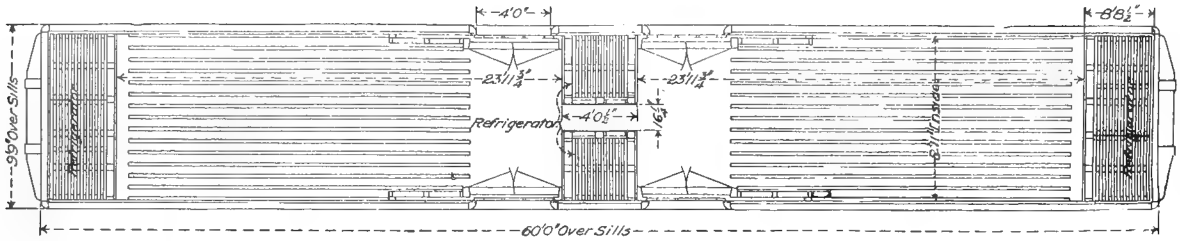


Fig. 219—Floor Plan of Great Northern Express Refrigerator Car.

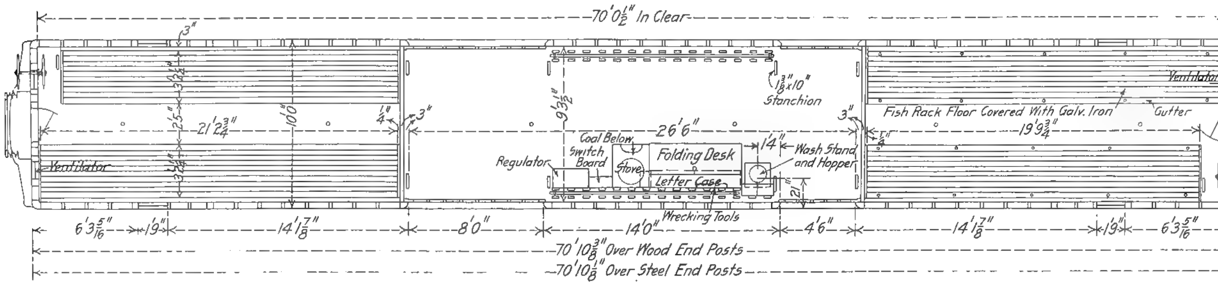


Fig. 220—Floor Plan of Missouri Pacific Baggage Car. Builder, American Car & Foundry Company.

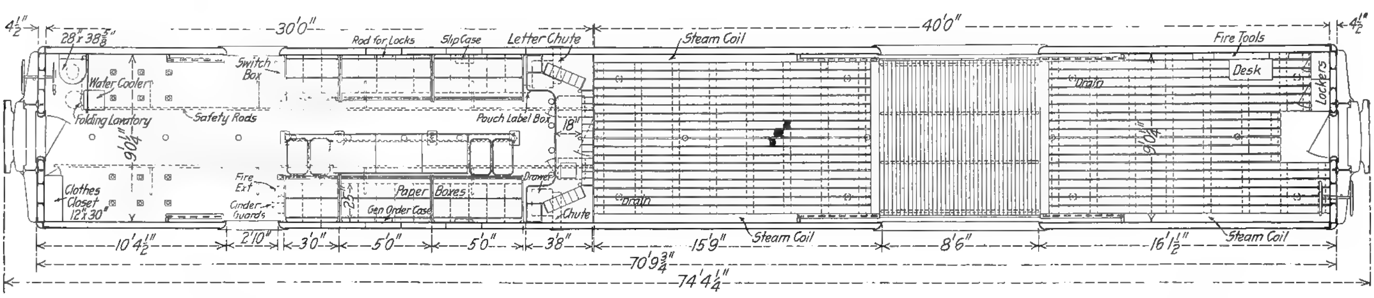


Fig. 221—Floor Plan of Central Railroad of New Jersey Baggage and Mail Cars Shown in Figs. 130, 131 and 372-374. Builder, The Harlan & Hollingsworth Corporation.

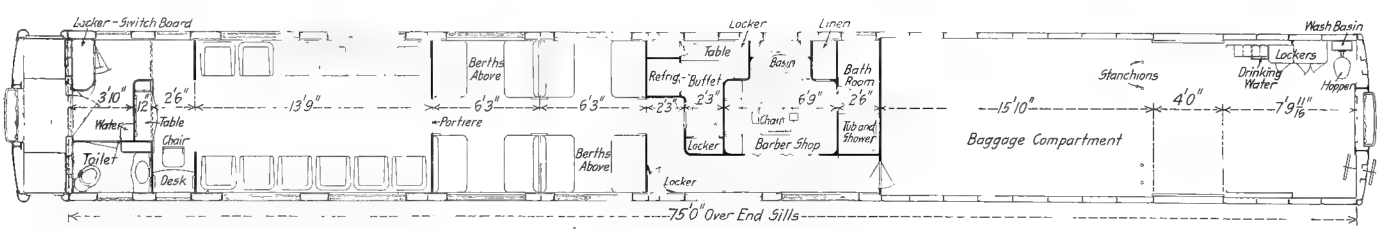


Fig. 222—Floor Plan of Union Pacific Baggage-Buffet Car. Builder, The Pullman Co.

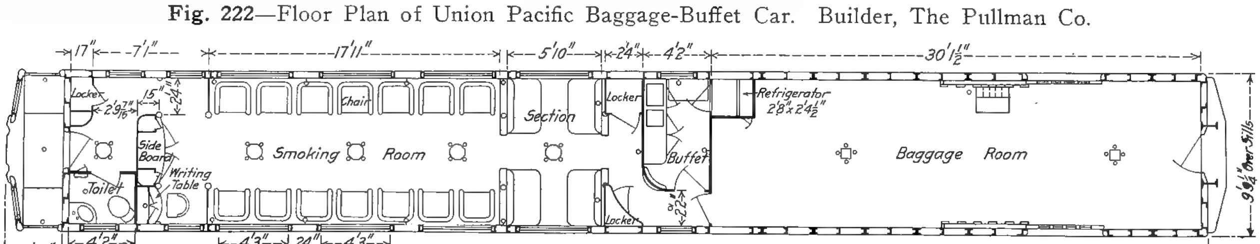


Fig. 224—Floor Plan of Western Pacific Baggage, Parlor and Library Car. Builder, The Barney & Smith Car Co.

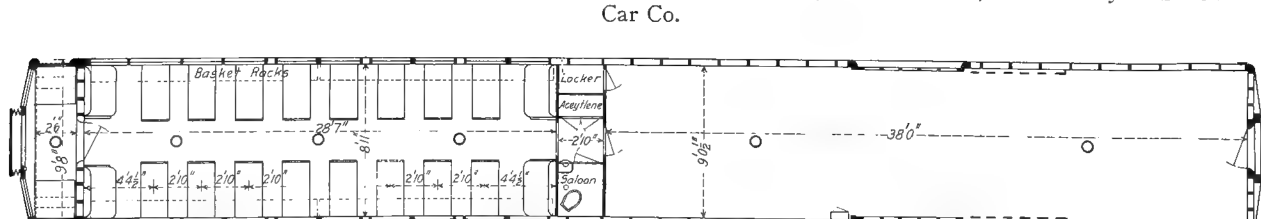


Fig. 225—Floor Plan of Chicago, Burlington & Quincy Combination Baggage and Passenger Car. Builder, American Car & Foundry Company.

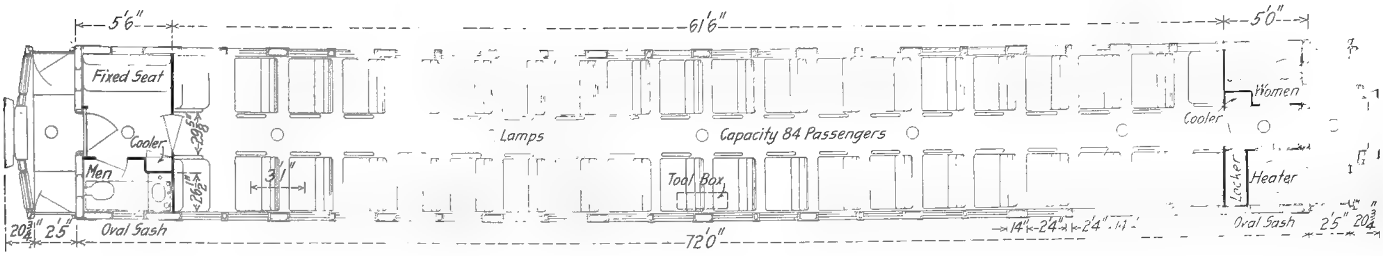


Fig. 226—Floor Plan of Canadian Pacific Steel Day Coach.

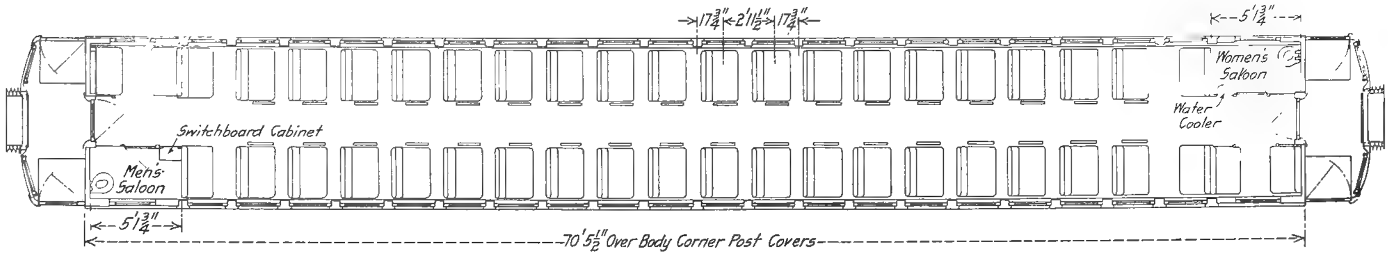


Fig. 227—Floor Plan of New York, New Haven & Hartford Steel Day Coach.

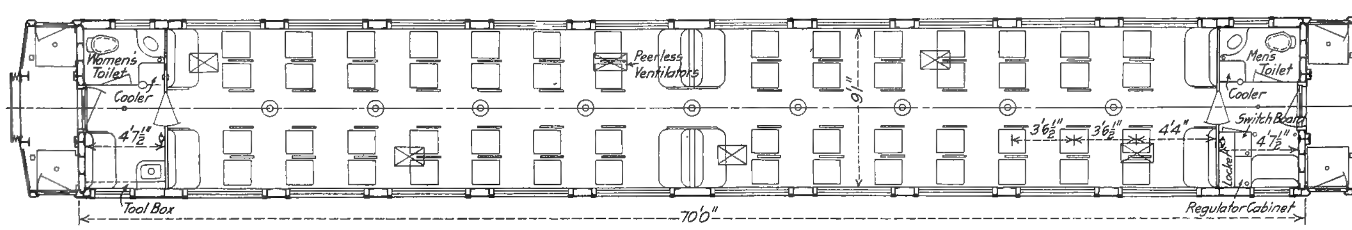


Fig. 228—Floor Plan of Atchison, Topeka & Santa Fe Steel Chair Car Shown in Figs. 378-380. Builder, The Pullman Co.

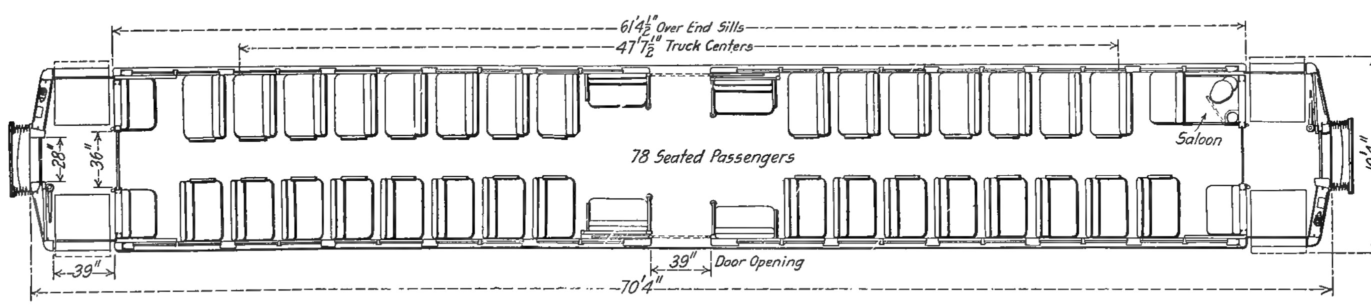


Fig. 229—Floor Plan of New York, Westchester & Boston Suburban Car Shown in Fig. 184.

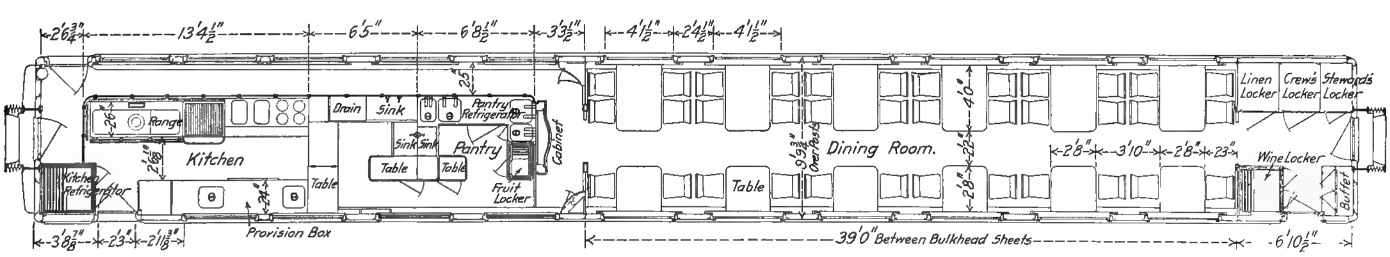


Fig. 230—Floor Plan of Pennsylvania Lines Dining Car.

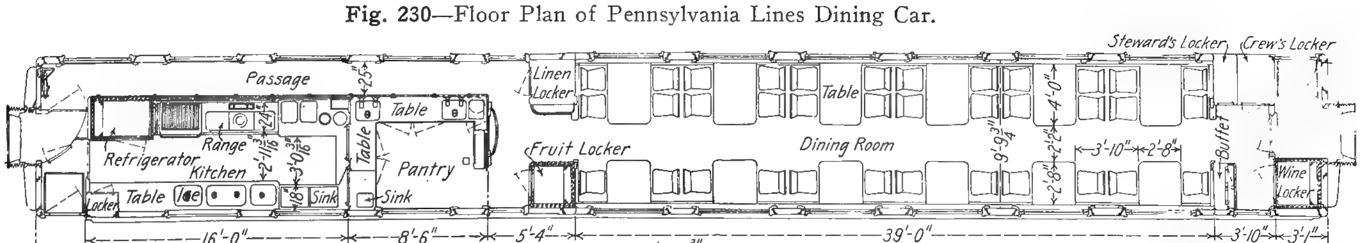


Fig. 231—Floor Plan of Pennsylvania Railroad Dining Car.

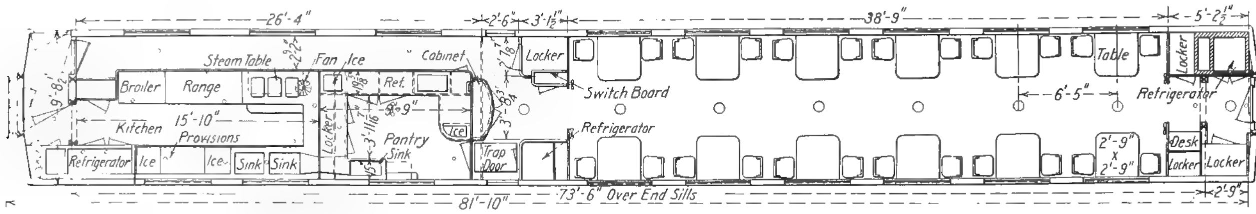


Fig. 232—Floor Plan of Atlantic Coast Line Dining Car.

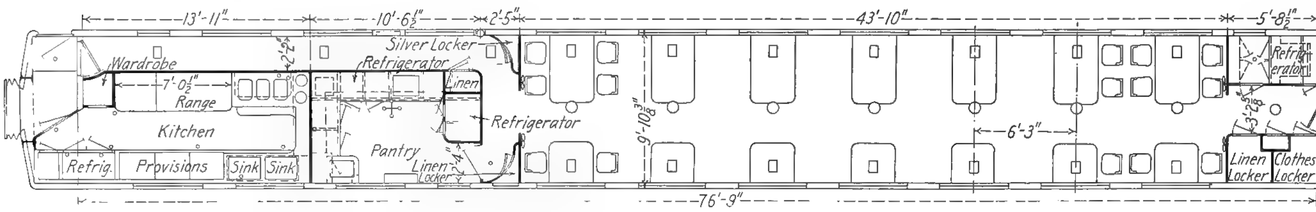


Fig. 233—Floor Plan of New York, New Haven & Hartford Dining Car. Builder, The Pullman Company.

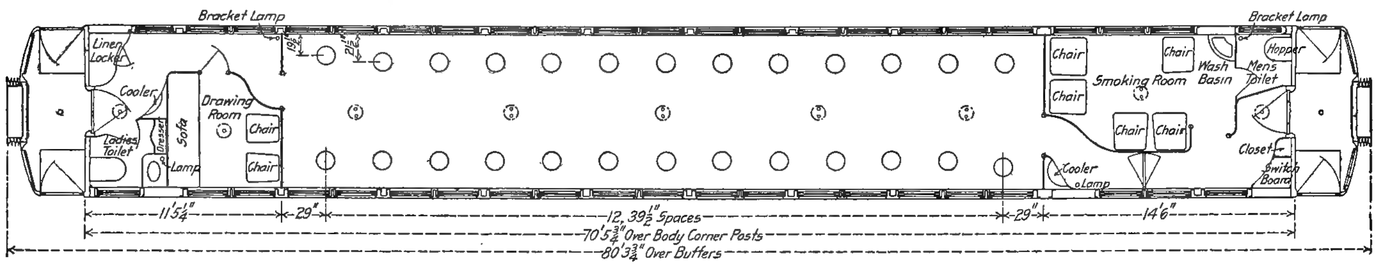


Fig. 234—Floor Plan of Long Island Steel Parlor Car. Builder, American Car & Foundry Company.

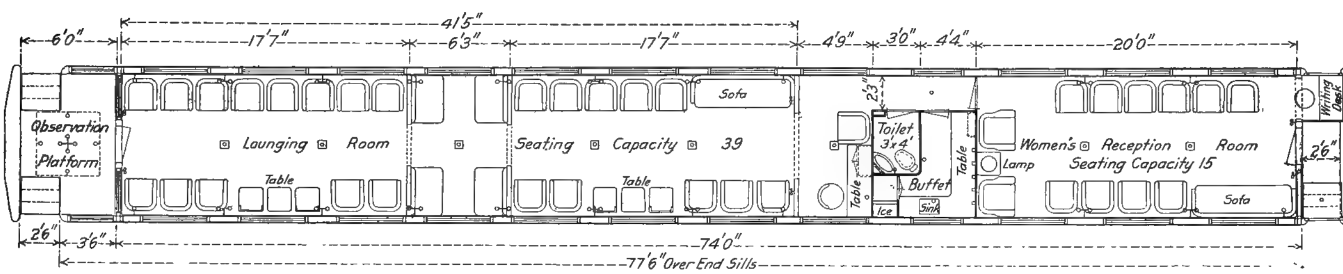


Fig. 235—Floor Plan of Chicago, Burlington & Quincy Parlor Car with Reception Room for Women.

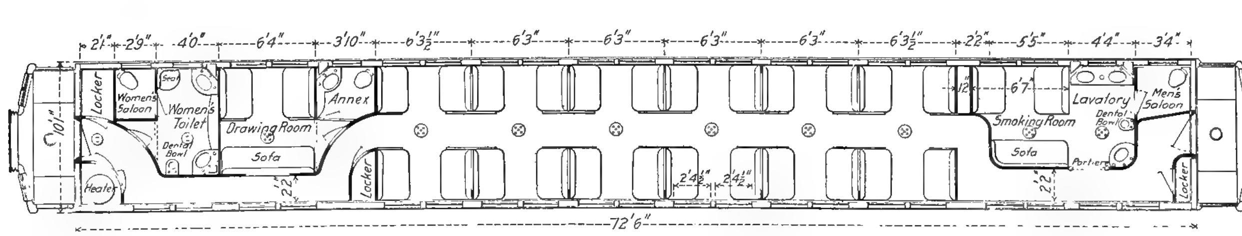


Fig. 236—Floor Plan of Chicago, Milwaukee & St. Paul Sleeping Car. Builder, The Pullman Co.

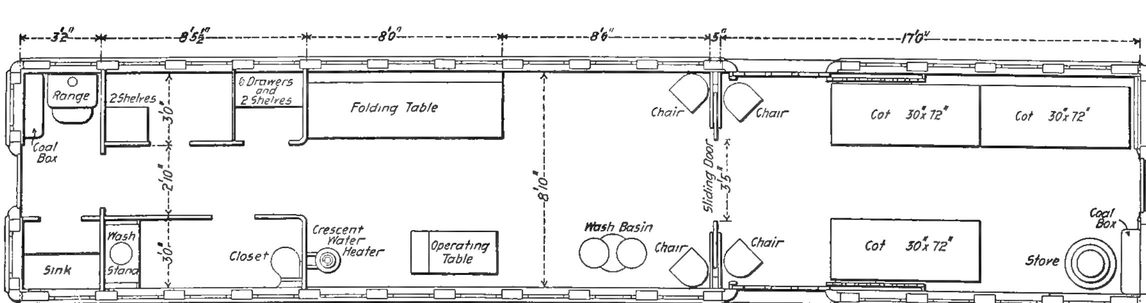


Fig. 237—Floor Plan of Lehigh Valley Hospital Car.

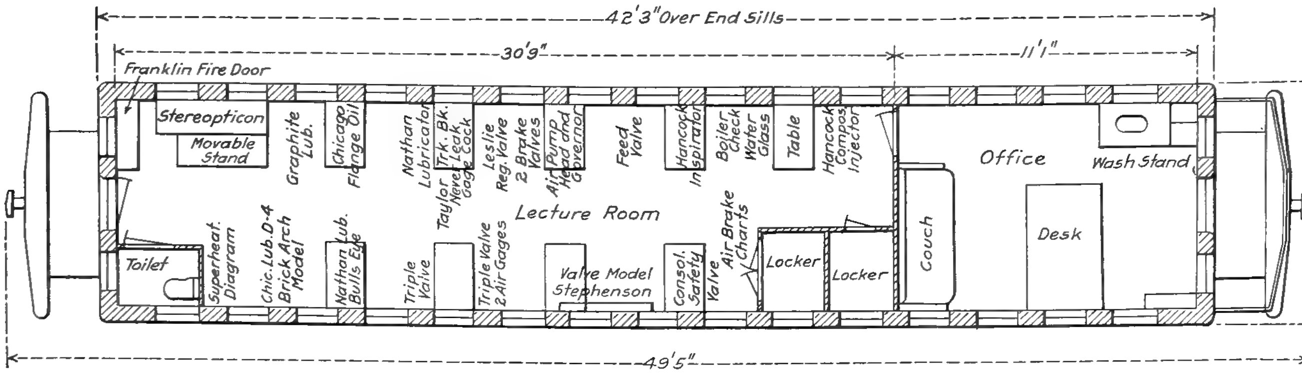


Fig. 238—Floor Plan of Delaware, Lackawanna & Western Fuel Instruction Car. Interior View Is Shown in Fig. 201.

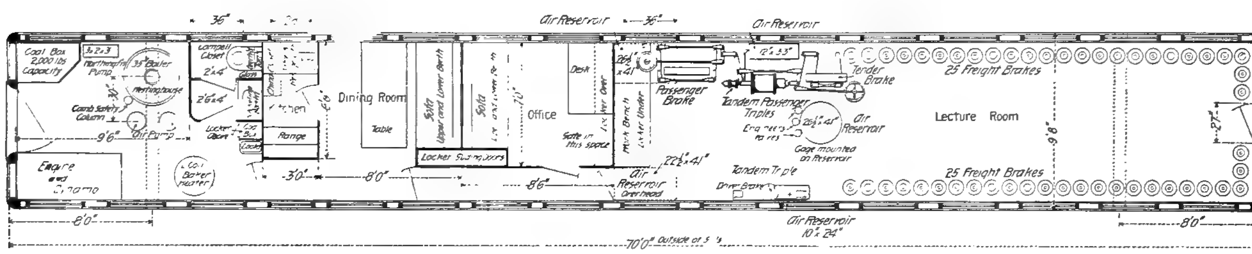


Fig. 239—Floor Plan of International Correspondence Schools Air Brake Instruction Car. Interior View is Shown in Fig. 197.

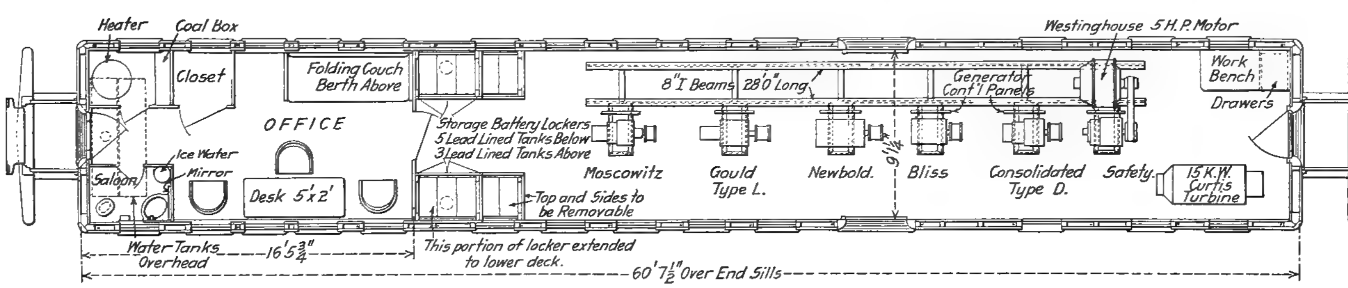


Fig. 240—Floor Plan of Pennsylvania Railroad Train Lighting Instruction Car.

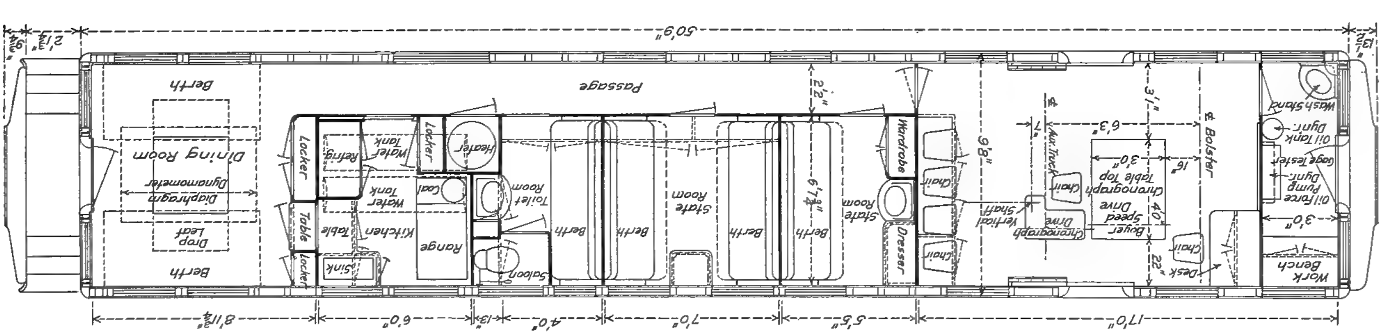


Fig. 241—Floor Plan of Baltimore & Ohio Dynamometer Car Shown in Fig. 200.

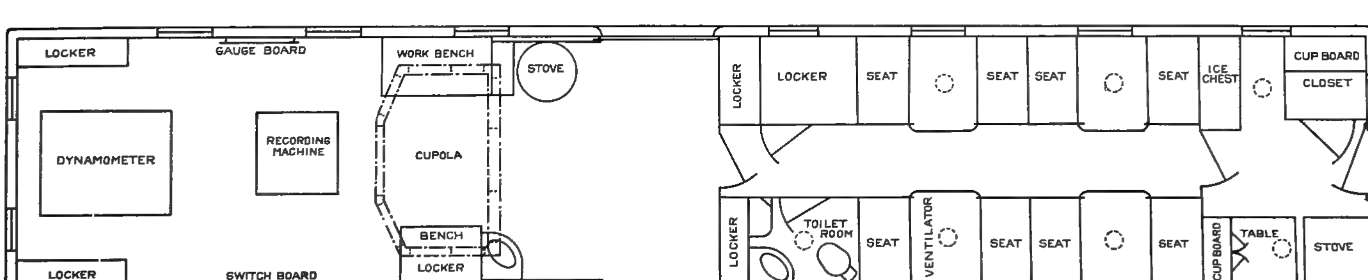


Fig. 242—Floor Plan of Atchison, Topeka & Santa Fe Dynamometer Car Shown in Fig. 199.

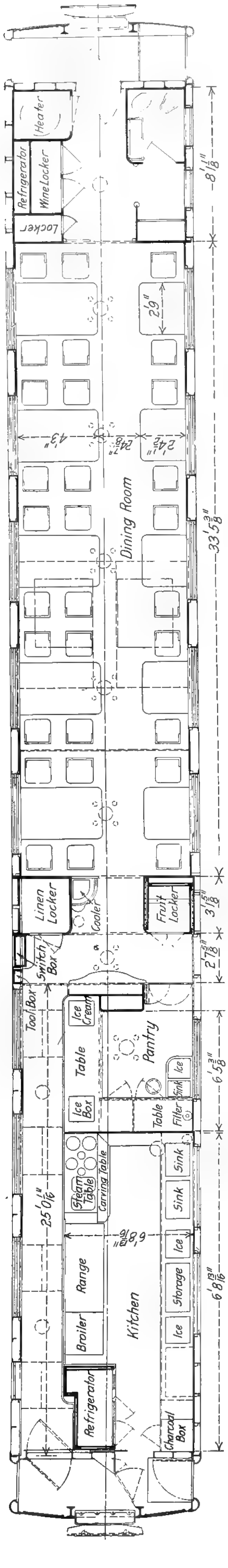


Fig. 243—Floor Plan of Union Pacific Steel Dining Car. Builder, The Pullman Co.

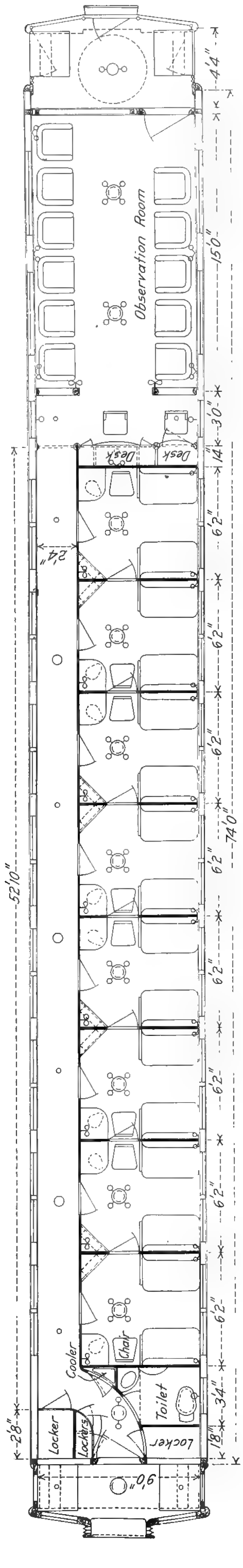


Fig. 244—Floor Plan of Chicago, Great Western Compartment Sleeper with Ladies' Observation Room. Builder, The Pullman Co.

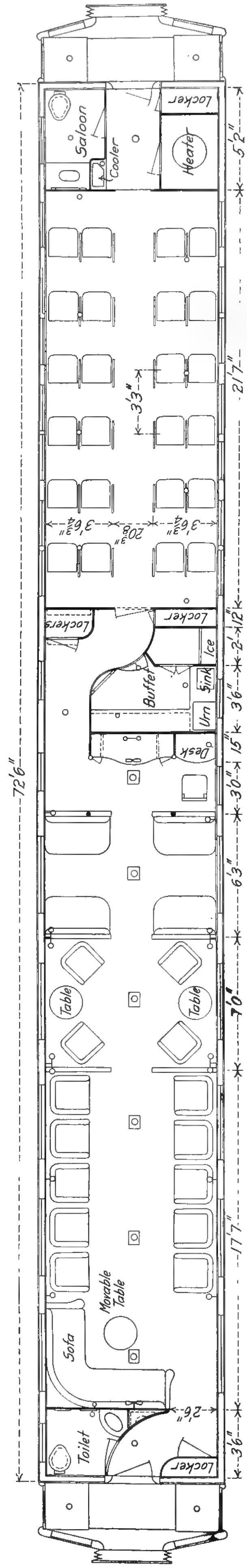


Fig. 245—Floor Plan of Chicago, Great Western Club Car. Builder, The Pullman Co.

Box Car Parts. See Figs. 287-288.

1 *Side Sill*
2 *End Sill*
3 *Floor Stringers*
4 *Center Sill*
5 *Body Bolster*
6 *Body Side Bearing*
7 *Body Center Plate*
8 *Crosstie*
9 *Drawbar*
10 *Carry Iron*
11 *Draft Casting*
12 *Striking Plate*
13 *Uncoupling Rigging*
14 *Floor*
15 *Sill Step*
16 *Side Brace*
17 *Post Pocket*
18 *End Brace*
19 *Sill and Plate Tie Rod*
20 *Side Post*
21 *End Post*
22 *Corner Post*
23 *Door Post*
24 *Grain Shoe*
25 *Side Plate*
26 *End Plate*
27 *Belt Rail*
28 *Sheathing or Siding*
29 *Lining*
30 *Corner Plate*
31 *Ladder Round*
32 *Hand Hold*
33 *Side Door*
34 *Side Door Top Track or Guide*
35 *Side Door Bottom Guide*
36 *Carline*
37 *Purline*
38 *Ridge Pole*
39 *Roof*
40 *Running Board*
41 *Running Board Bracket*
42 *End Fascia*
43 *Side Fascia*
44 *Hand Brake Wheel*
45 *Hand Brake Shaft*
46 *Hand Brake Shaft Step*
47 *Hand Brake Shaft Guide*
48 *Hand Brake Step*
49 *Hand Brake Step Bracket*
50 *Hand Brake Ratchet*
51 *Hand Brake Chain Drum*
52 *Push Pole Pocket*
53 *Side Nailing Strip or Floor Stringer Bracket*
54 *Diagonal Brace*
55 *Draft Gear*
56 *Cross Tie Floor Beam or Stringer Support*
57 *End Belt Rail*
58 *Inside Corner Plate*
59 *Side Door Stop and Lock*
60 *Side Door Hanger*
61 *Door Handle*
62 *Door Back Stop*

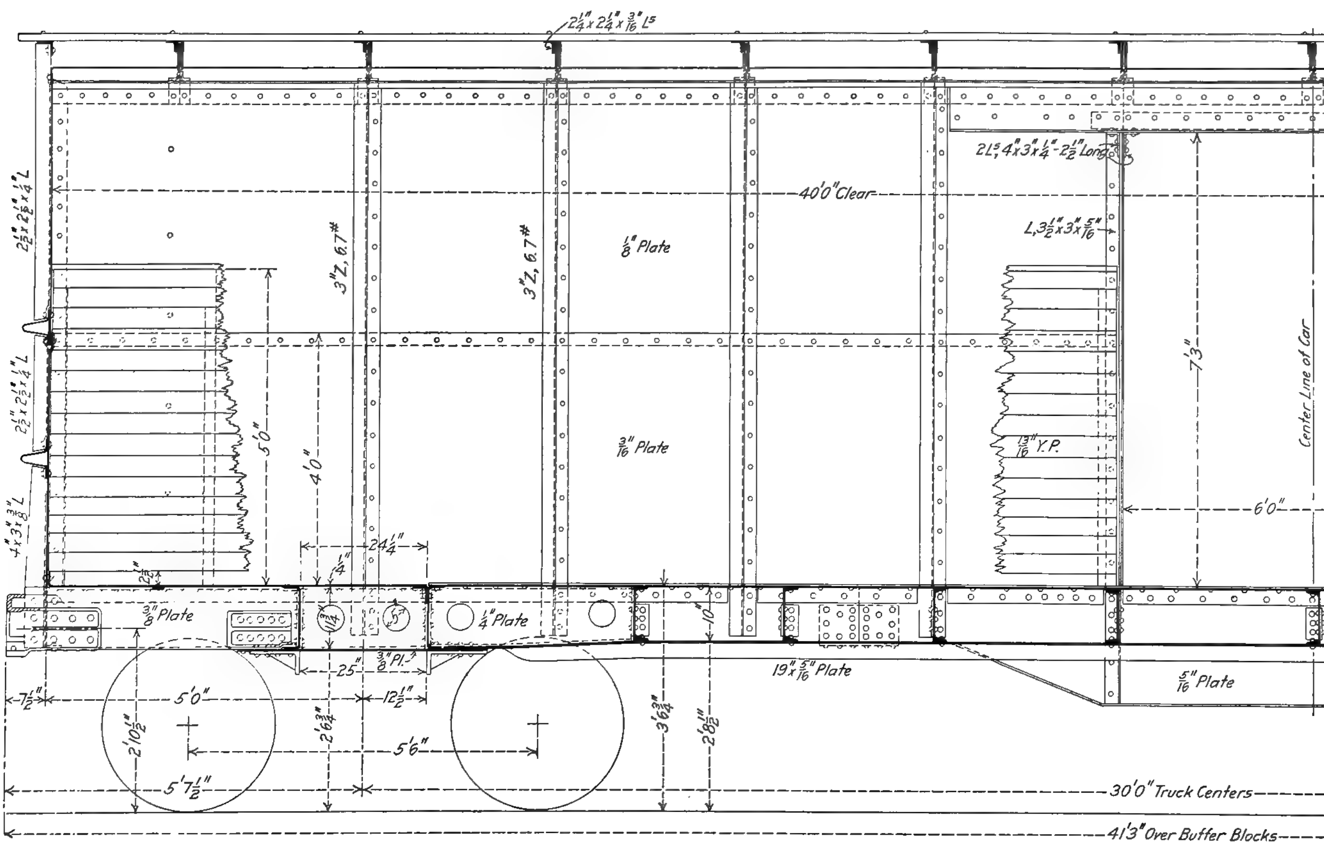


Fig. 259—Longitudinal Section of Summers All-Steel 50-Ton Capacity Box Car, Similar to the Car Shown in Fig. 1. See also Figs. 260 and 261.

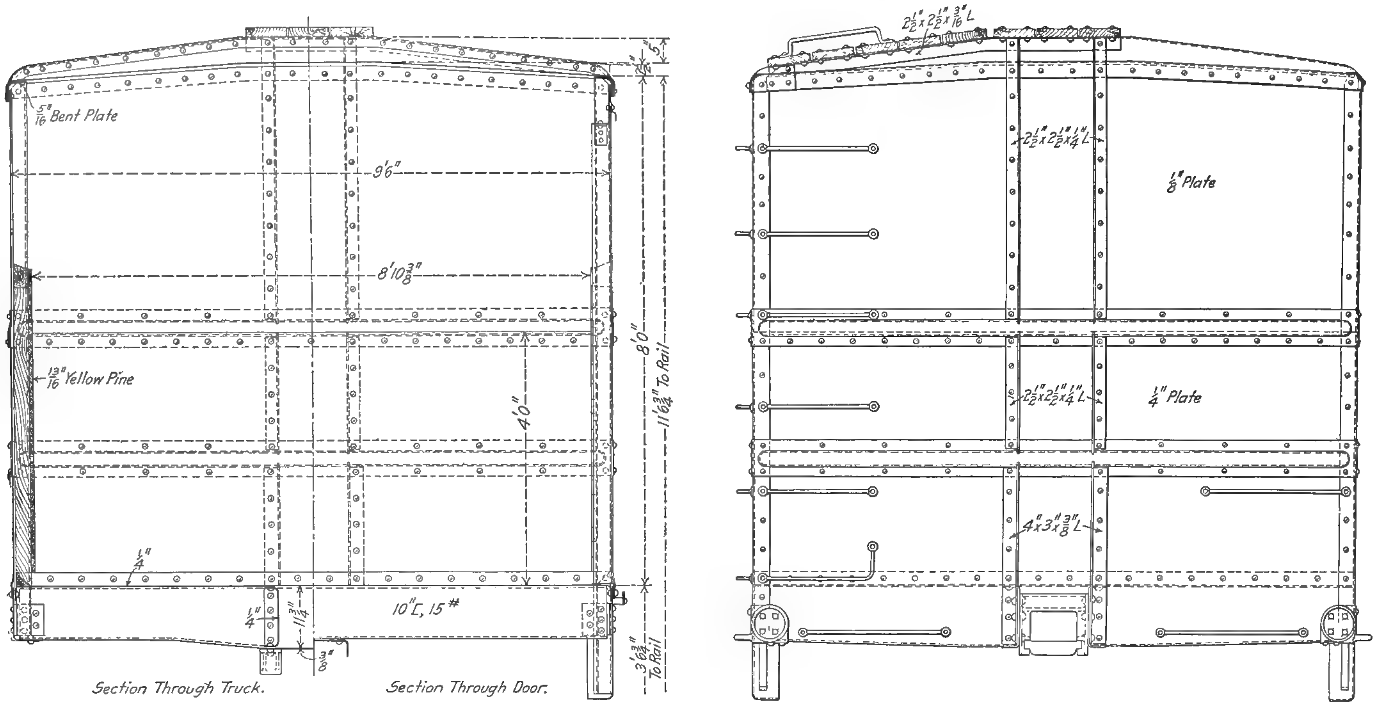


Fig. 260—Cross Sections and End Elevation of Summers All-Steel 50-Ton Capacity Box Car, Similar to the Car Shown in Fig. 1. See also Figs. 259 and 261.

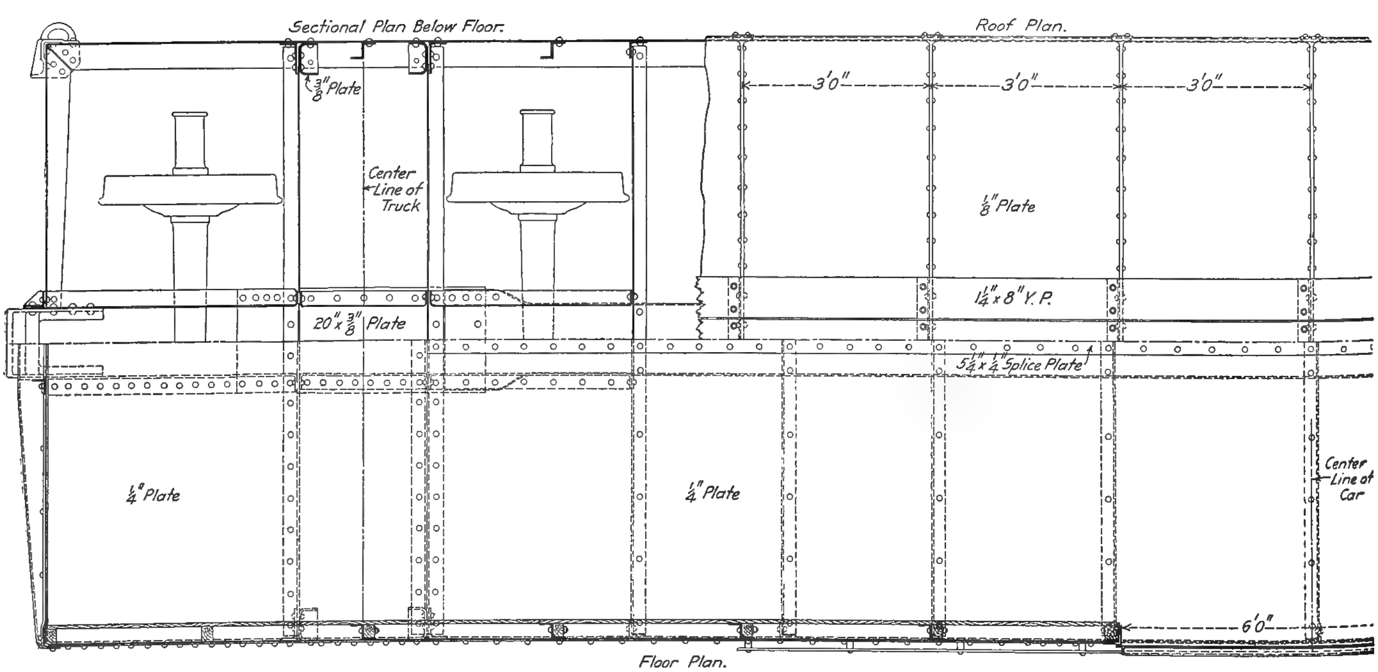


Fig. 261—Plan of Summers All-Steel 50-Ton Capacity Box Car, Similar to the Car Shown in Fig. 1. See also Figs. 259 and 260.

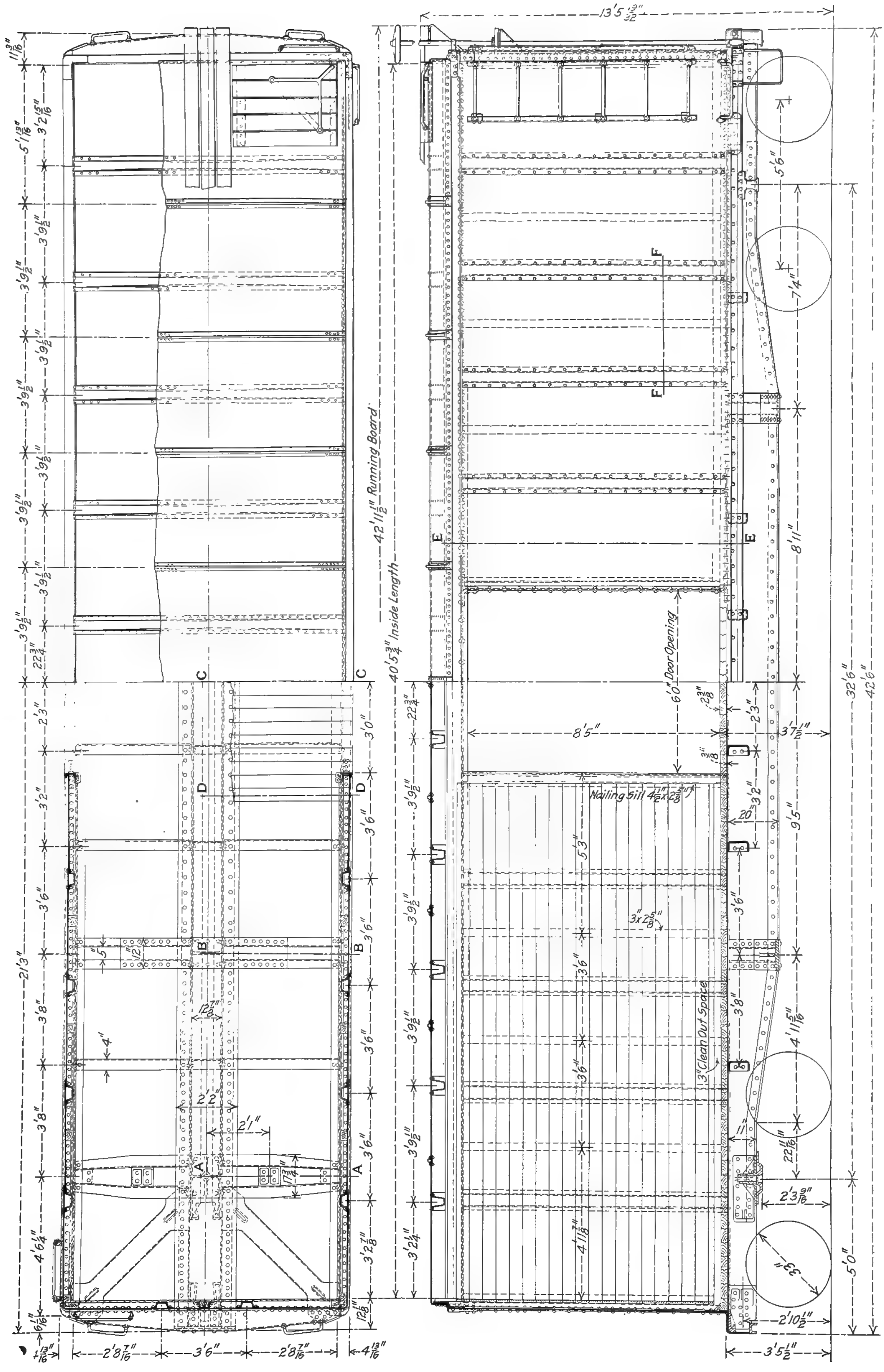


Fig. 262—Pennsylvania Railroad Steel Box Car Shown in Fig. 7. See also Figs. 263-265.

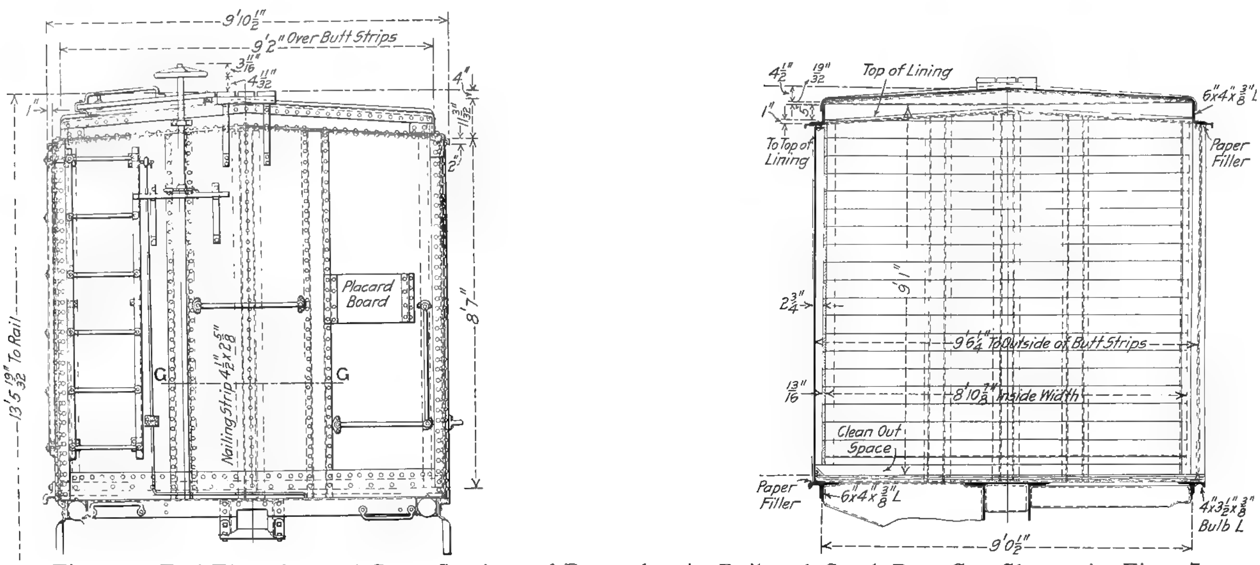
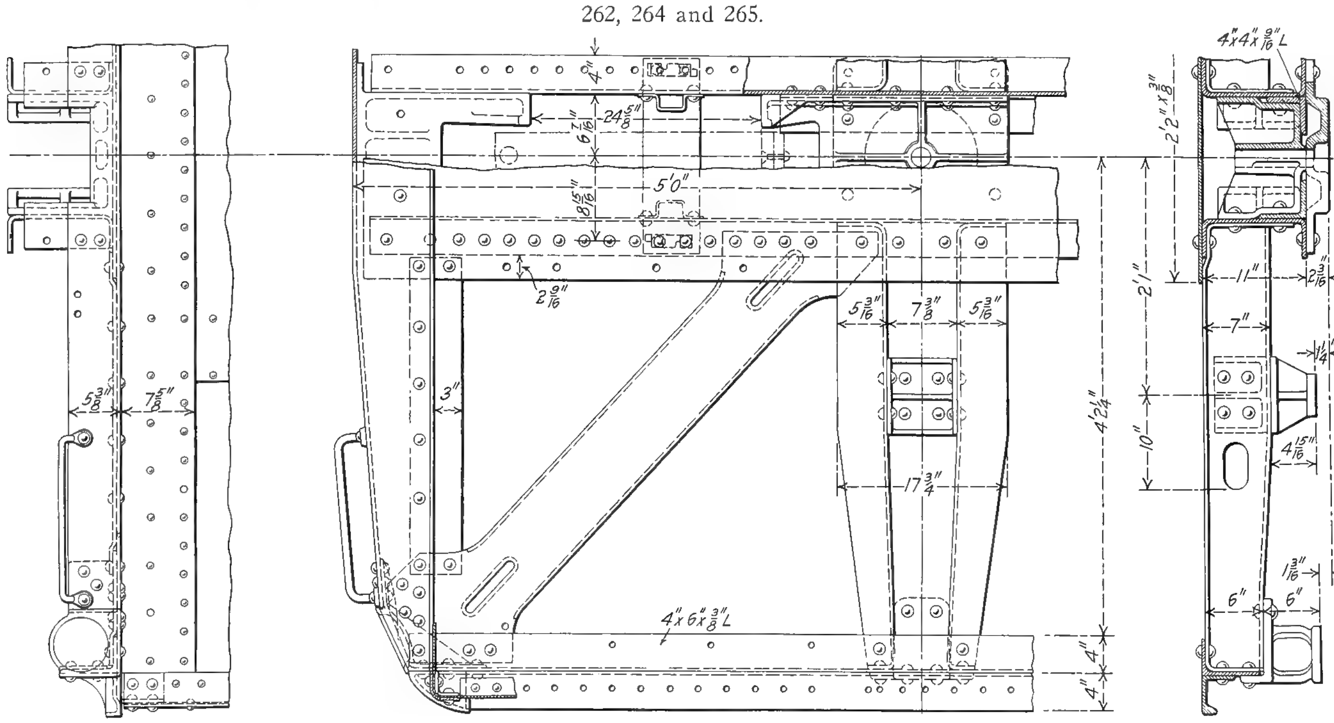


Fig. 263—End Elevation and Cross Sections of Pennsylvania Railroad Steel Box Car Shown in Figs. 7, 262, 264 and 265.



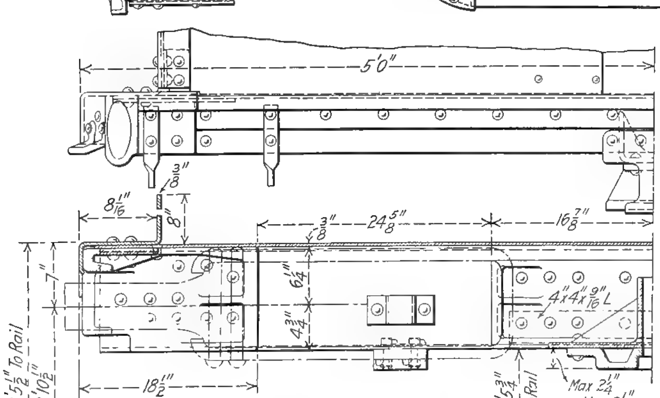


Fig. 264—End Sill and Corner Construction of Pennsylvania Railroad Steel Box Car. See also Figs. 7 and 262-265.

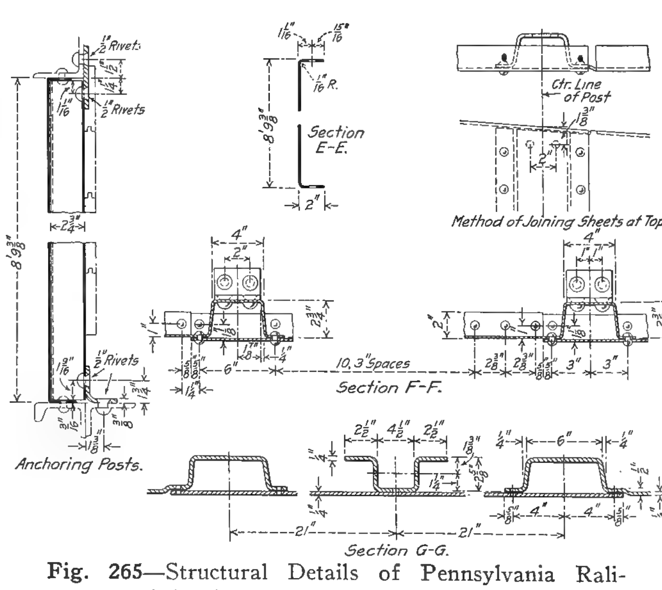


Fig. 265—Structural Details of Pennsylvania Railroad Steel Box Car. See also Figs. 7 and 262-264.

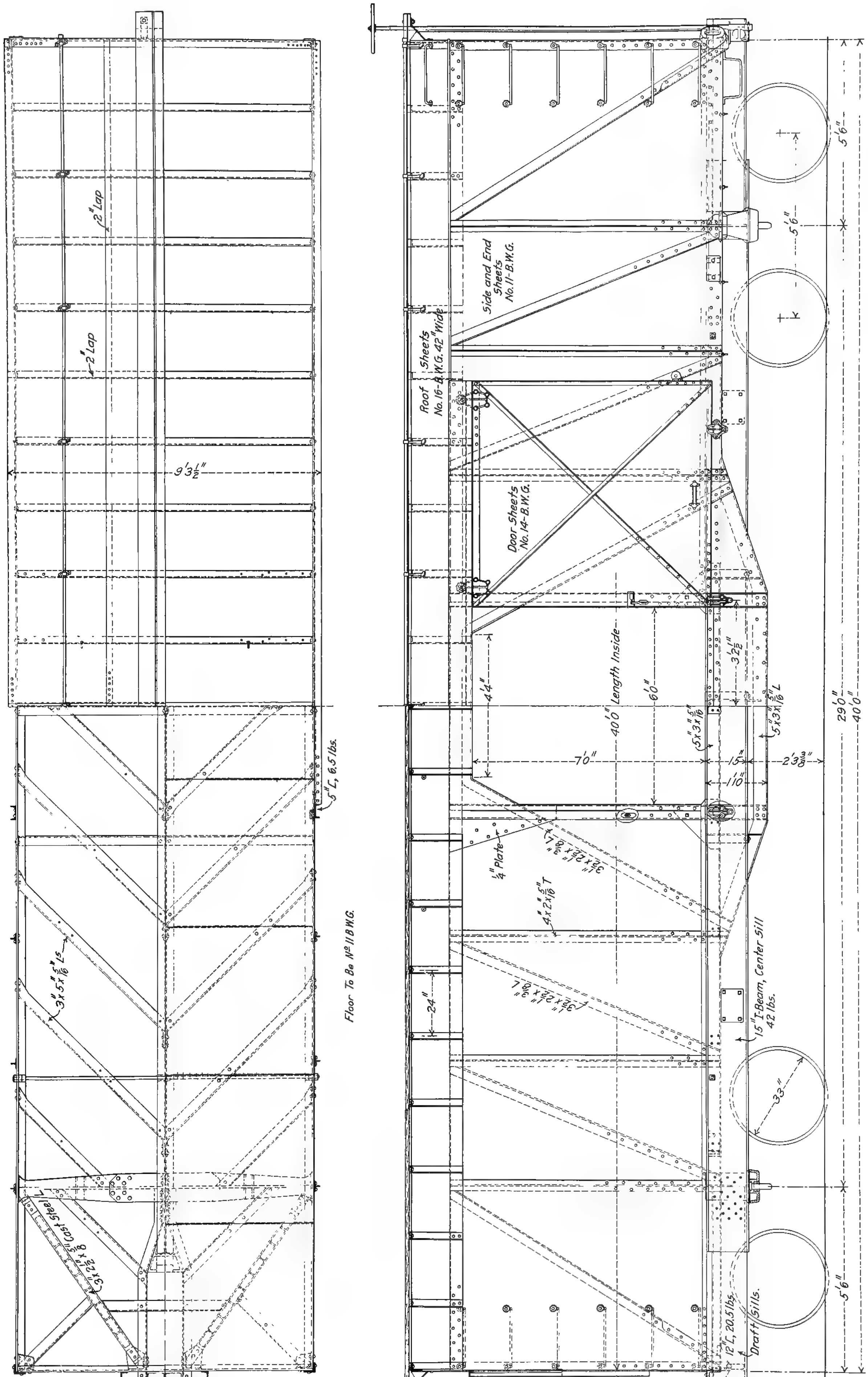


Fig. 266—Side Elevation and Plan of Union Pacific All-Steel 50-Ton Capacity Box Car.

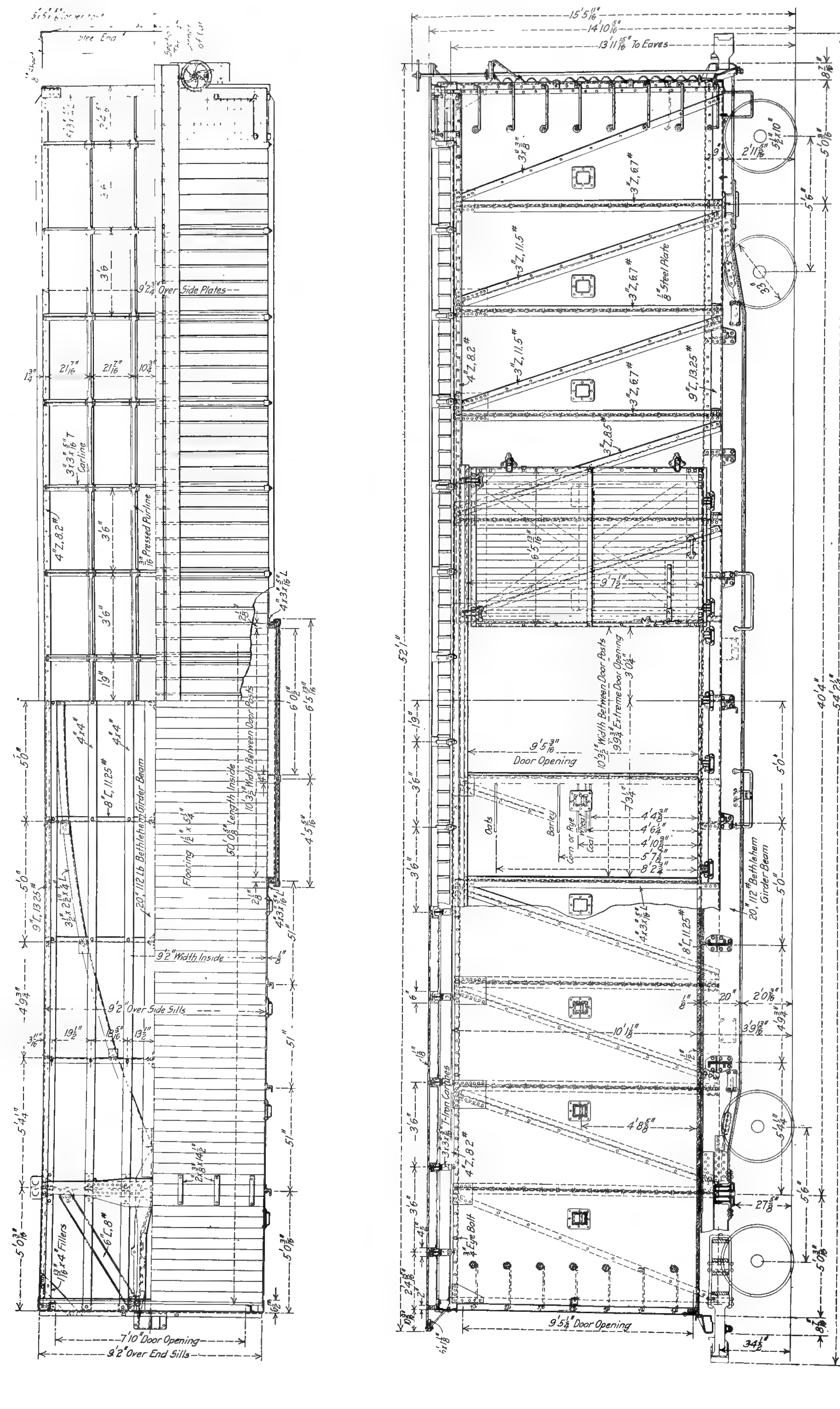


Fig. 267—Union Pacific Steel Automobile Car Shown in Figs. 21 and 268. Builder, Western Steel Car & Foundry Co.

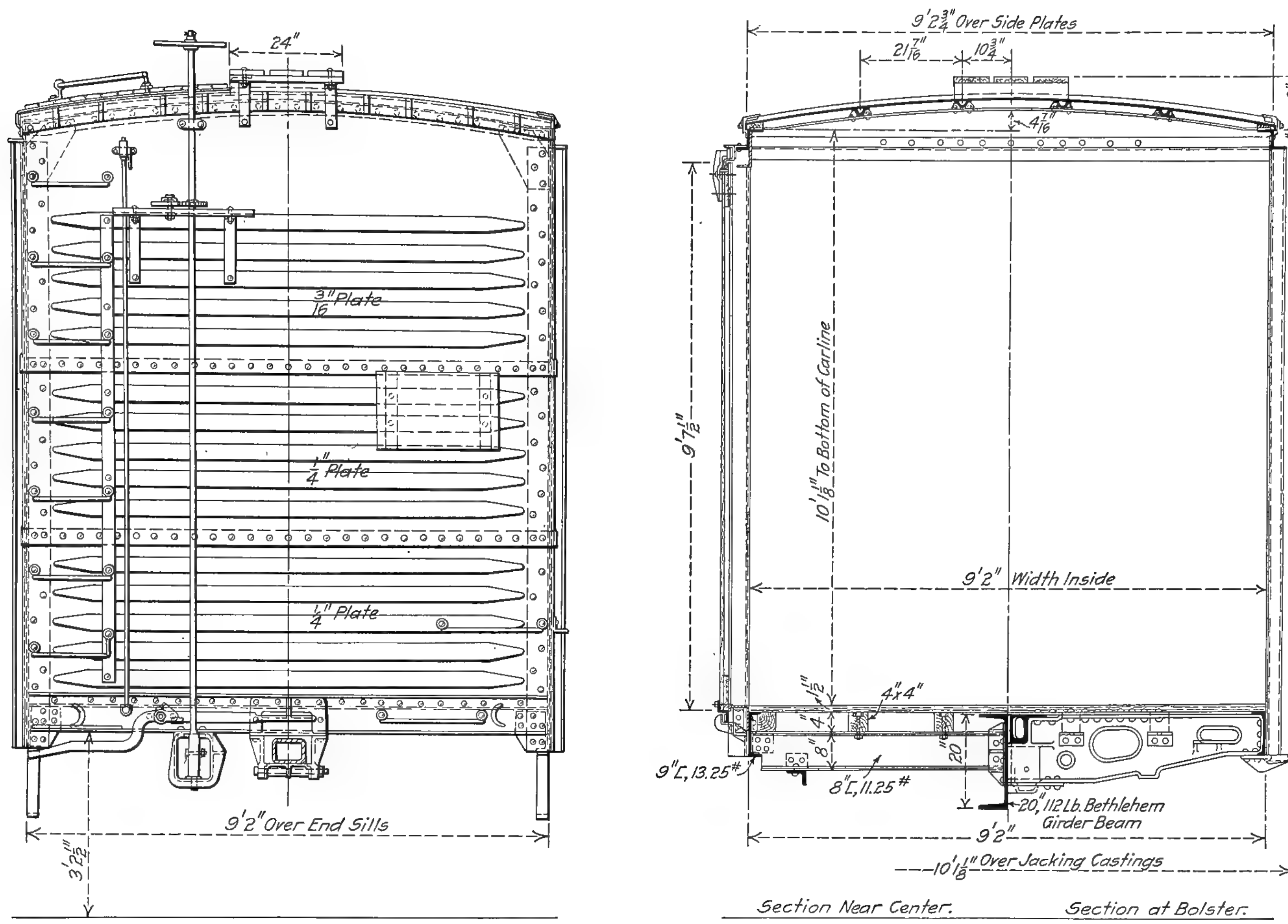


Fig. 268—End Elevation and Cross Sections of Union Pacific Steel Automobile Car Shown in Figs. 21 and 267.

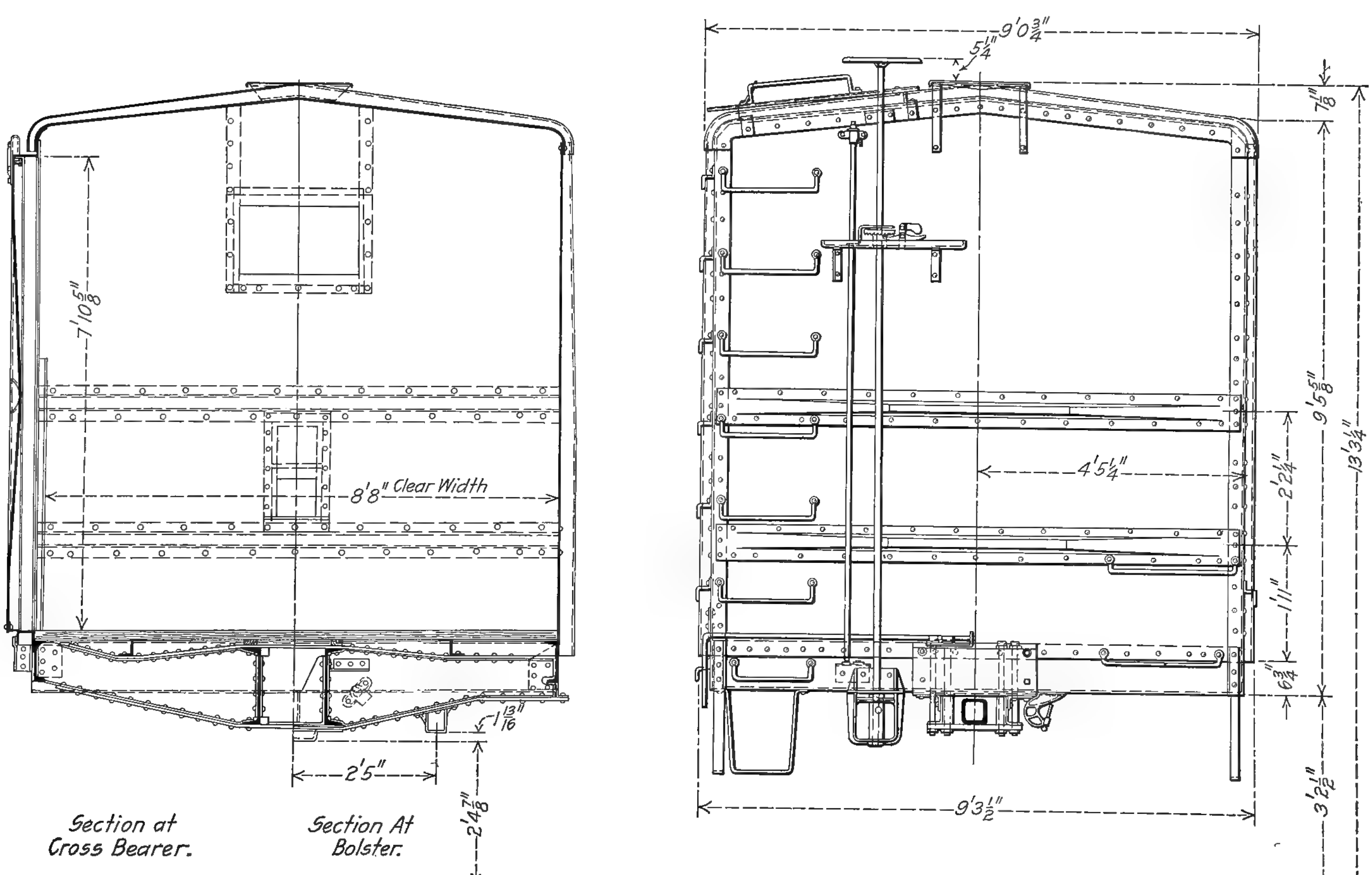


Fig. 269—End Elevation and Cross Sections of Canadian Pacific Steel Box Car Shown in Figs. 2 and 270.

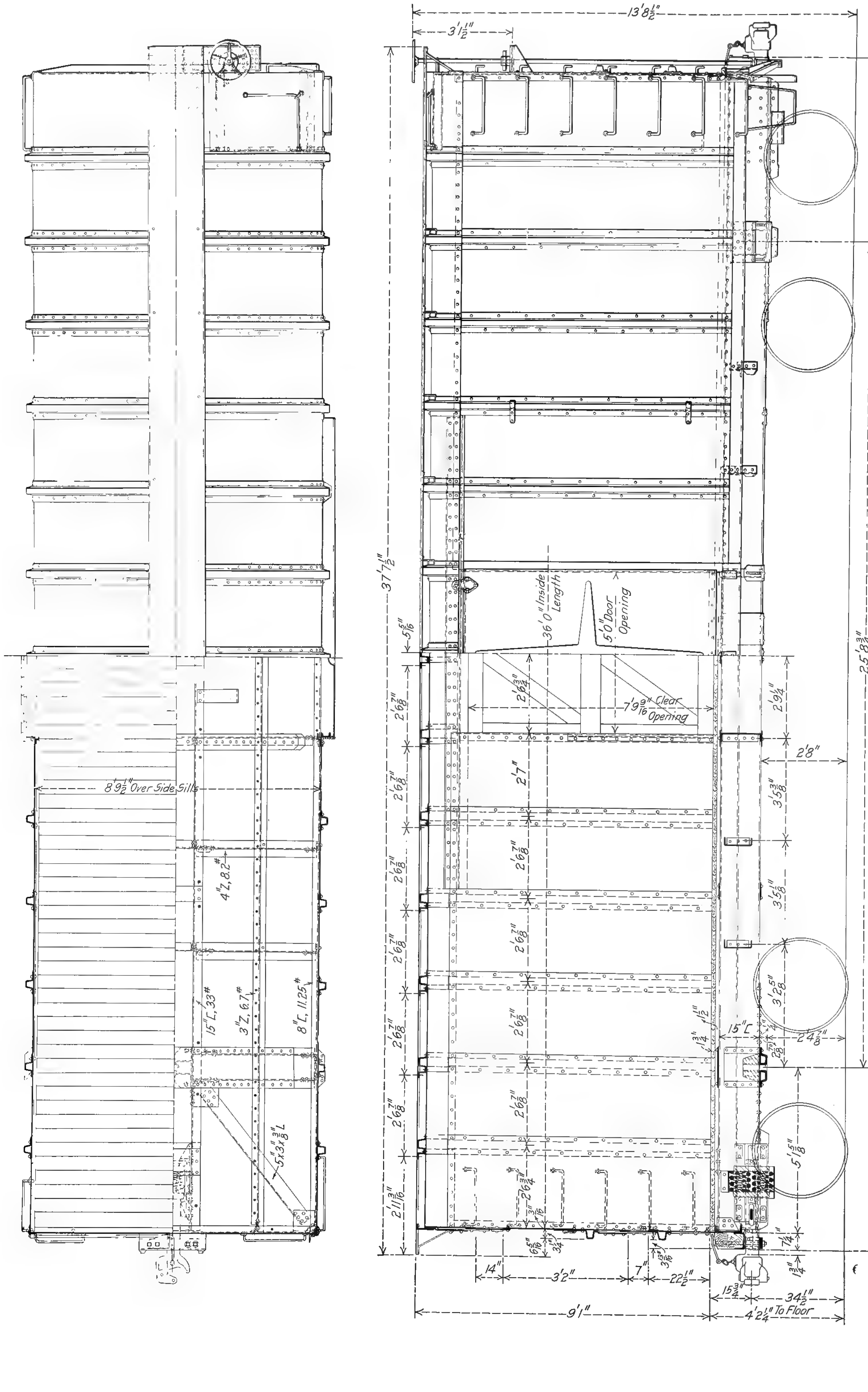


Fig. 270—Canadian Pacific Steel Box Car Shown in Figs. 2 and 269. Builder, Canadian Car & Foundry Co.

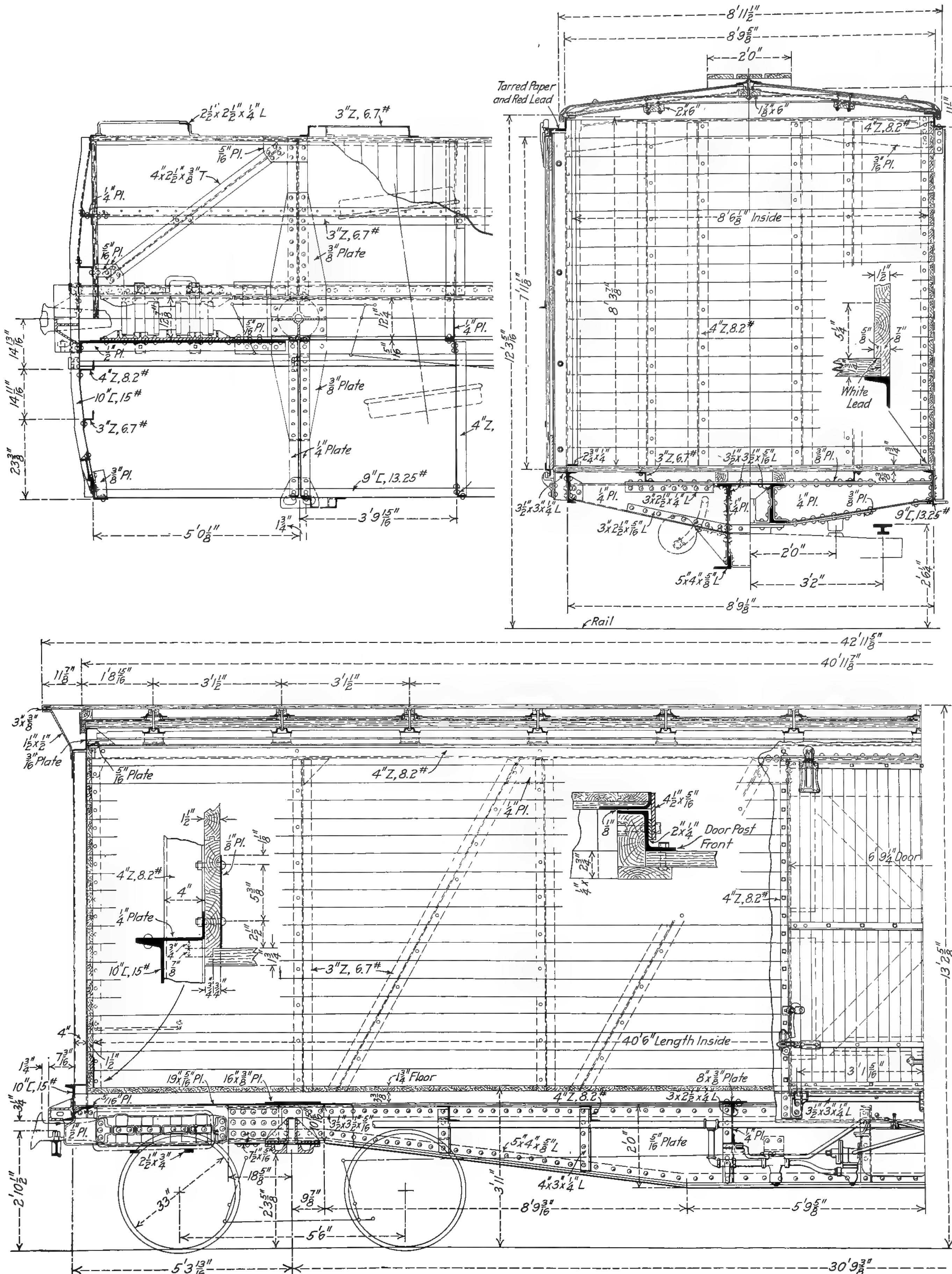
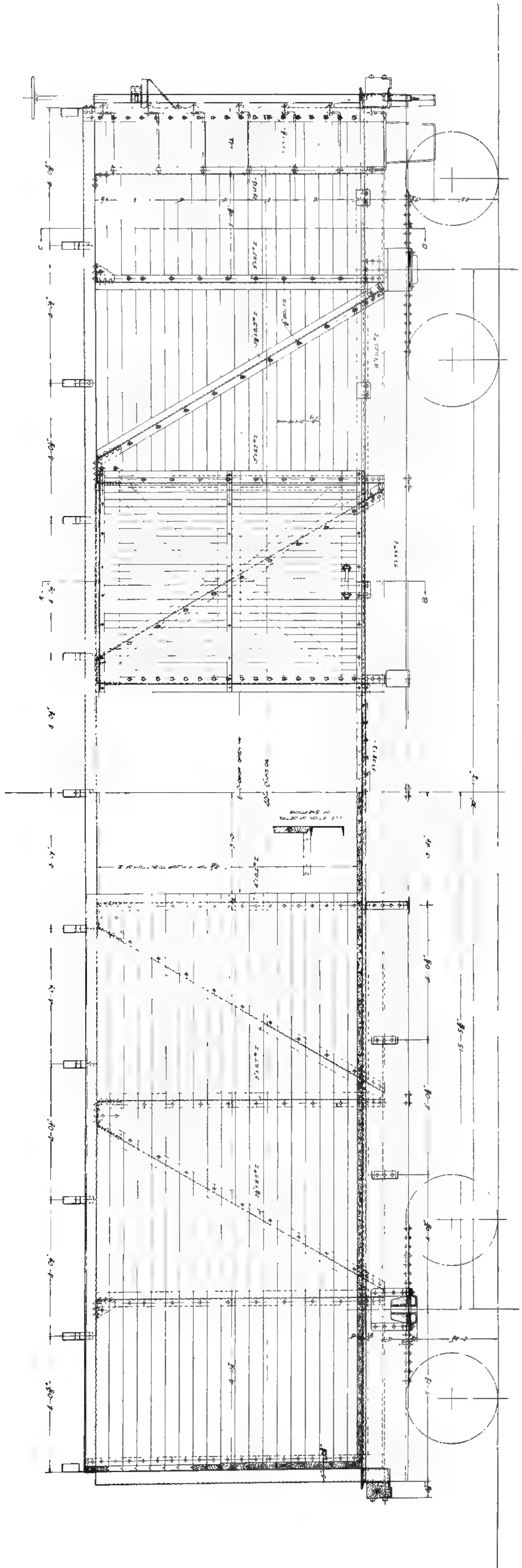


Fig. 271—Illinois Central Steel Frame 40-Ton Capacity Box Car. Builder, American Car & Foundry Co.



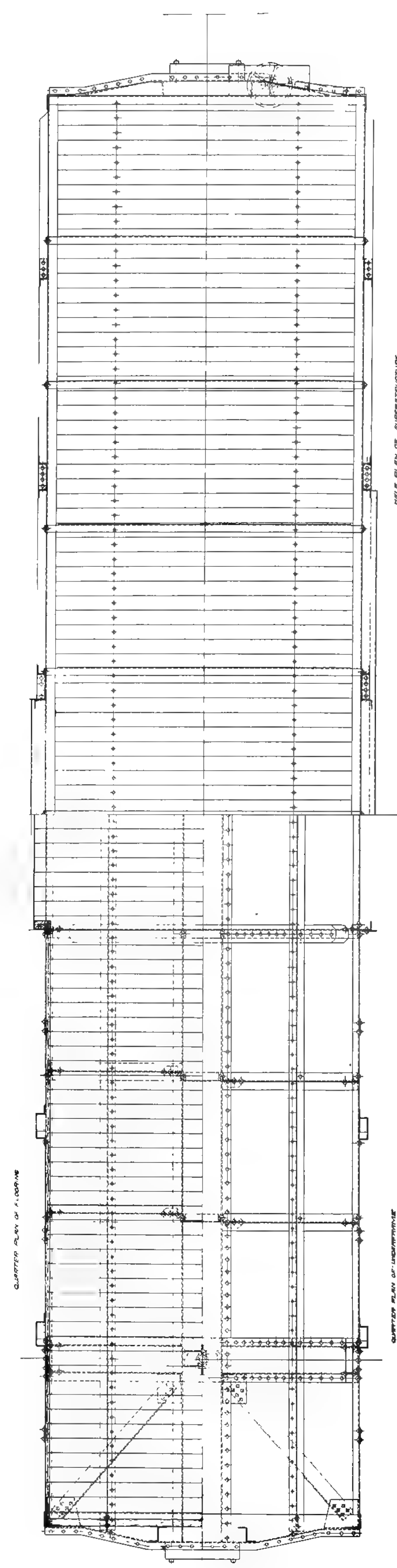


Fig. 272—Steel Frame Box Car Shown in Figs. 11 and 273. Built Under the Fowler Patents.

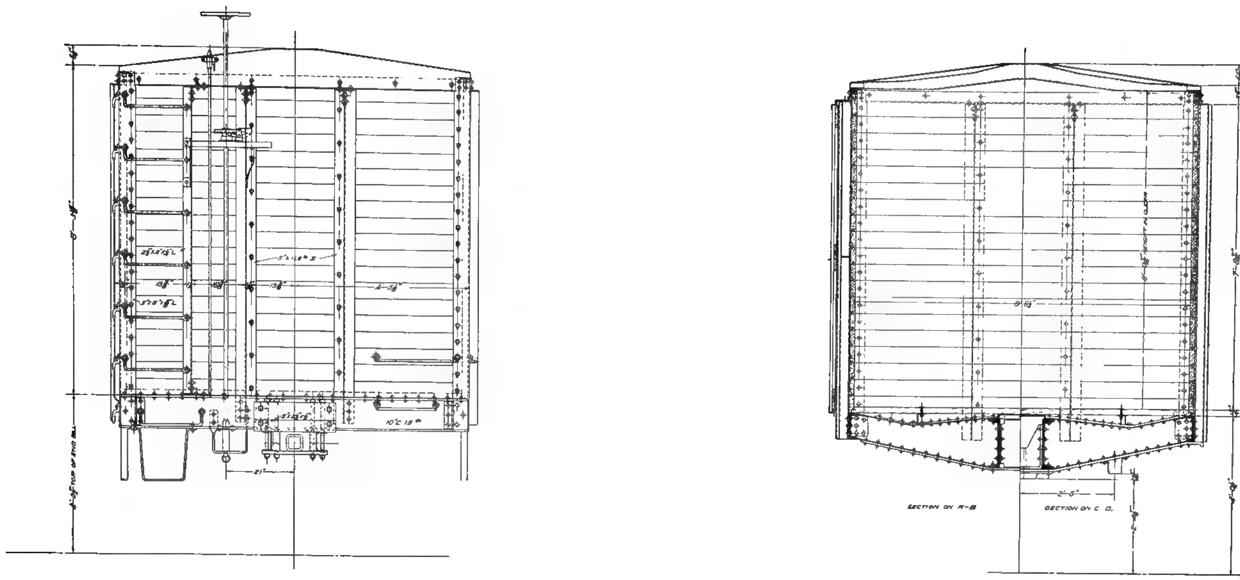


Fig. 273—End Elevation and Cross Sections of the Steel Frame Box Car Shown in Figs. 11 and 272.

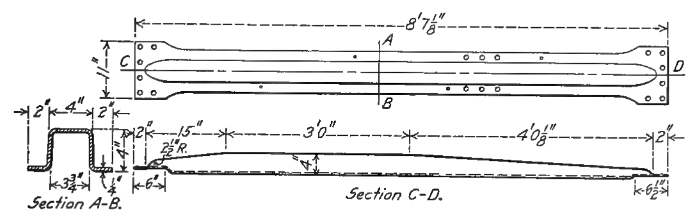


Fig. 274—Pressed Steel Side Post Used on Pennsylvania Steel Frame Box Car Shown in Figs. 275 and 276.

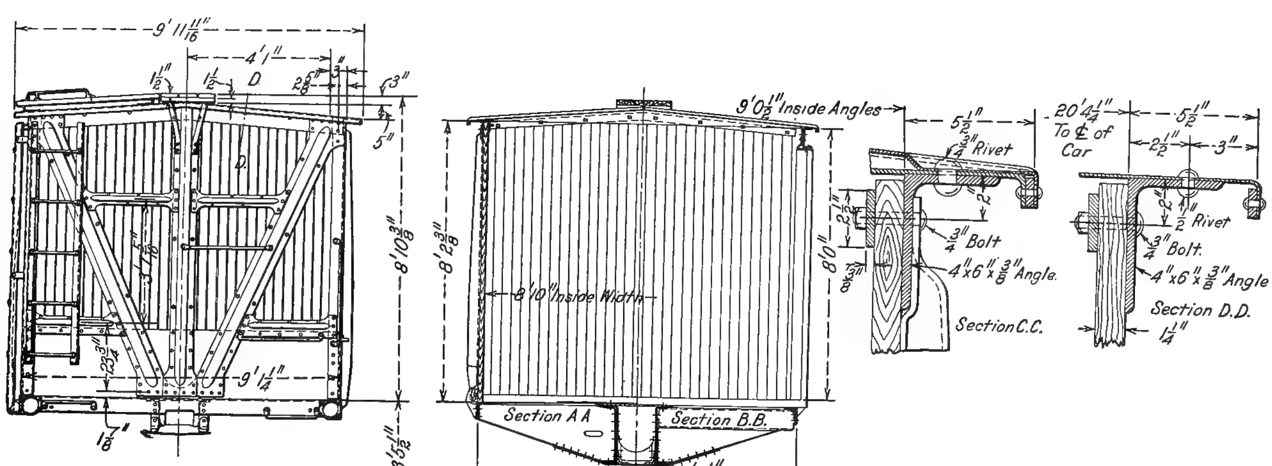


Fig. 275—End Elevation and Cross Sections of Pennsylavnia Steel Frame 50-Ton Capacity Box Car. The Dotted Lines at Top of Section "CC" Show Opening in Steel Roof Extending Between Carlines for Ventilation. See also Figs. 274 and 276.

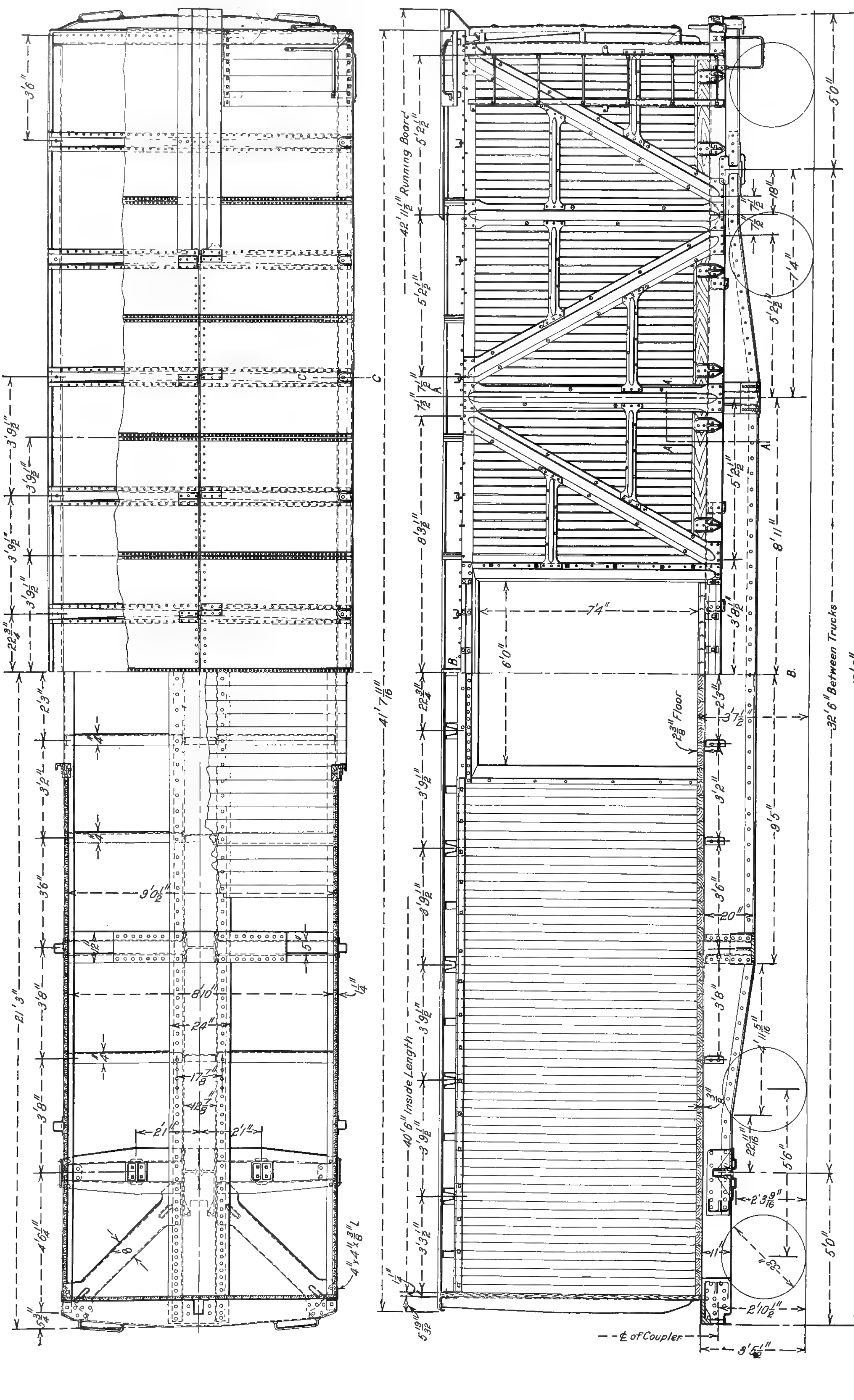


Fig. 276—Pennsylvania Steel Frame 50-Ton Capacity Box Car. See also Figs. 274 and 275.

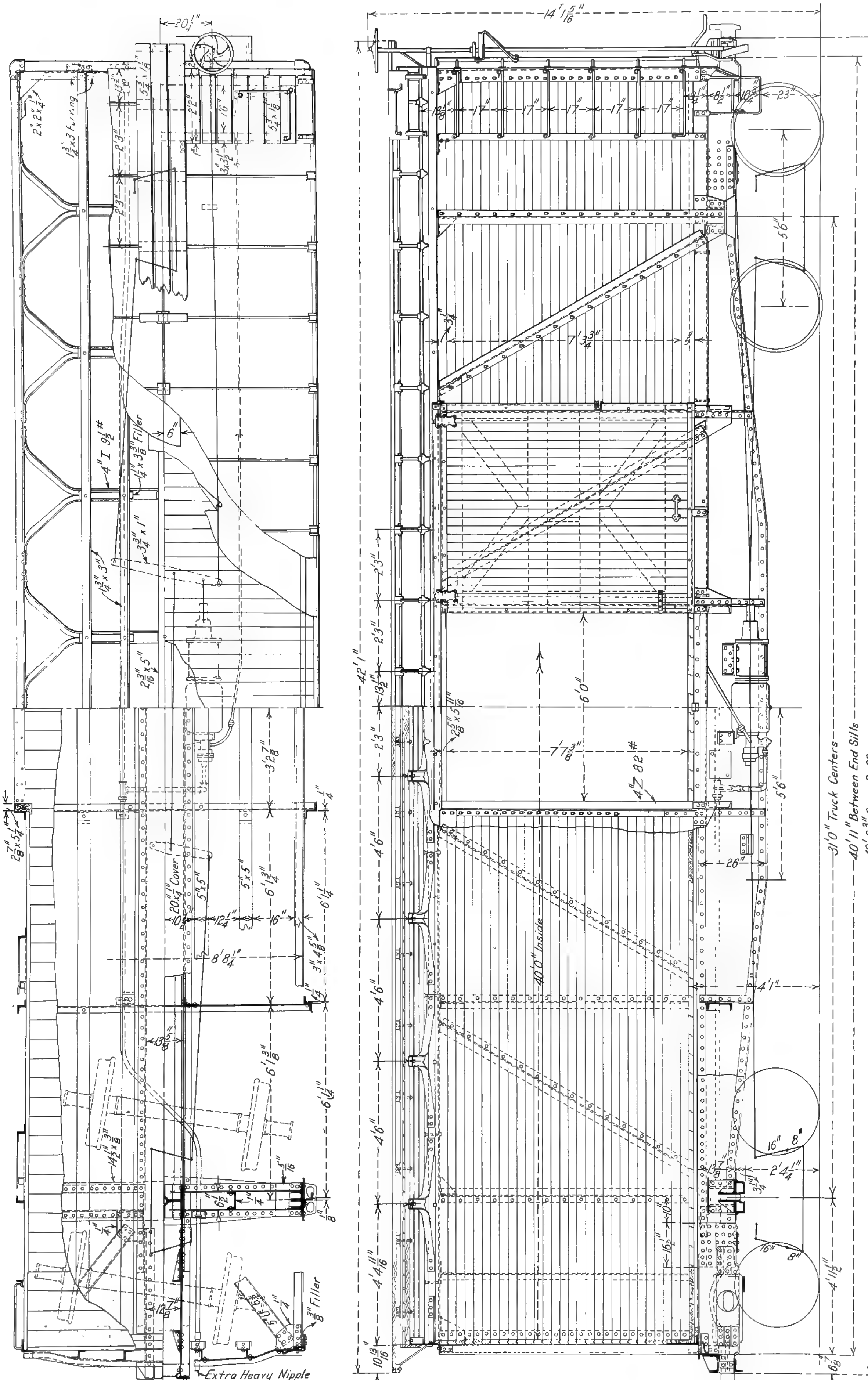


Fig. 277—St. Louis & San Francisco Steel Frame 40-Ton Capacity Box Car Shown in Figs. 14 and 278. Builder, American Car & Foundry Co.

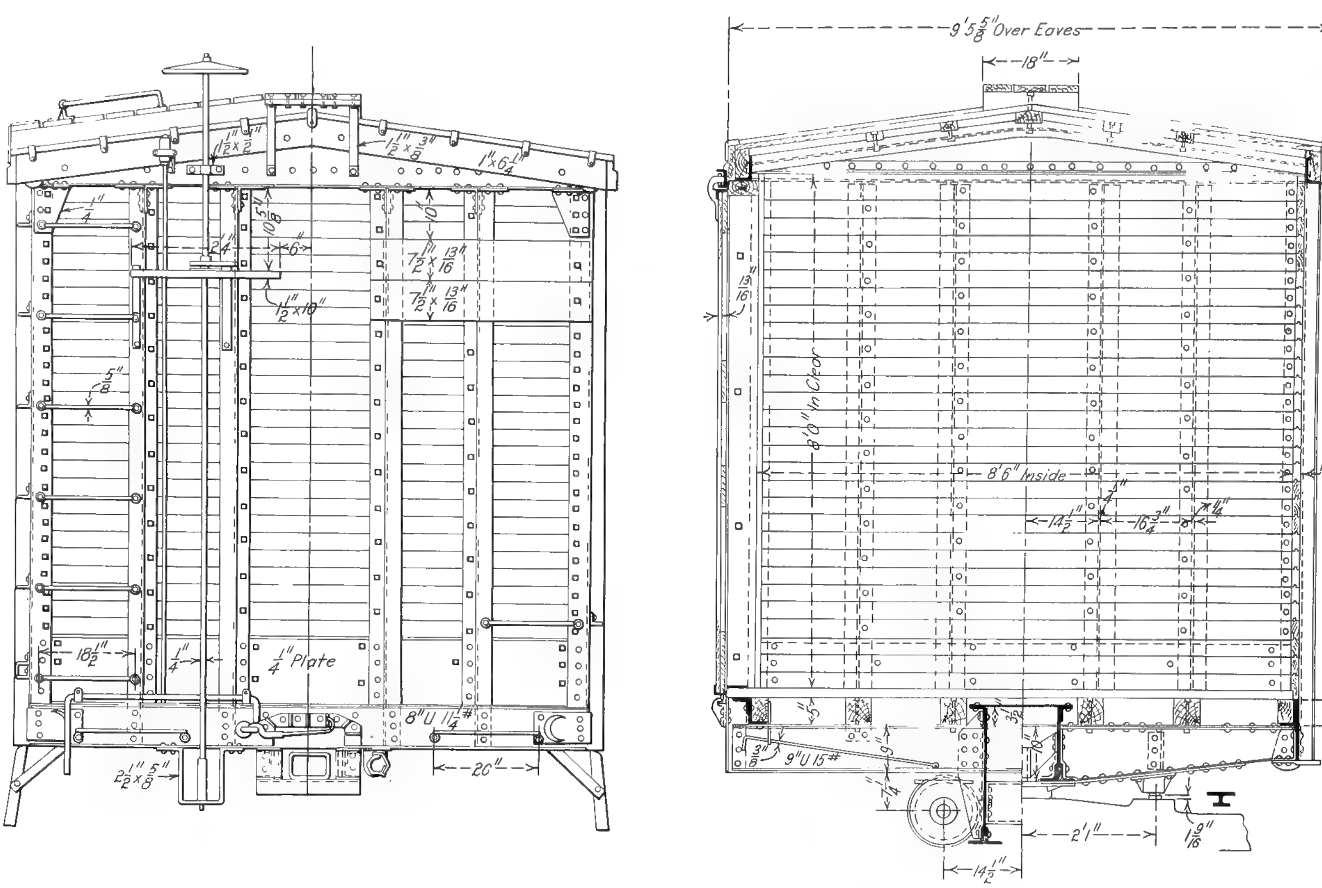


Fig. 278—End Elevation and Cross Sections of St. Louis & San Francisco Steel Frame Box Car Shown in Figs. 14 and 277.

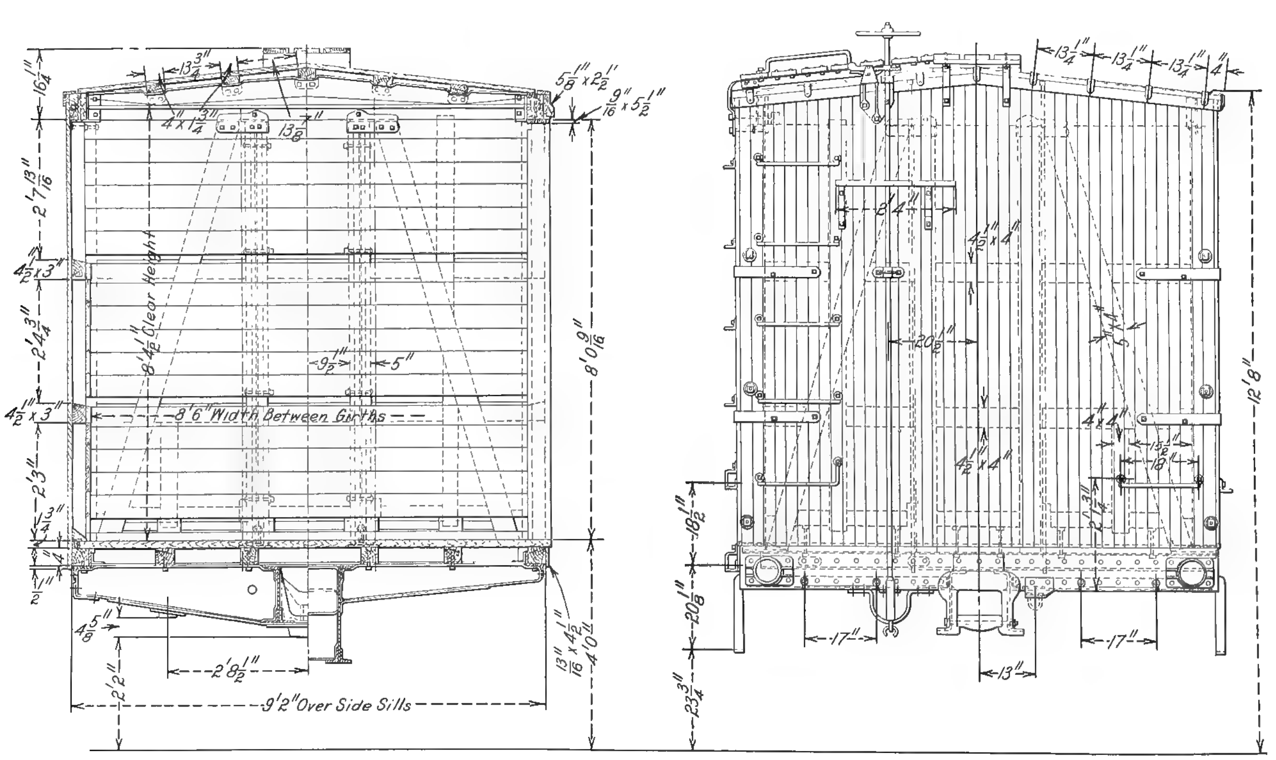


Fig. 279—End Elevation and Cross Sections of New York Central Steel Underframe Box Car Shown in Fig. 280.

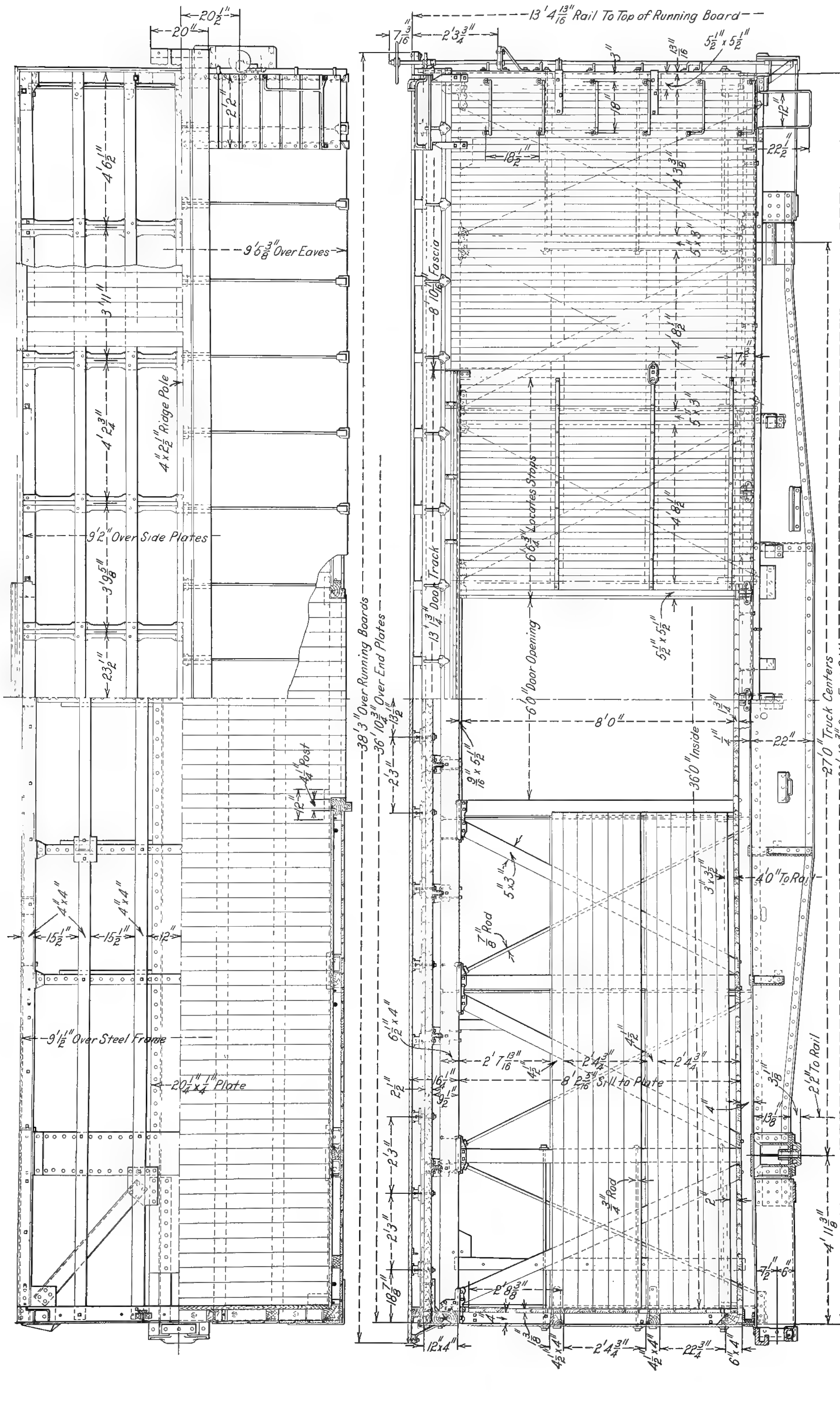


Fig. 280—New York Central Steel Underframe 40-Ton Capacity Box Car. See also Fig. 279.

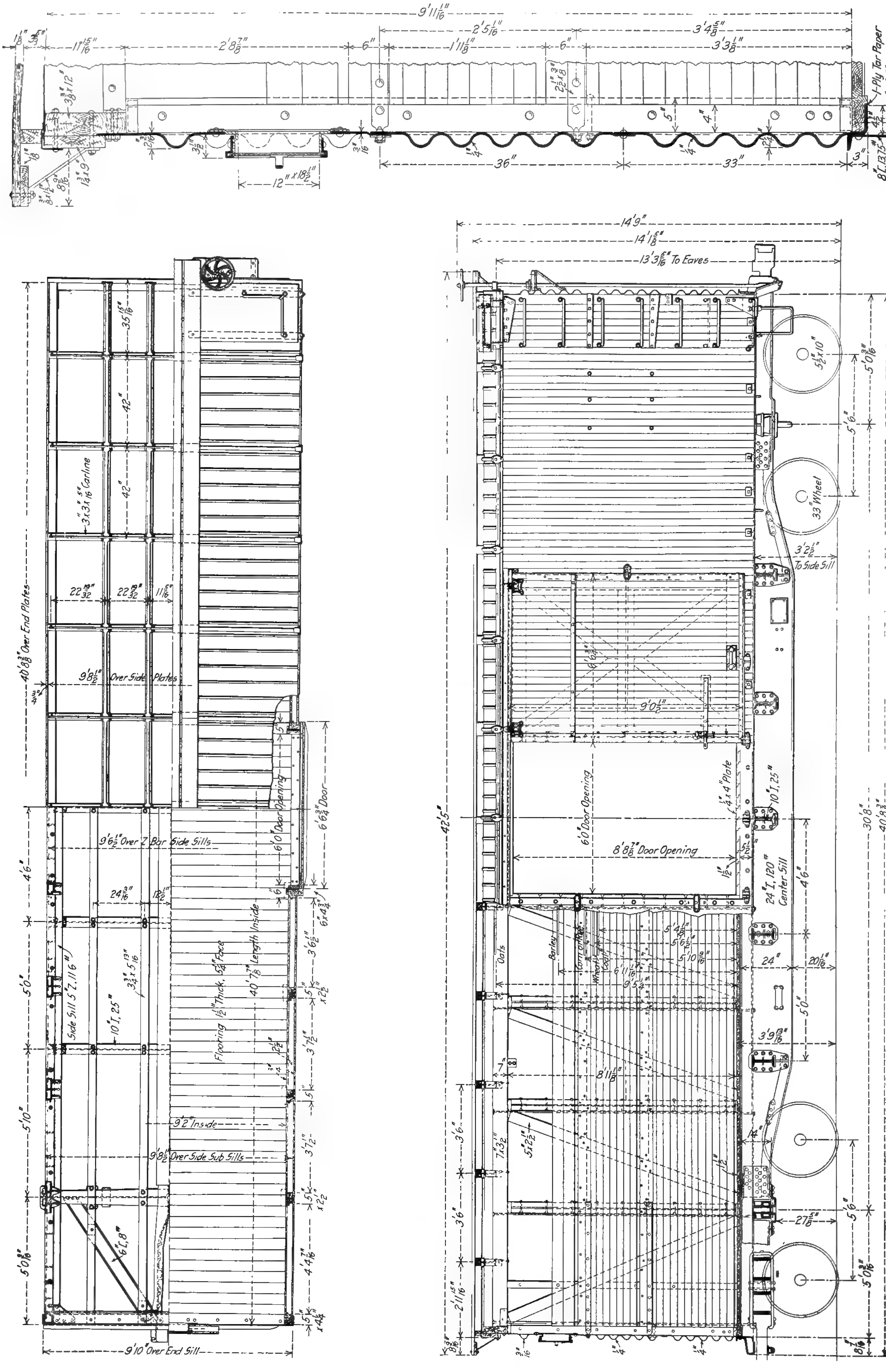


Fig. 281—Union Pacific Steel Underframe 50-Ton Capacity Box Car Shown in Figs. 17 and 282. Builder, Western Steel Car & Foundry Co.

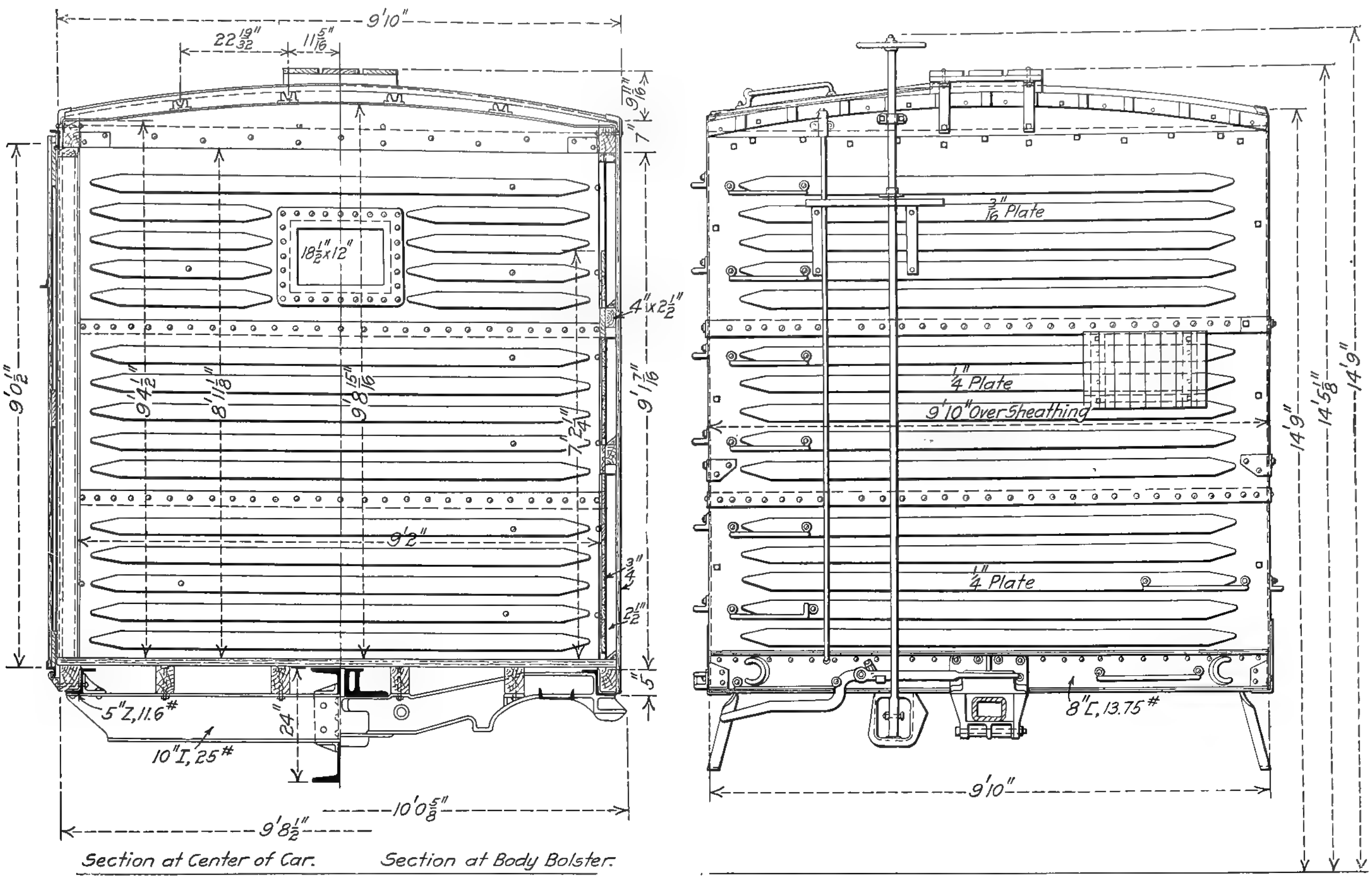


Fig. 282—End Elevation and Cross Sections of Union Pacific Steel Underframe Box Car Shown in Figs. 17 and 281.

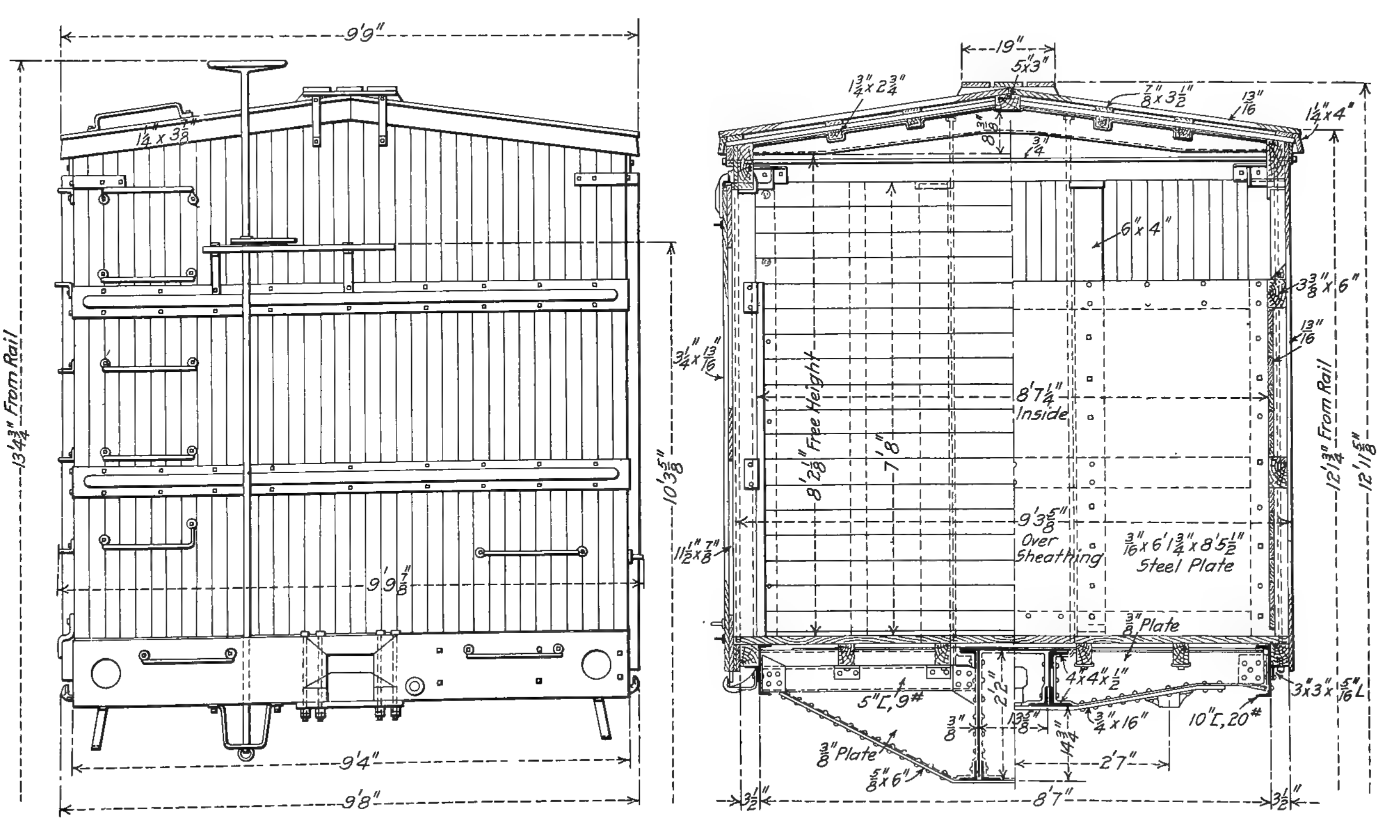


Fig. 283—End Elevation and Cross Sections of Philadelphia & Reading Steel Underframe 42½-Ton Capacity Box Car Shown in Fig. 284.

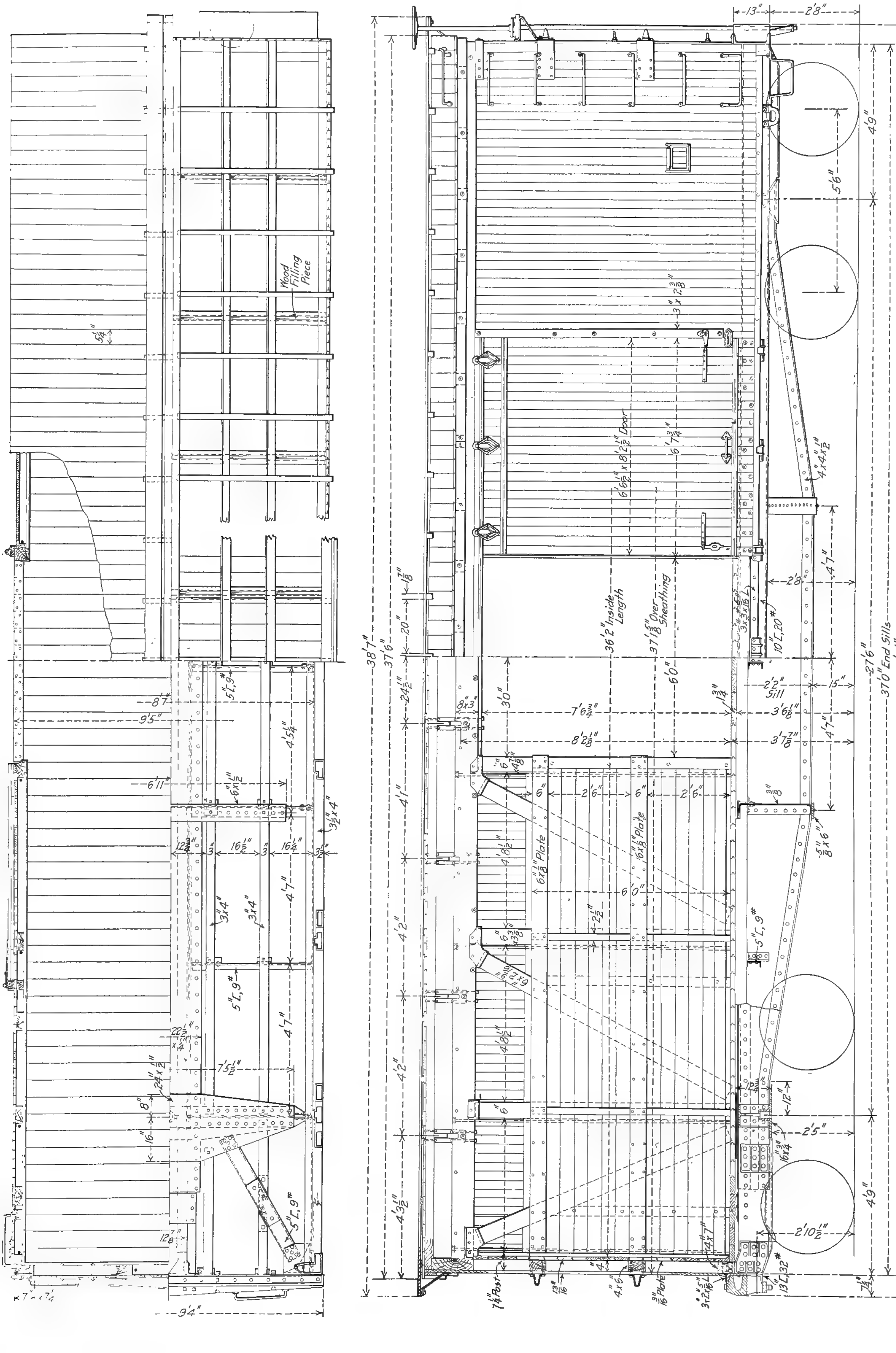


Fig. 284—Philadelphia & Reading Steel Underframe 42½-Ton Capacity Box Car. Builder, American Car & Foundry Co. See also Fig. 283.

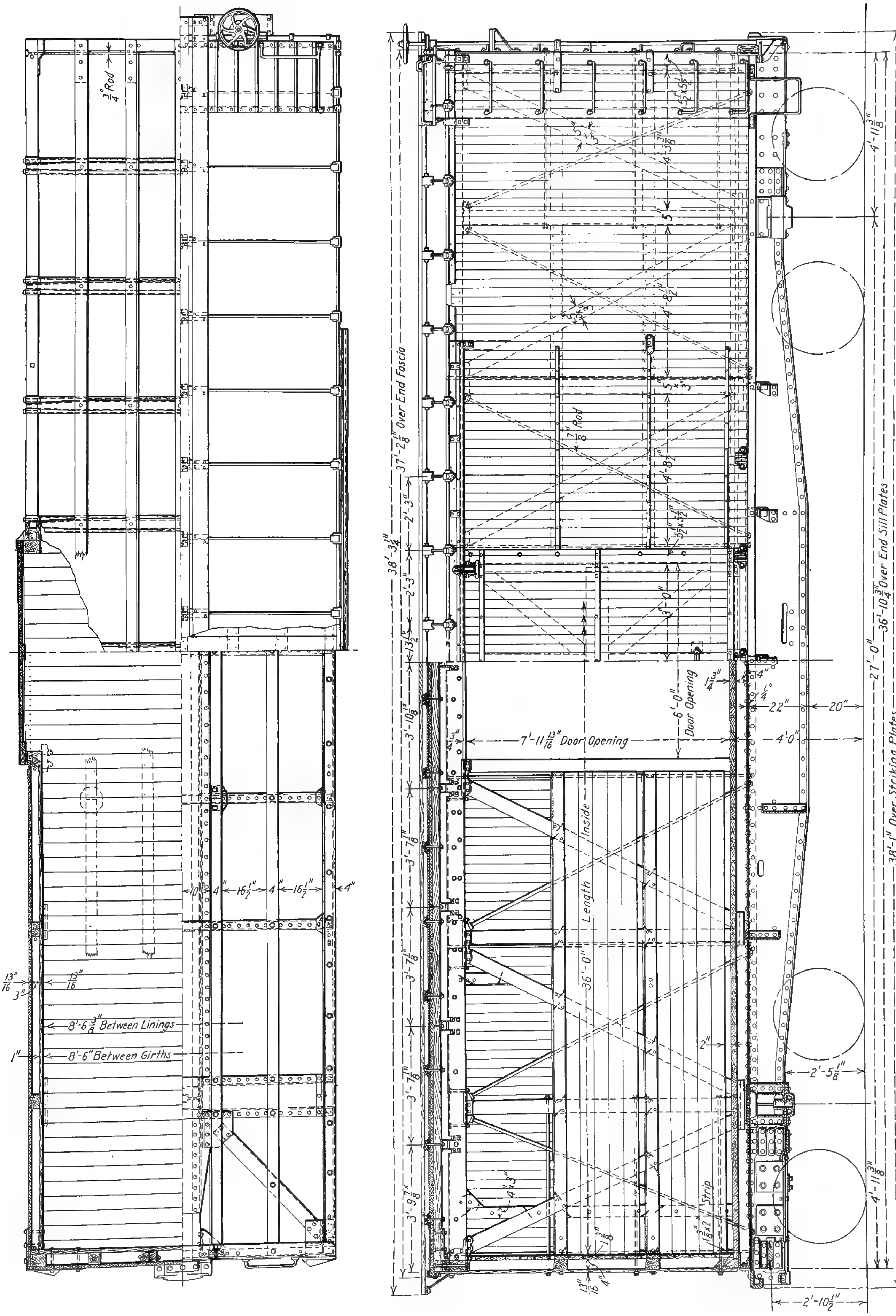


Fig. 285—Pittsburgh & Lake Erie Steel Underframe 40-Ton Capacity Box Car Shown in Figs. 16 and 286. Builder, Pressed Steel Car Co.

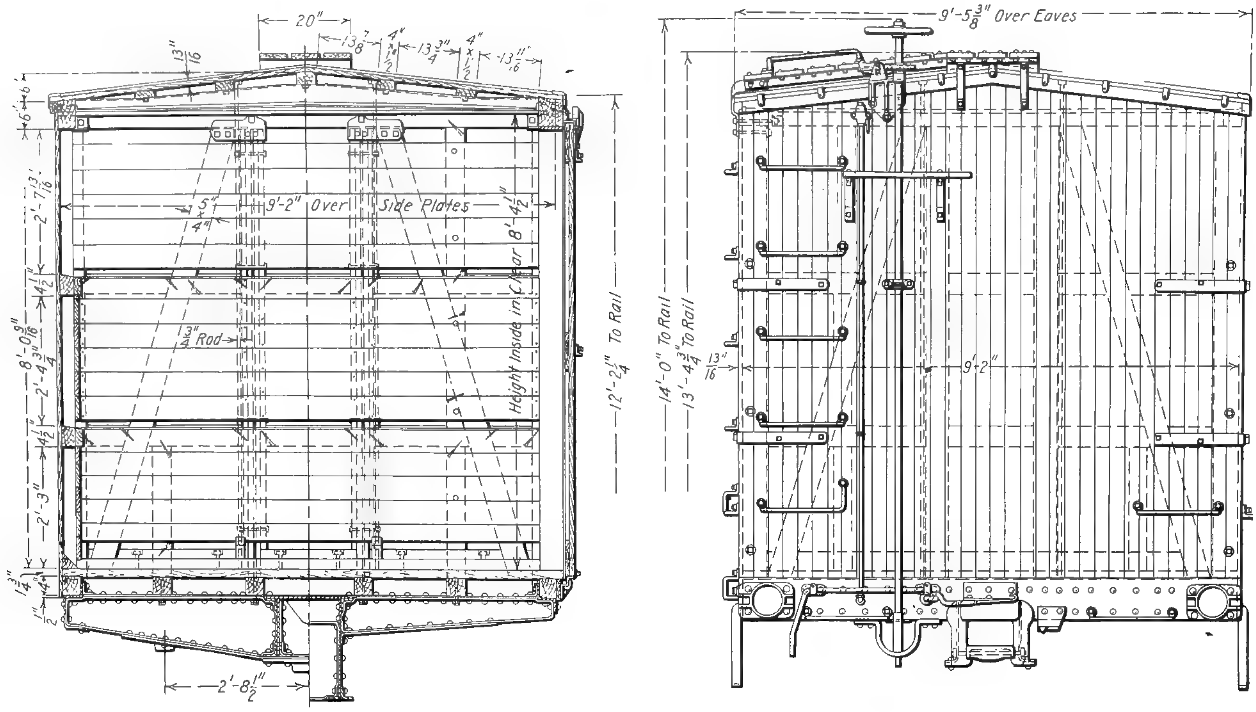


Fig. 286—End Elevation and Cross Sections of Pittsburgh & Lake Erie Steel Underframe Box Car Shown in Figs 16 and 285.

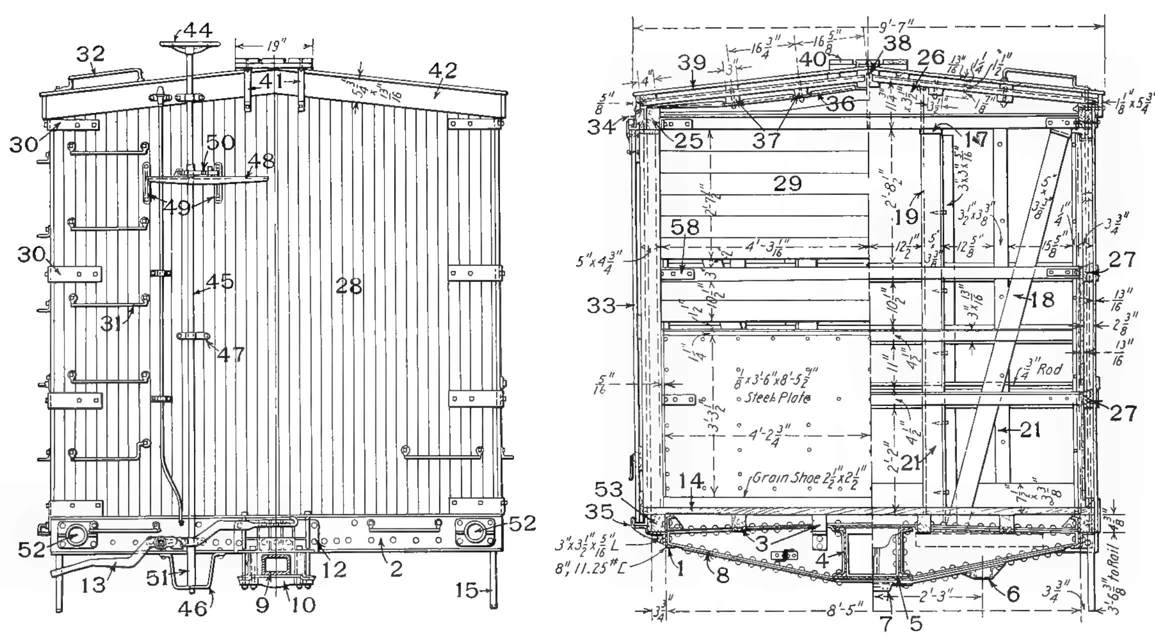


Fig. 287—End Elevation and Cross Sections of Delaware, Lackawanna & Western Steel Underframe Box Car Shown in Fig. 288.

See Page 273 for Names of Numbered Parts.

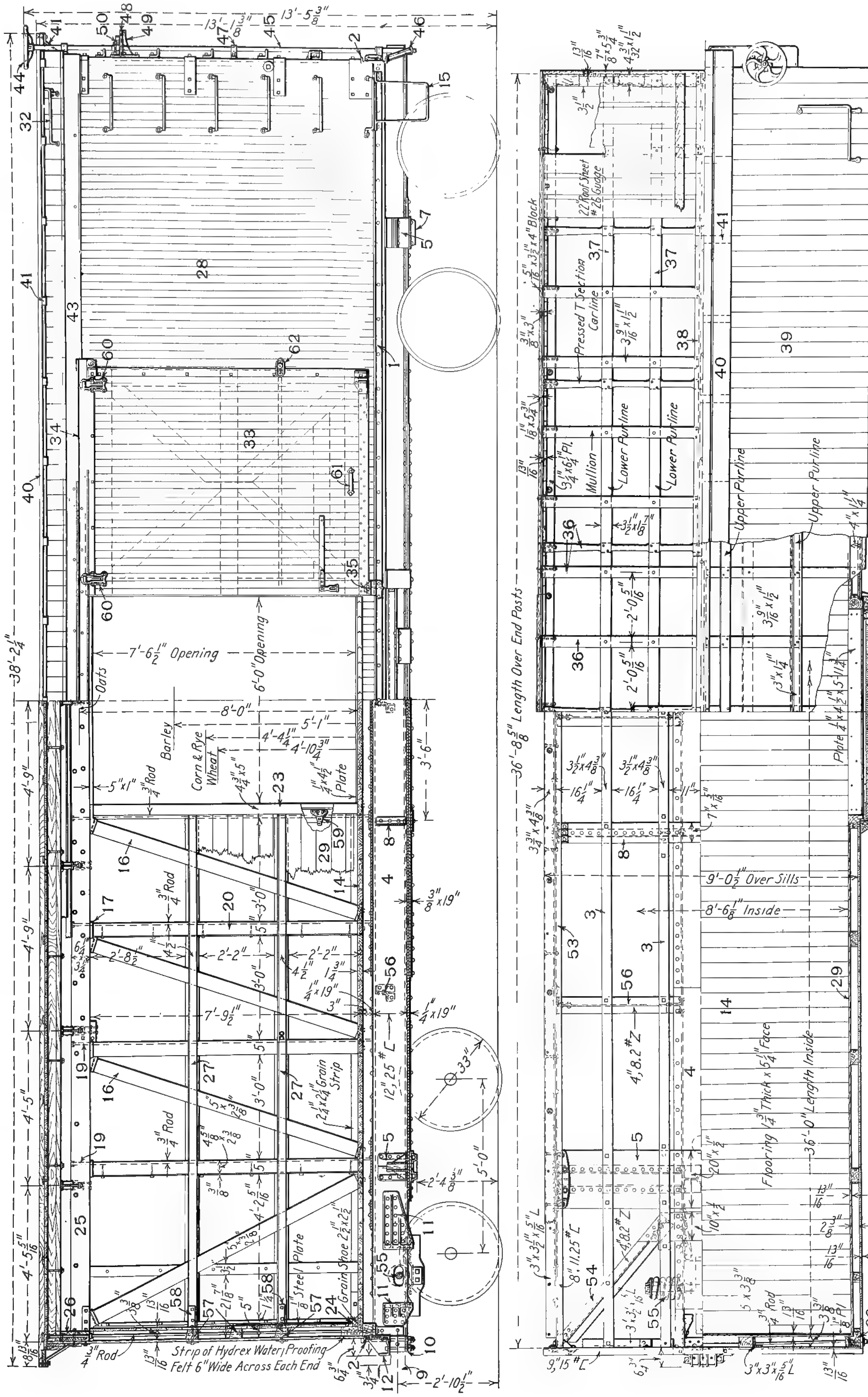


Fig. 288—Delaware, Lackawanna & Western Steel Underframe 30-Ton Capacity Box Car. Builder, The Barney & Smith Car Co. See also Fig. 287.
See Page 273 for Names of Numbered Parts.

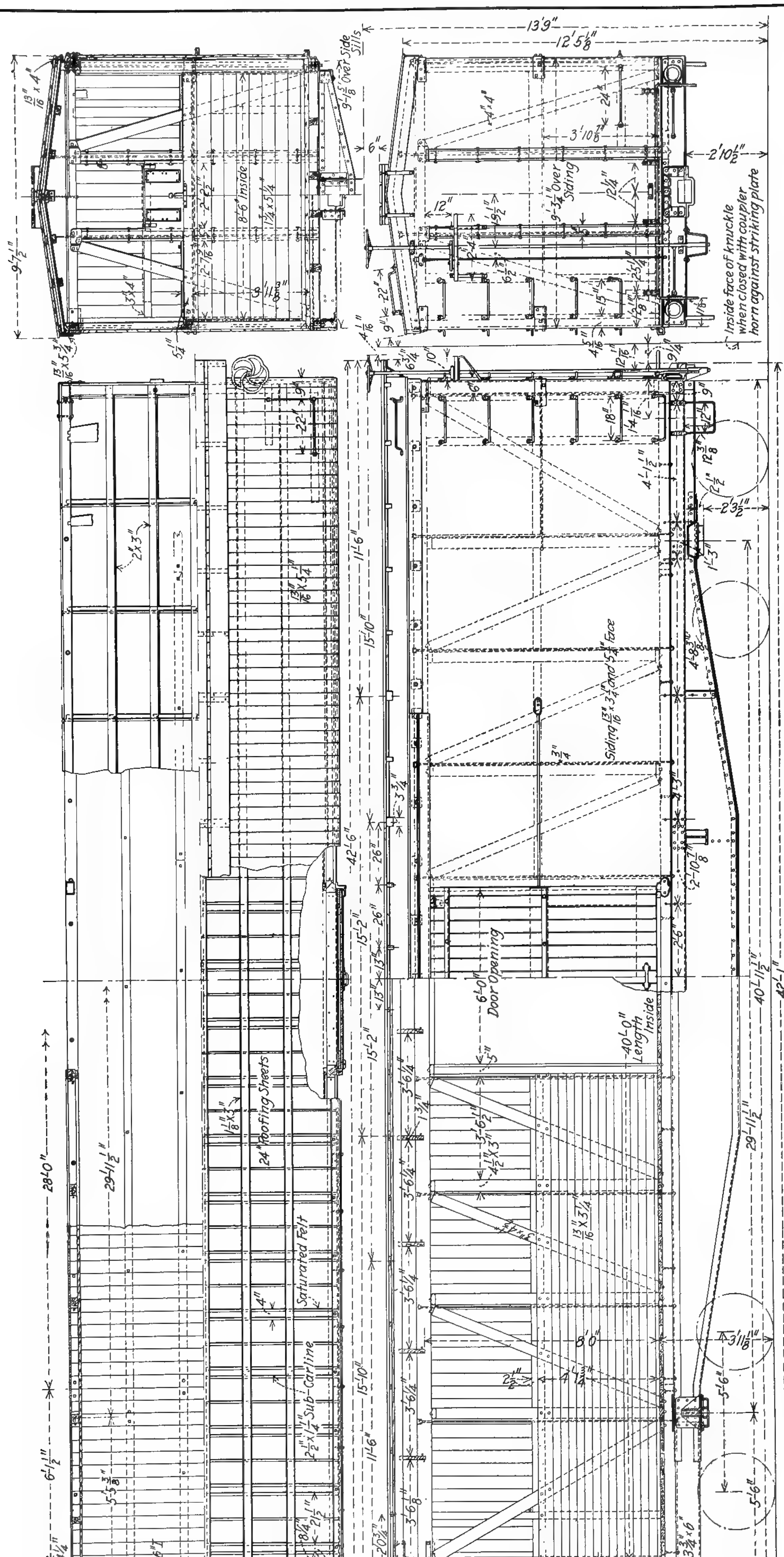


Fig. 289—Ann Arbor Steel Underframe 40-Ton Capacity Box Car Shown in Fig. 15. Builder, Western Steel Car & Foundry Company.

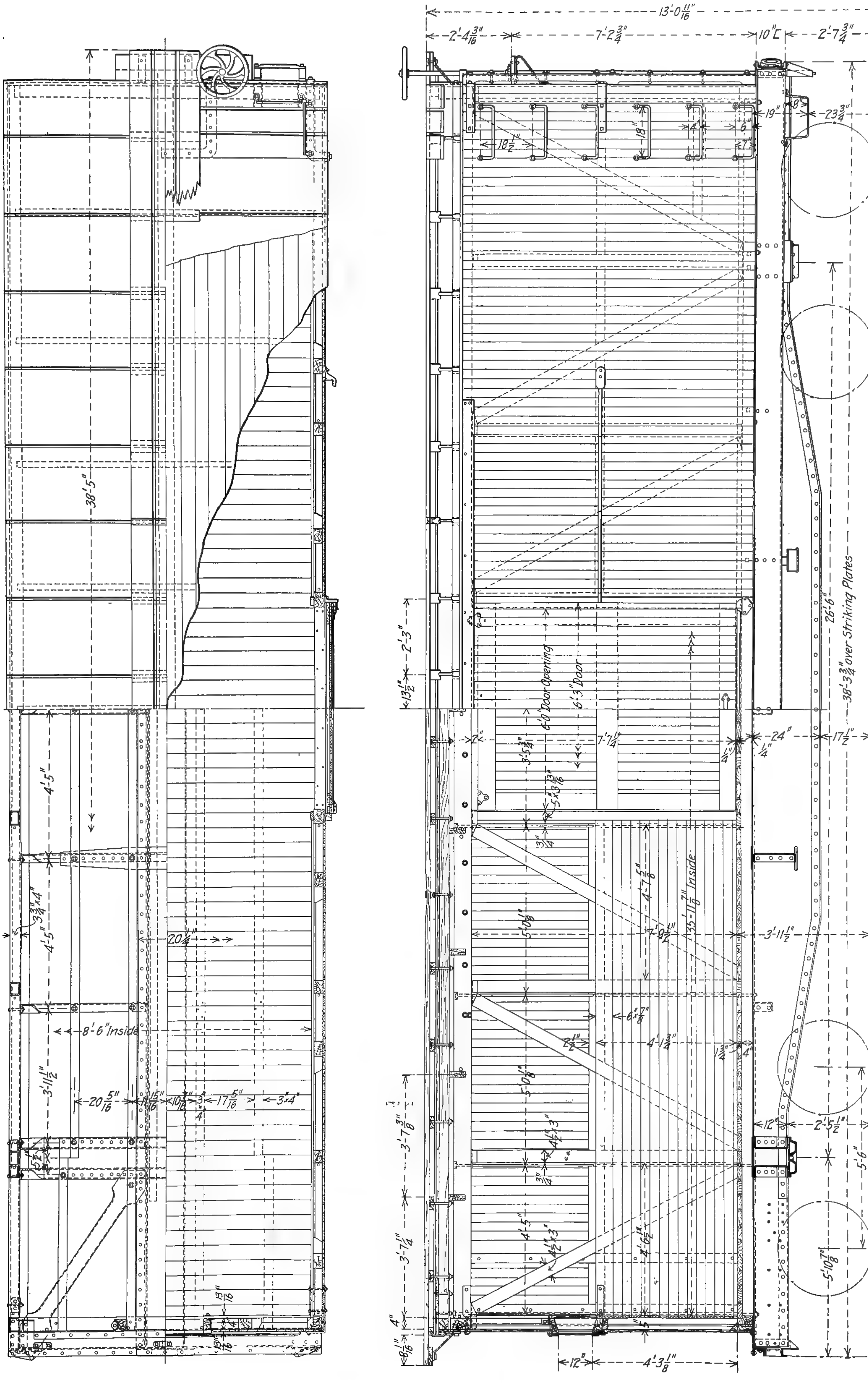


Fig. 290—Steel Underframe 40-Ton Capacity Box Car. Builder, Standard Steel Car Company.

Hopper Car Parts. See Fig. 291.

1 *Draft Sill*
2 *Center Sill*
3 *Center Sill Top Cover Plate*
4 *End Sill*
5 *Draft Plate or Cheek Casting*
6 *Body Center Plates*
7 *Body Bolster*
8 *Cross Bearer*
9 *Diagonal or Corner Brace*
10 *Push Pole Pocket*
11 *Striking Plate*
12 *Uncoupling Lever*
13 *Coupler*
14 *Brake Mast*
15 *Hand Brake Wheel*
16 *Hopper Door*
17 *Door Operating Gear*
18 *Slope Floor Sheet*
19 *End Sheet*
20 *Side Sheets*
21 *Side Stake*
22 *Coupler Carrier*
23 *Corner Post Grab Iron*
24 *Side Sill Step*
25 *Brake Step*
26 *Brake Ratchet Wheel*
27 *Top Side Angle of Coke Rack*
28 *Wheel*
29 *Corner Post*
30 *Gusset; Cross Ridge to Side*
31 *Body Cross Tie*
32 *Intermediate Side Angles of Coke Rack*

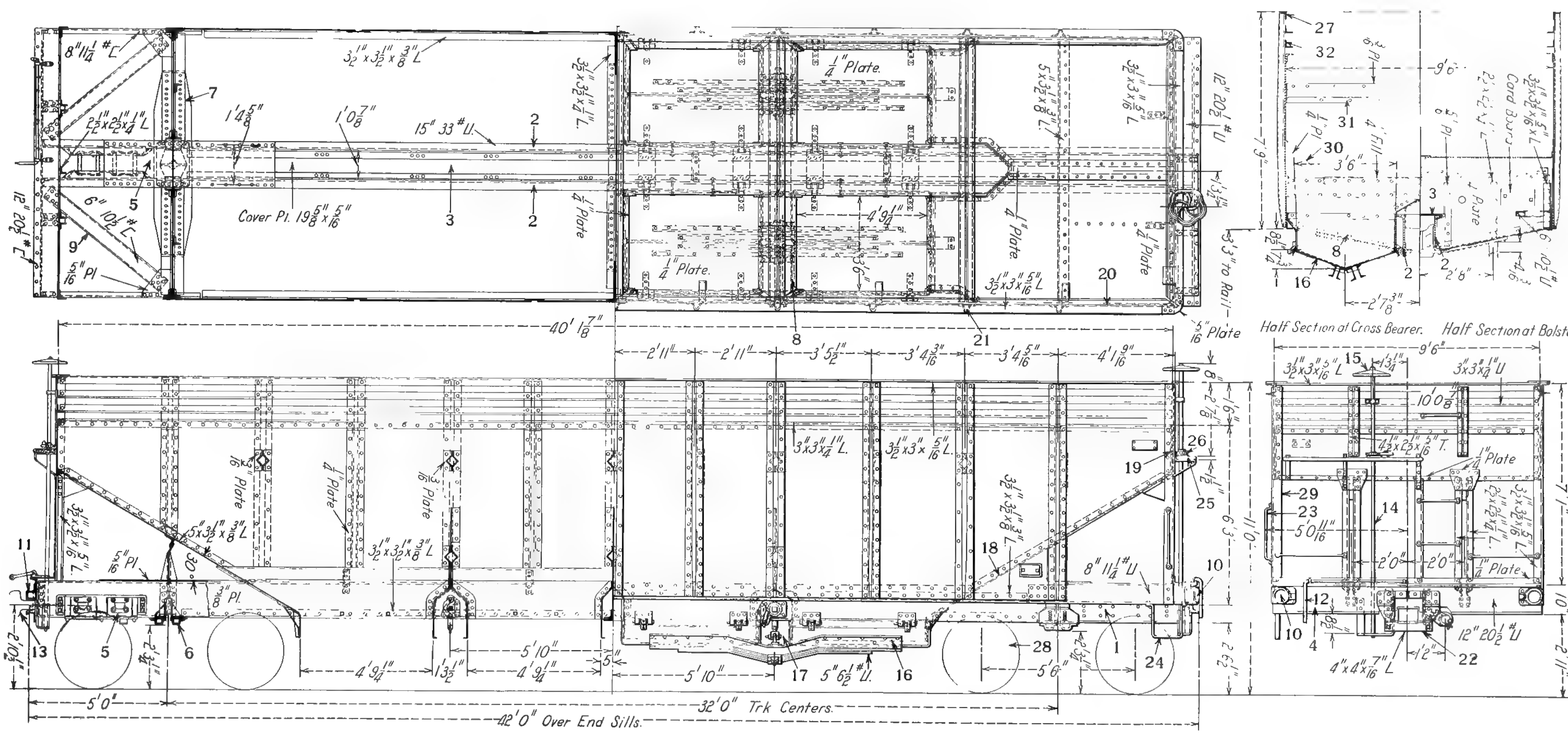


Fig. 291—Southern Railway All-Steel 50-Ton Capacity Hopper Coke Car Shown in Fig. 34. Builder, Cambria Steel Company.

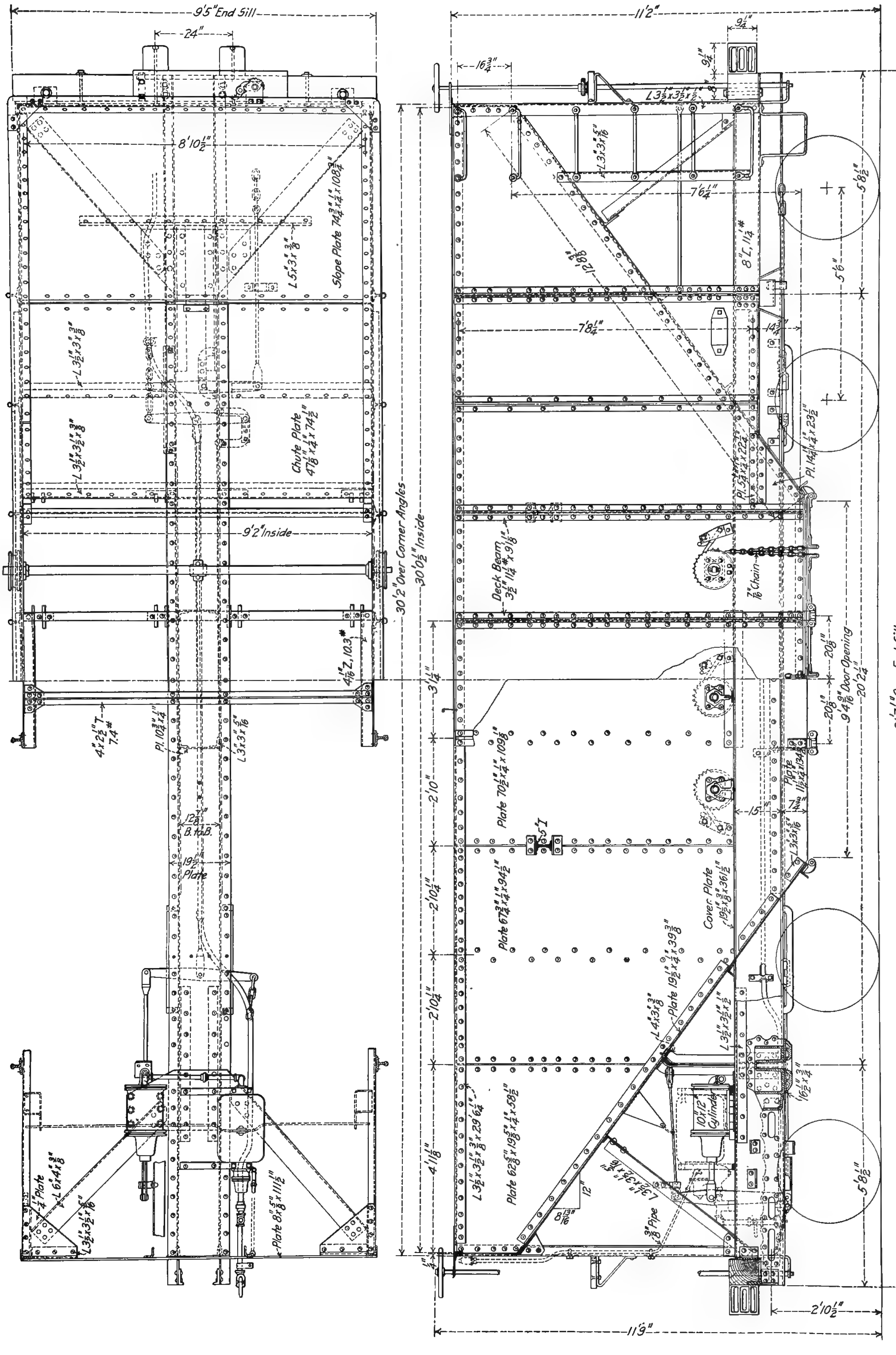


Fig. 292—Norfolk & Western All-Steel 57½-Ton Capacity Hopper Car Shown in Figs. 22 and 293. Build er, The Barney & Smith Car Company.

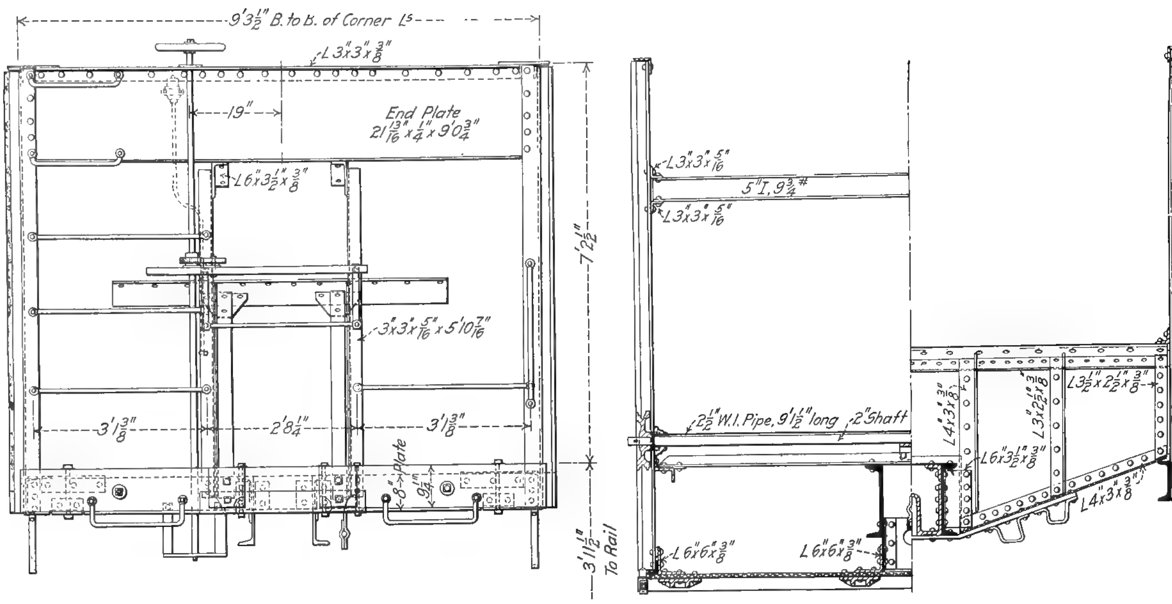


Fig. 293—End Elevation and Cross Sections of Norfolk & Western All-Steel Hopper Car Shown in Figs. 22 and 292.

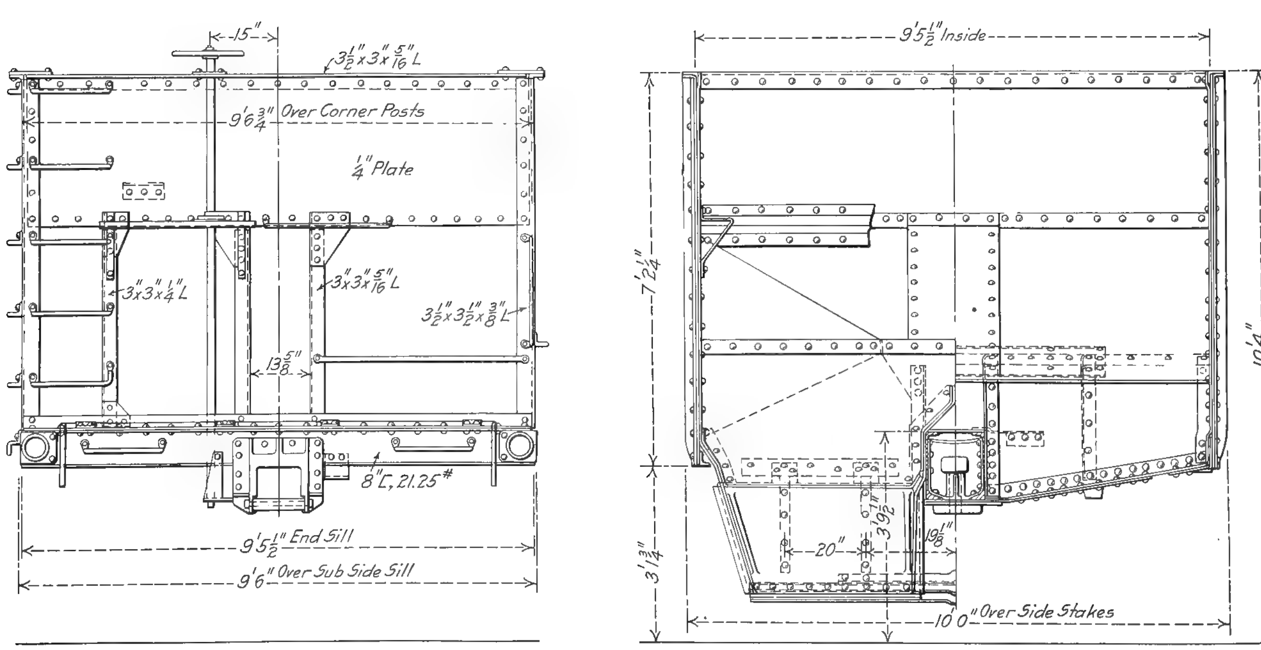


Fig. 294—End Elevation and Cross Sections of Central of New Jersey All-Steel Hopper Car Shown in Fig 295.

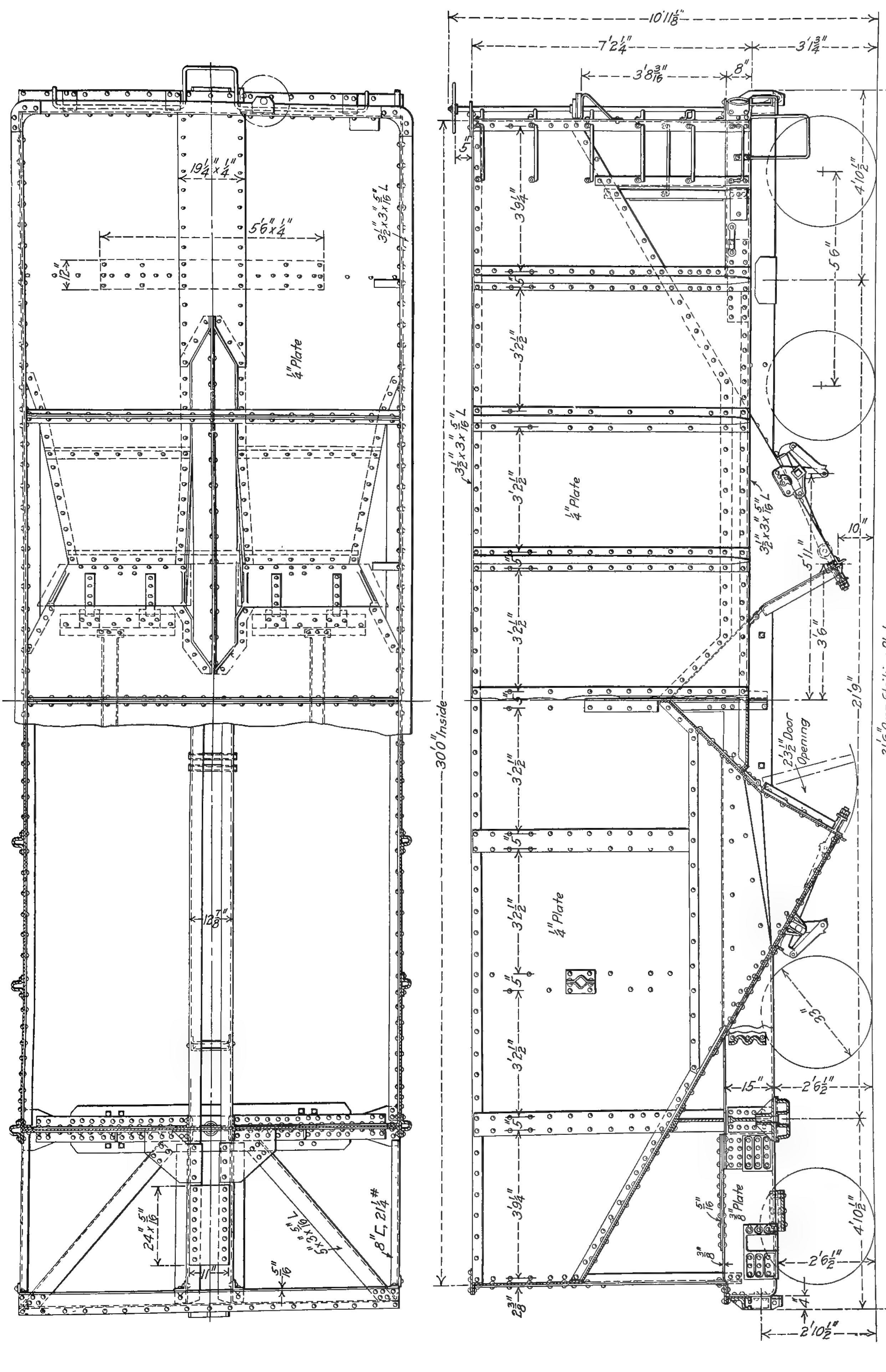


Fig. 295—Central Railroad of New Jersey All-Steel 50-Ton Capacity Hopper Car. Builder, Standard Steel Car Co. See also Fig. 294.

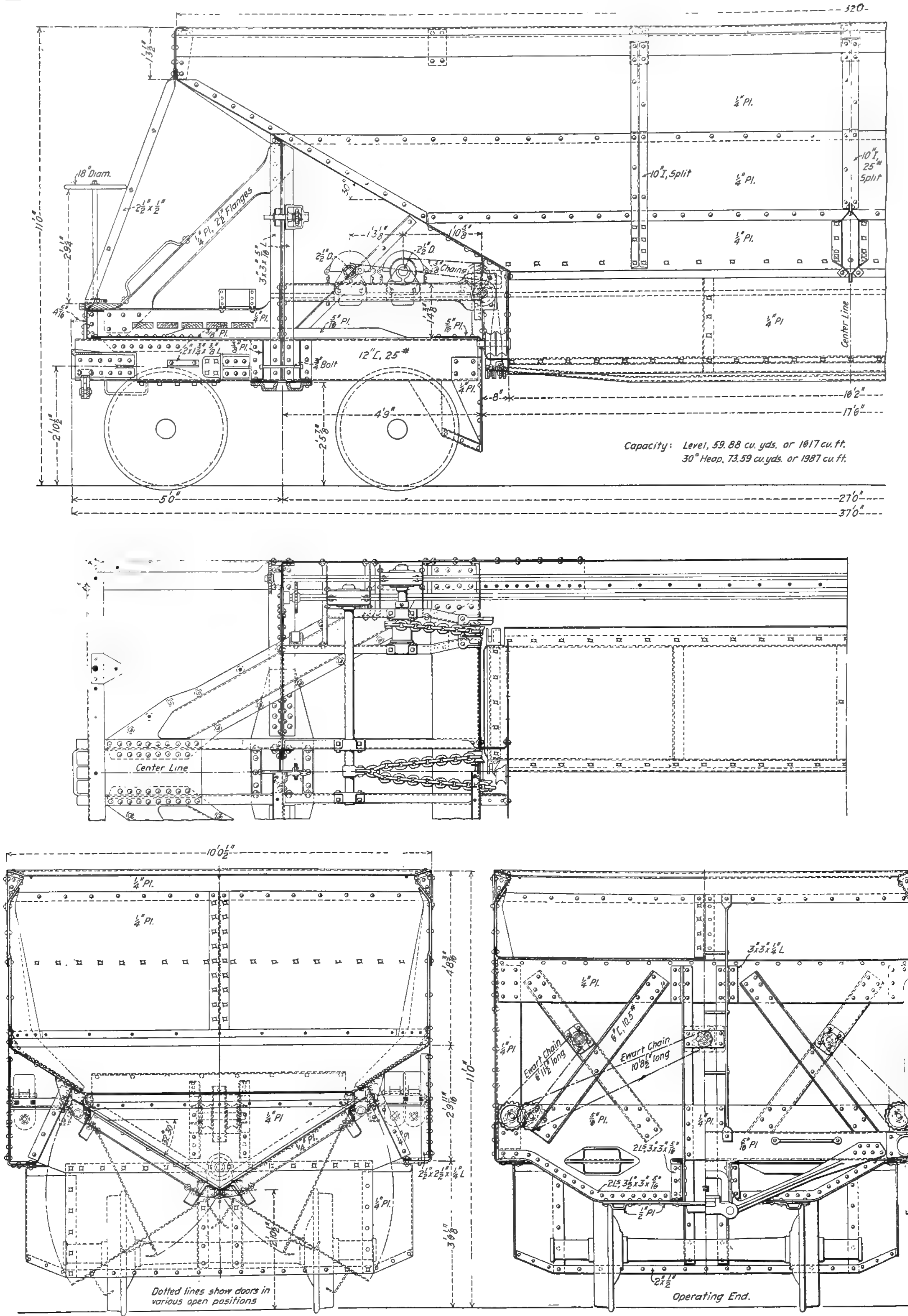


Fig. 296—Union Railroad All-Steel 50-Ton Capacity Hopper Car. Builder, Summers Steel Car Company.

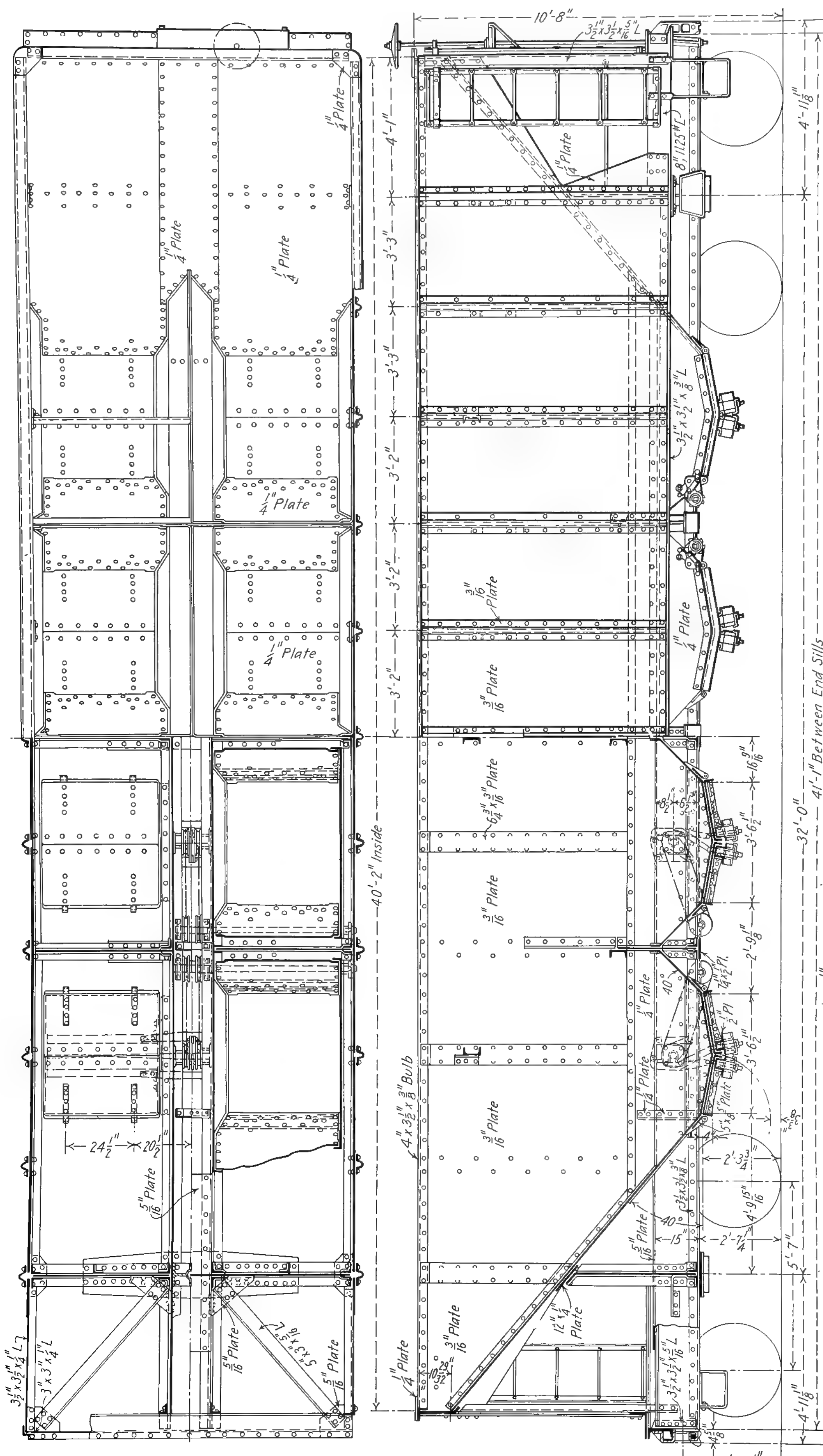


Fig. 297—All-Steel 70-Ton Capacity Hopper Car with 40-Deg. Floor Slopes. Builder, Enterprise Railway Equipment Co.

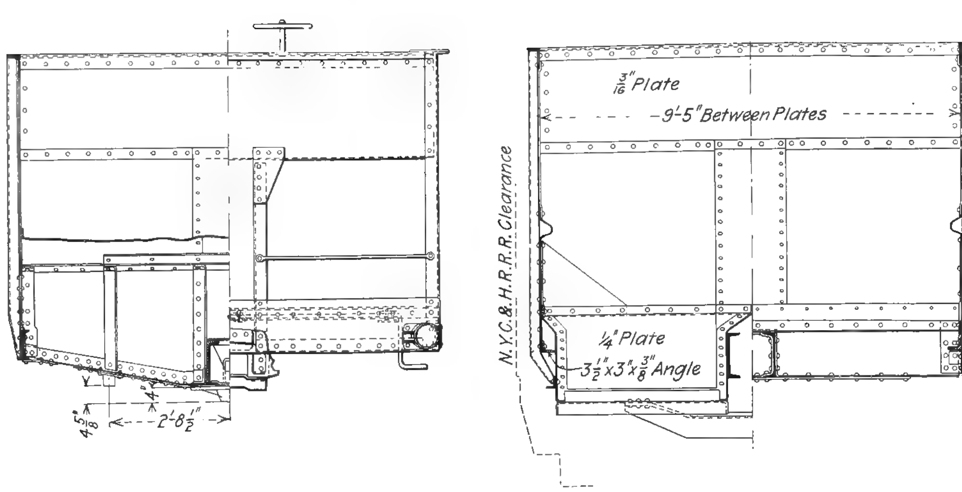


Fig. 298—Cross Sections and End Elevation of All-Steel 40-Ton Capacity Hopper Coke Car Shown in Figs. 33 and 300.

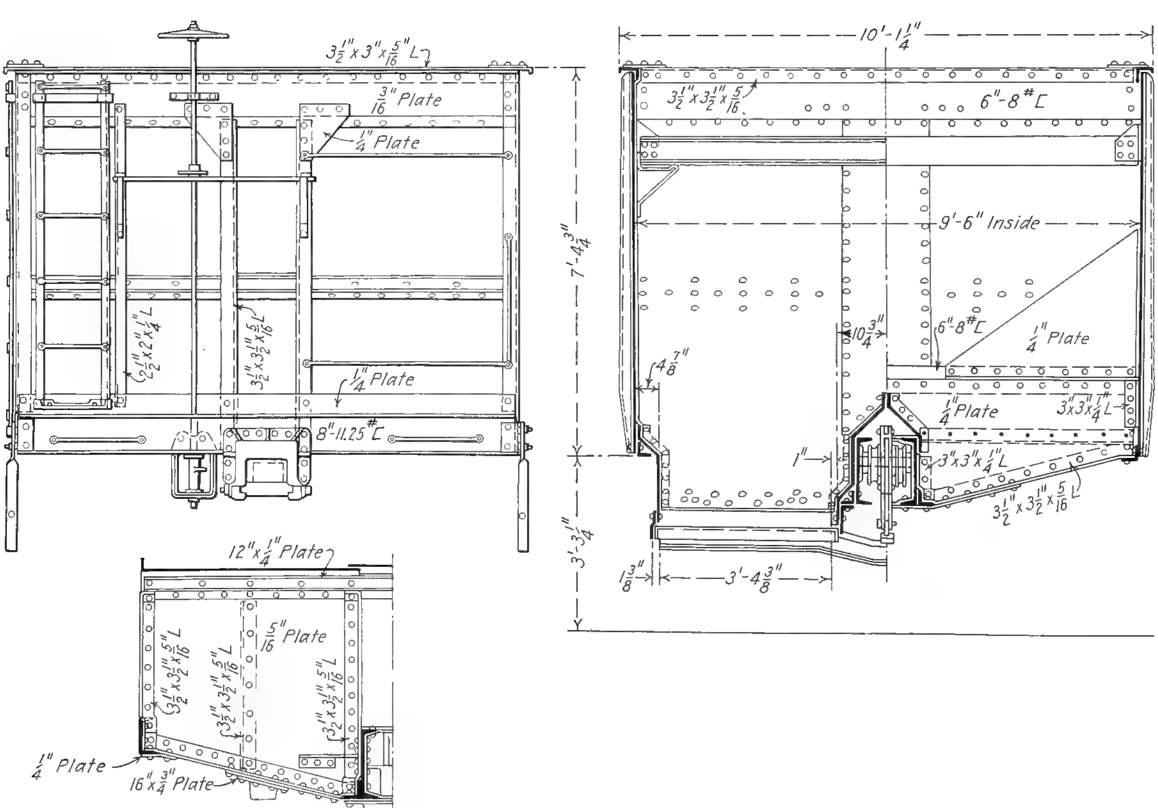


Fig. 299—Cross Sections and End Elevation of All-Steel 70-Ton Capacity Hopper Car Shown in Fig. 297.

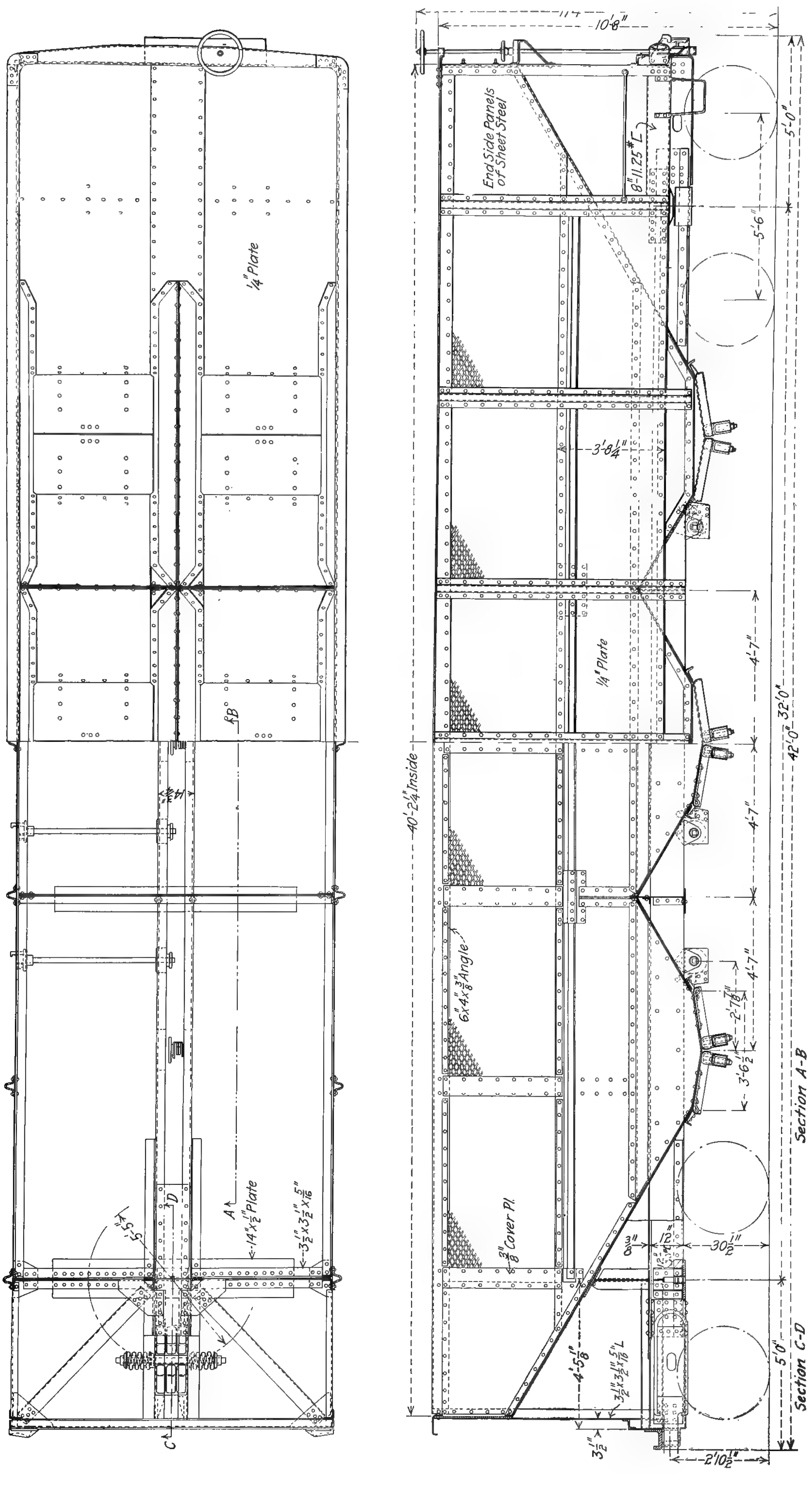


Fig. 300—New York Central All-Steel 40-Ton Capacity Hopper Coke Car Shown in Figs. 33 and 298. Builder, American Car & Foundry Company.

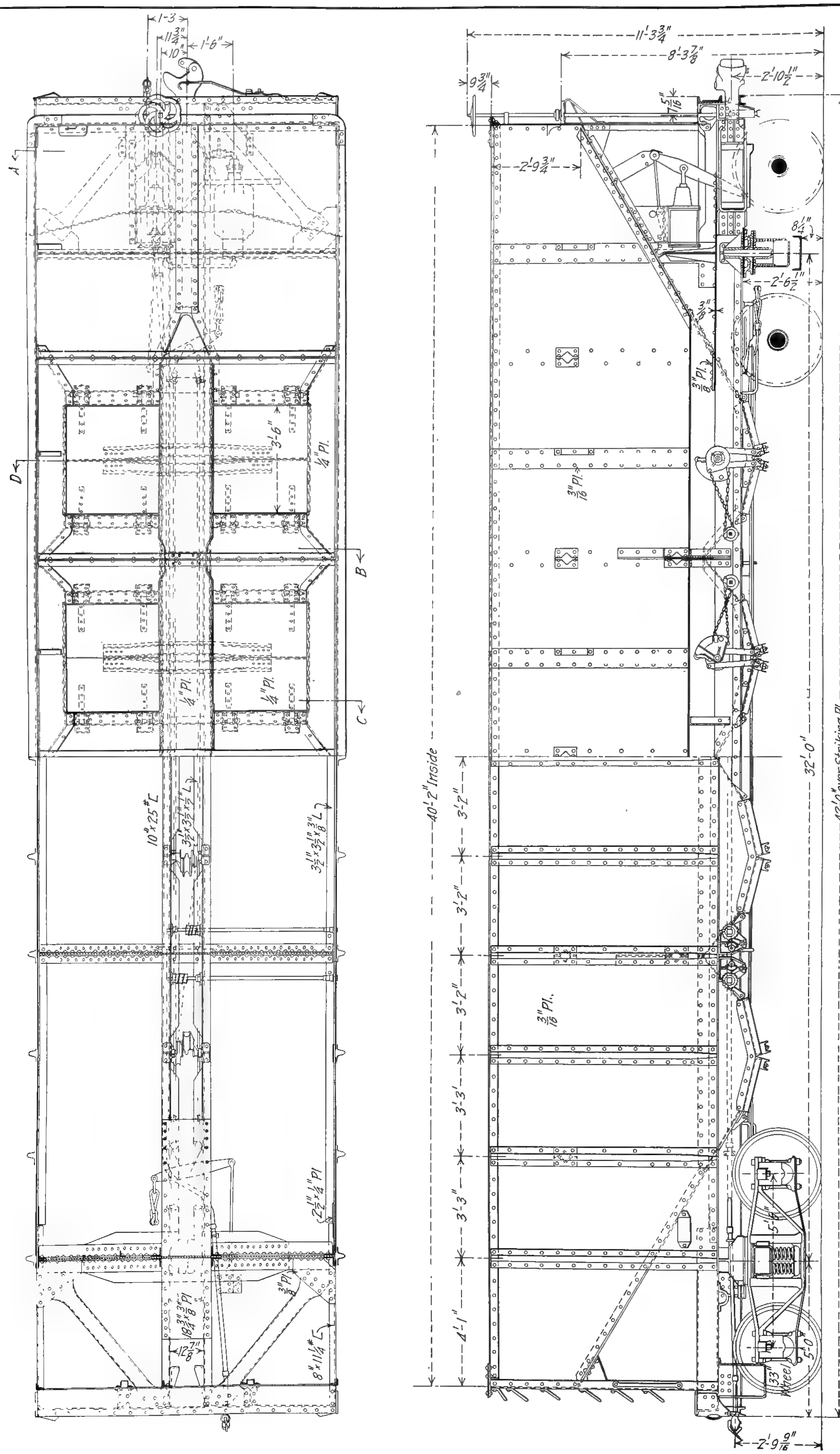


Fig. 301—Pennsylvania Railroad All-Steel 50-Ton Capacity Hopper Coke Car. Builder, Cambria Steel Company. See also Figs. 302 and 303.

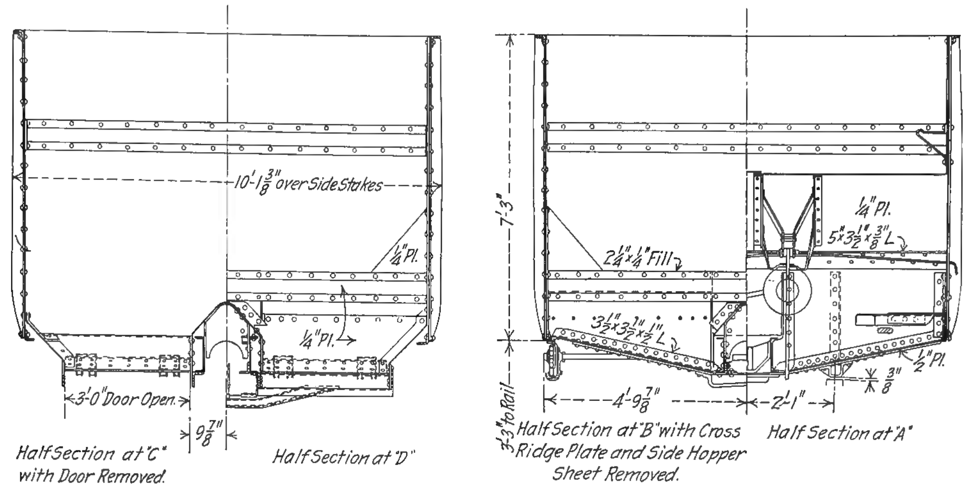


Fig. 302—Cross Sections of Pennsylvania All-Steel Hopper Car Shown in Figs. 301 and 303.

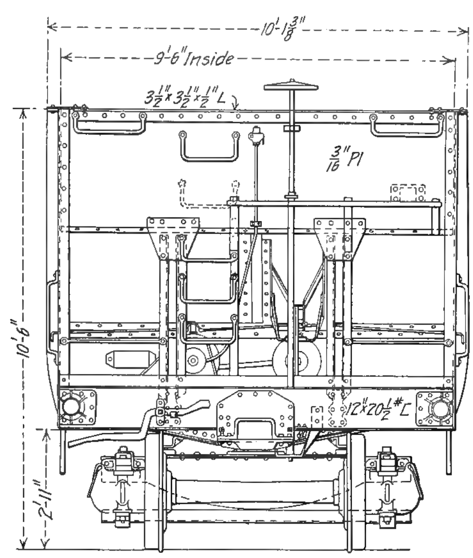


Fig. 303—End Elevation of Pennsylvania All-Steel Hopper Car Shown in Figs. 301 and 302.

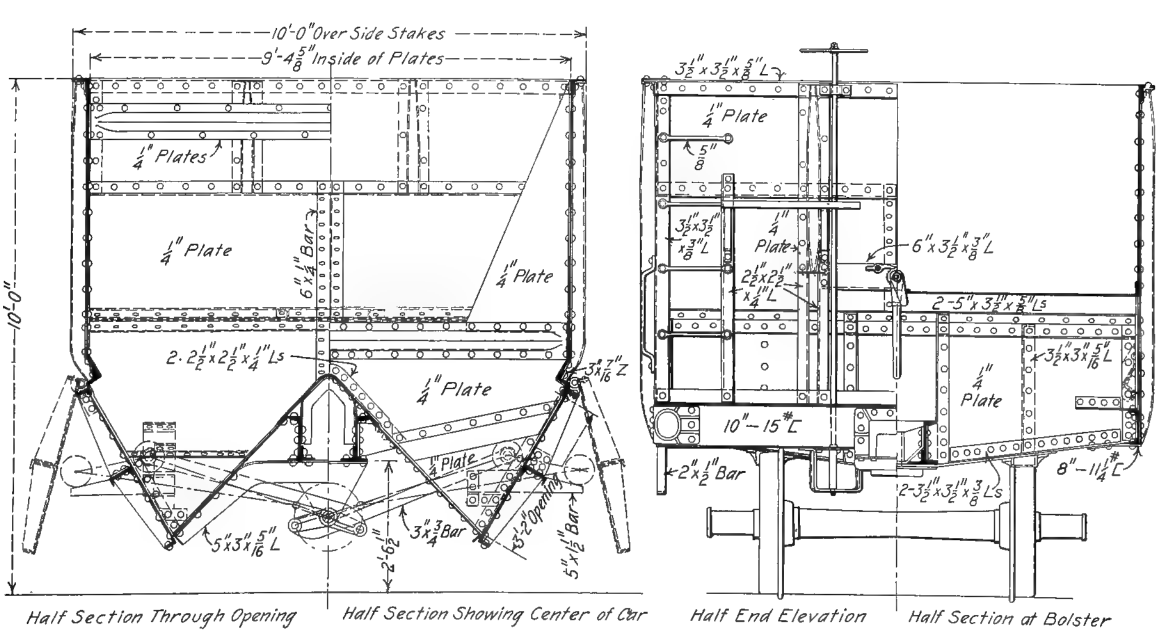


Fig. 304—Cross Sections and End Elevation of All-Steel Side Dump Coke Car Shown in Fig. 305.

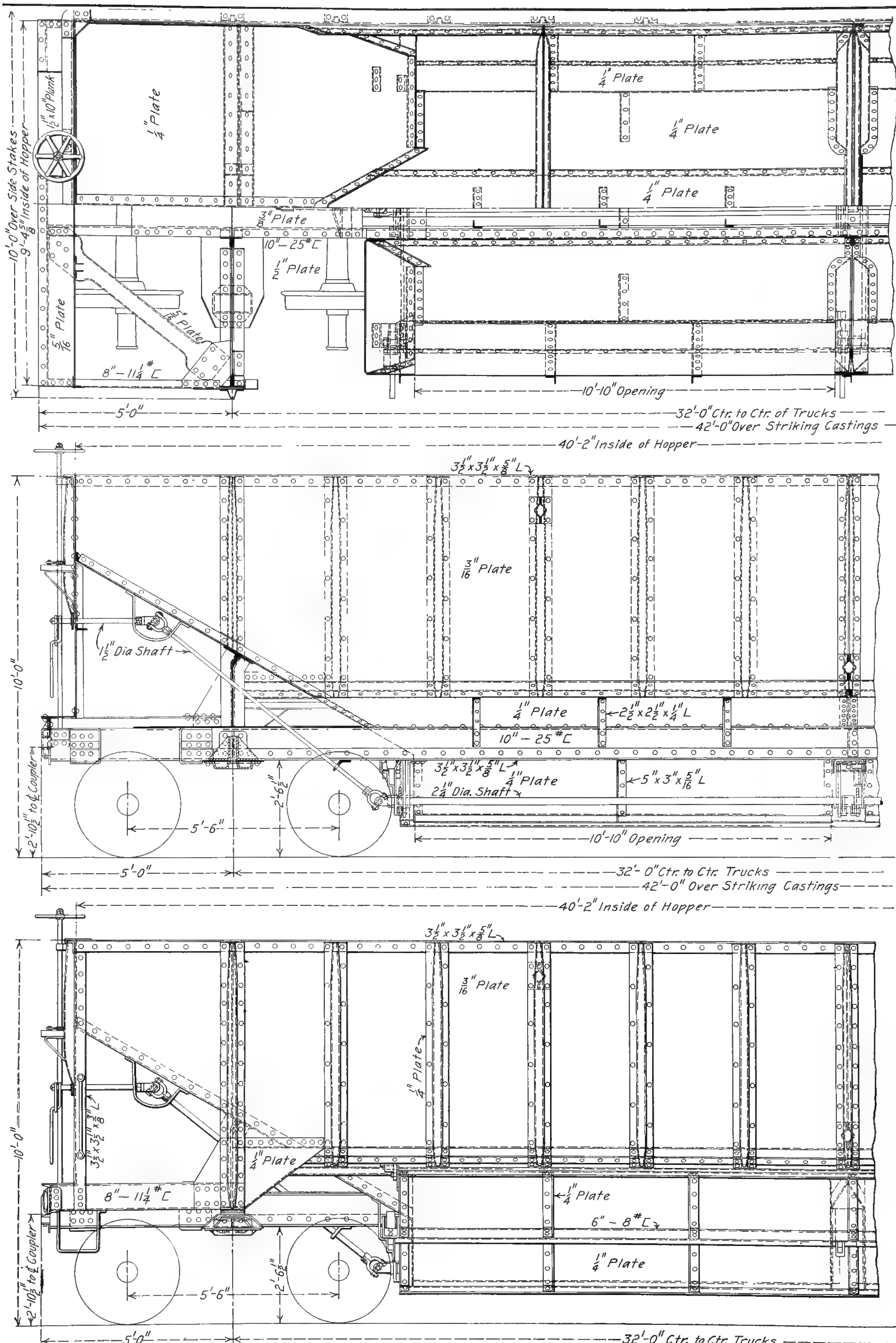


Fig. 305—All-Steel 50-Ton Capacity Side Dump Hopper Coke Car. Builder, Clark Car Company. See also Fig. 304.

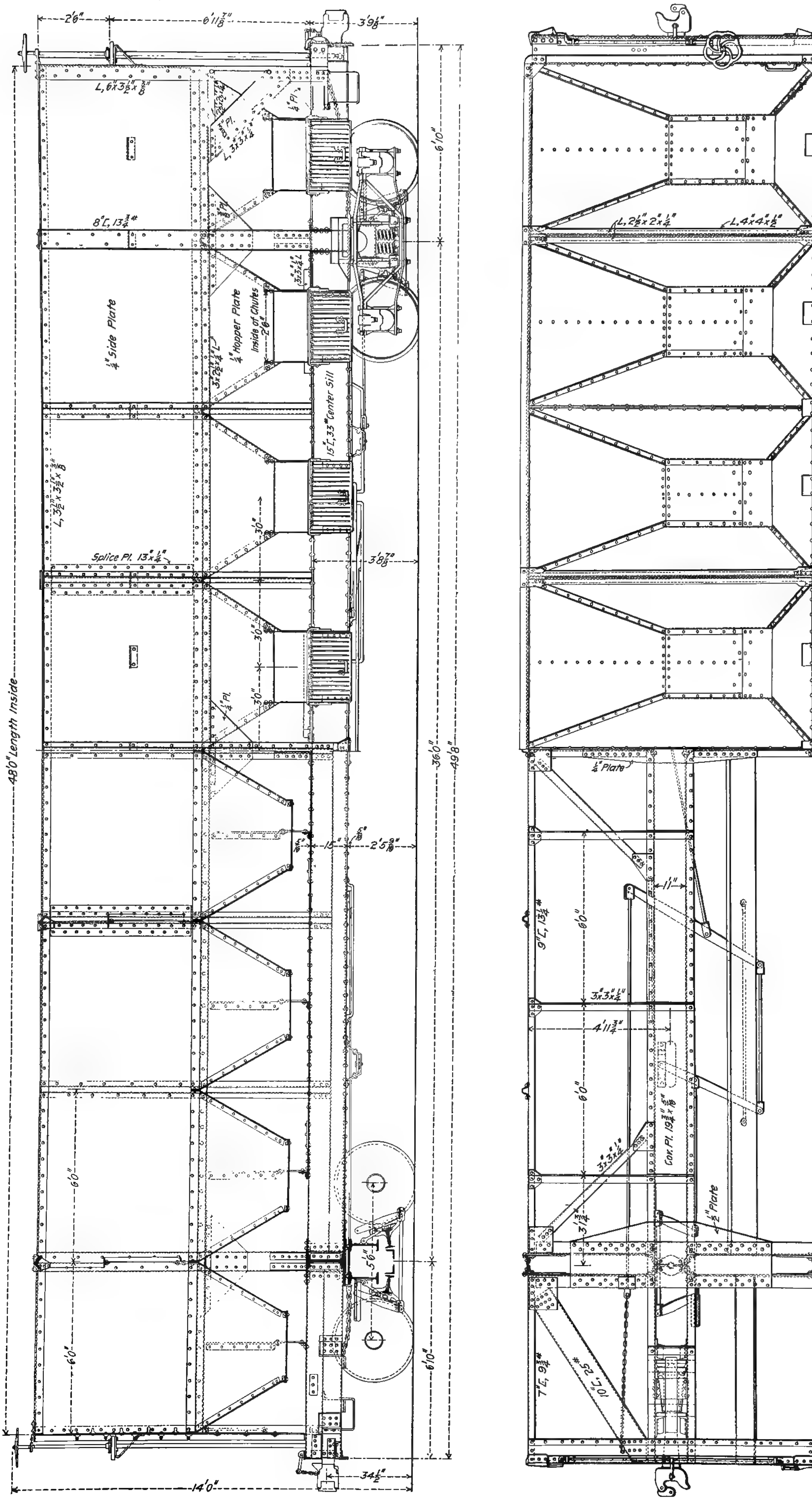


Fig. 306—All-Steel 50-Ton Capacity Side Dump Hopper Coke Car with Eight Hoppers. Builder, Cambria Steel Company. See also Fig. 307.

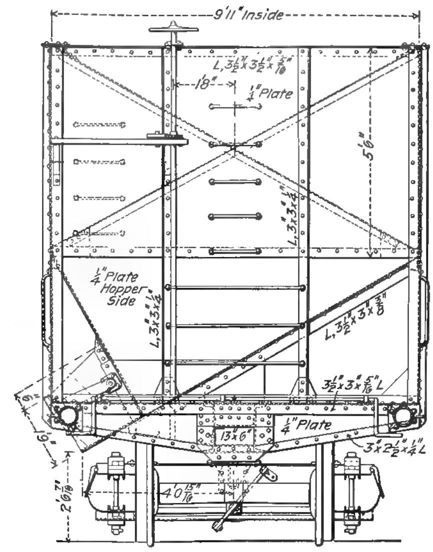


Fig. 307—End Elevation of All-Steel 50-Ton Capacity Side Dump Coke Car Shown in Fig. 306.

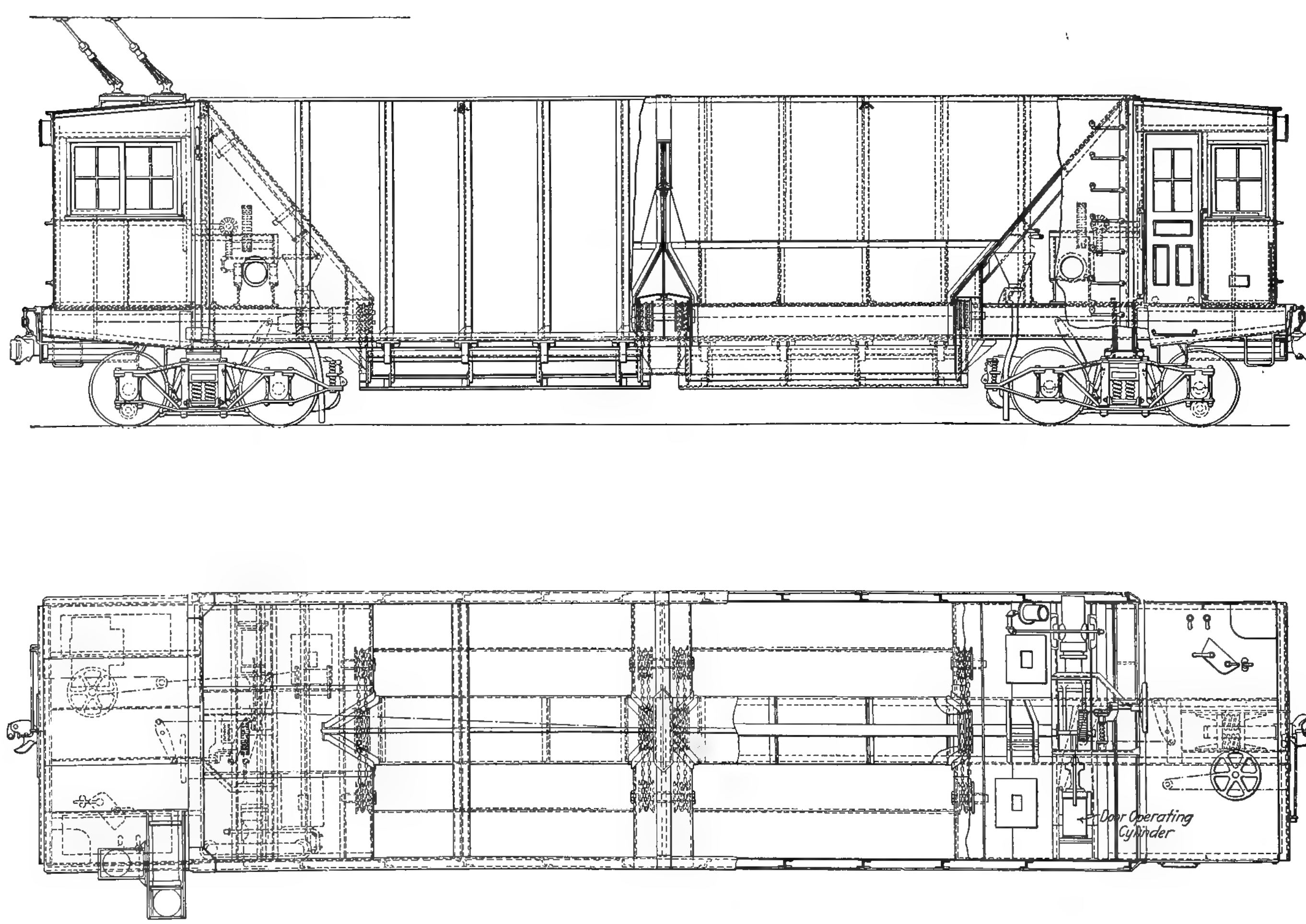


Fig. 308—All-Steel 60-Ton Capacity Electrically Operated Conveyor Hopper Car for Use on Virginian Railway Coal Wharf.

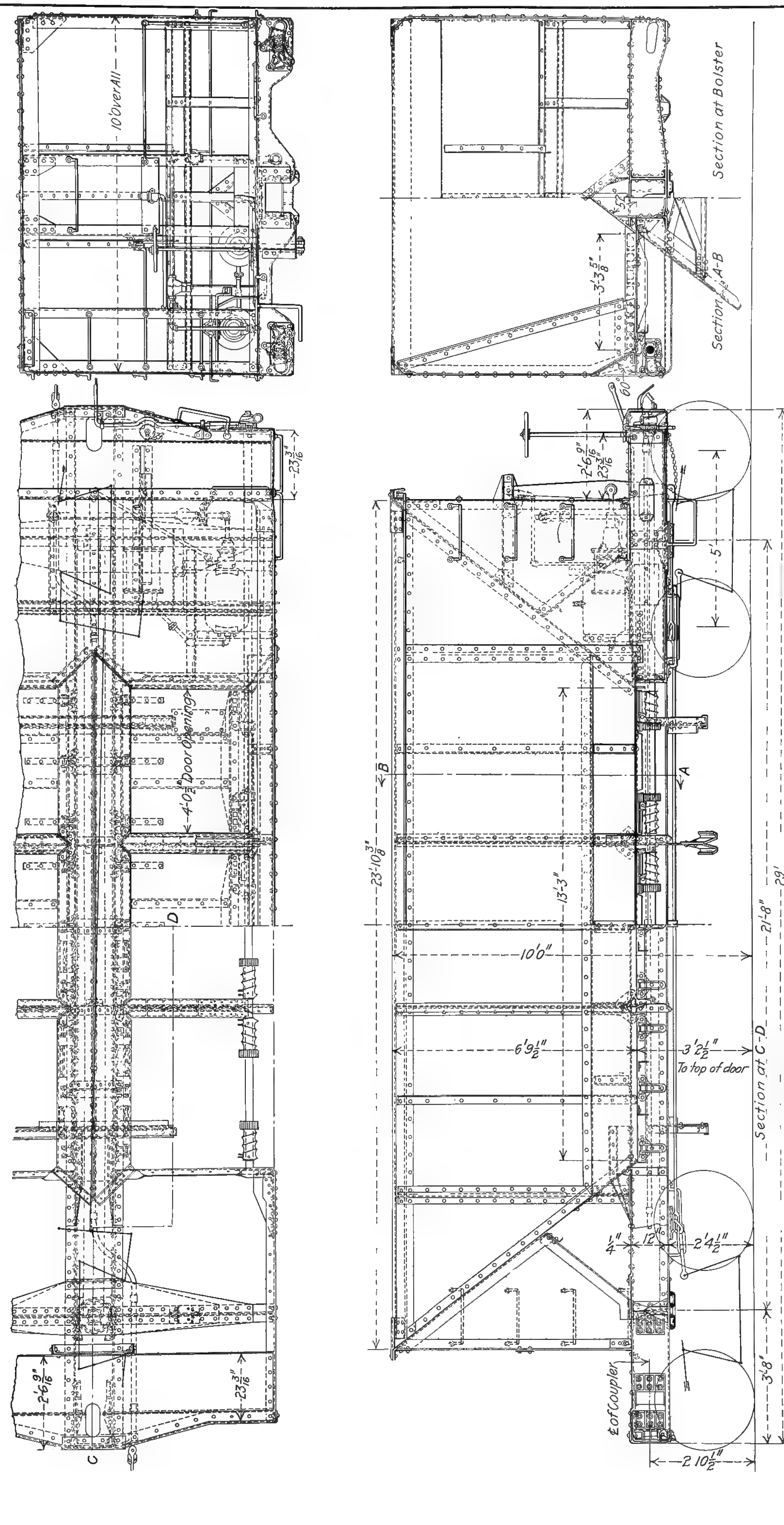


Fig. 309—Bingham & Garfield All-Steel 60-Ton Capacity Hopper Ore Car Shown in Fig. 37. Builder, Pressed Steel Car Company.

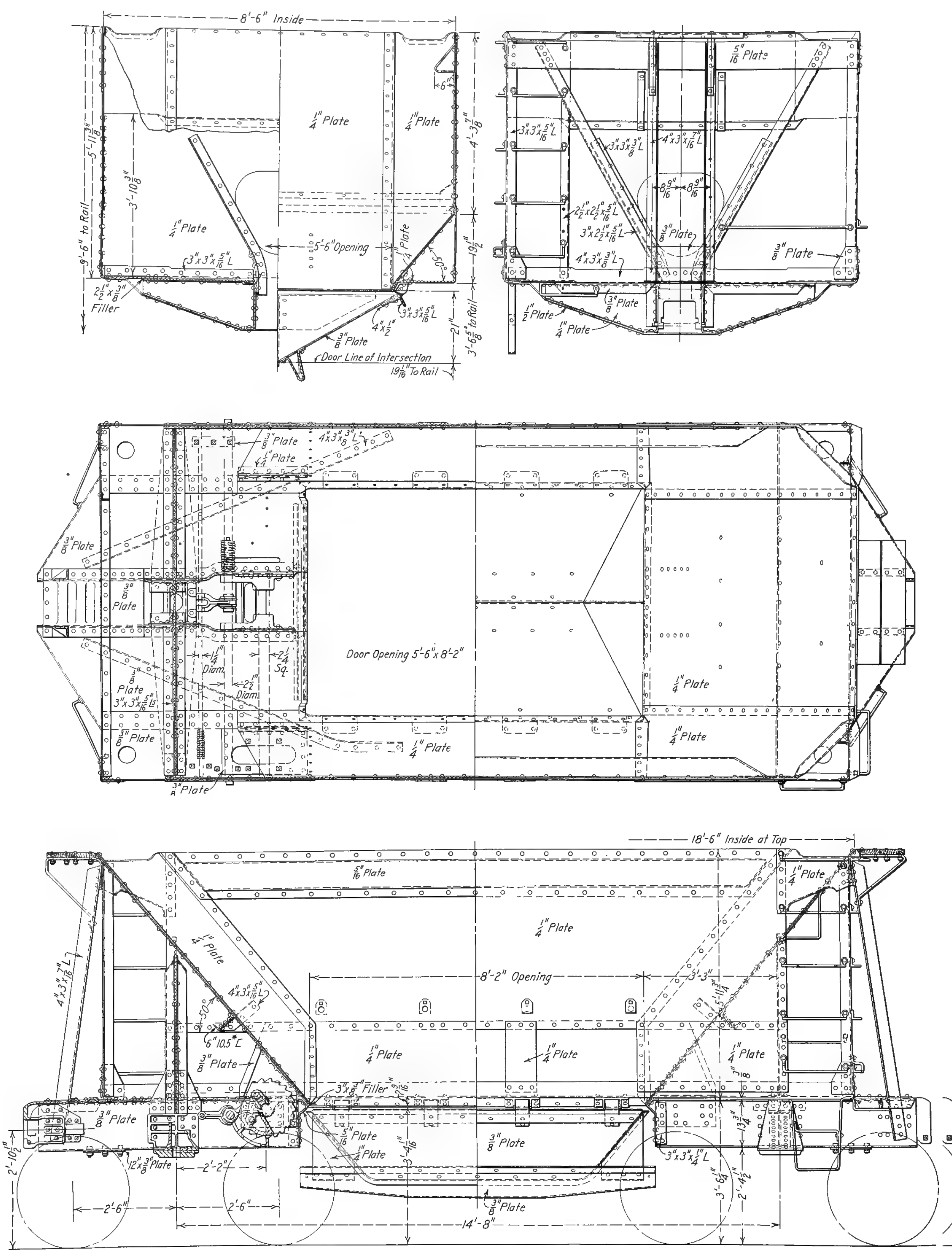


Fig. 310—Duluth & Iron Range All-Steel 50-Ton Capacity Hopper Ore Car. Builder, Summers Steel Car Company.

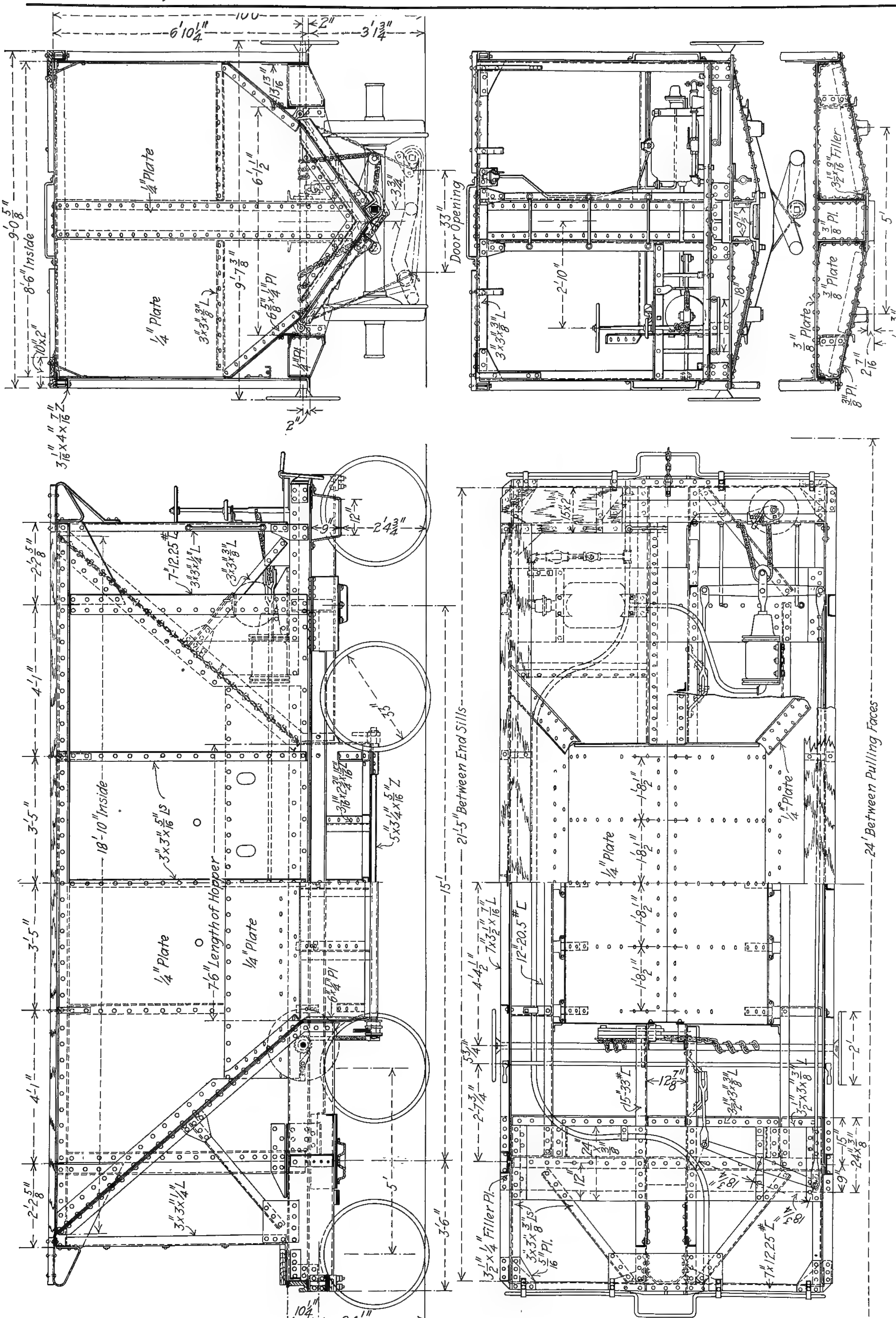


Fig. 311—Minneapolis, St. Paul & Ste. Marie All-Steel 50-Ton Capacity Hopper Ore Car. Builder, National Dump Car Company.

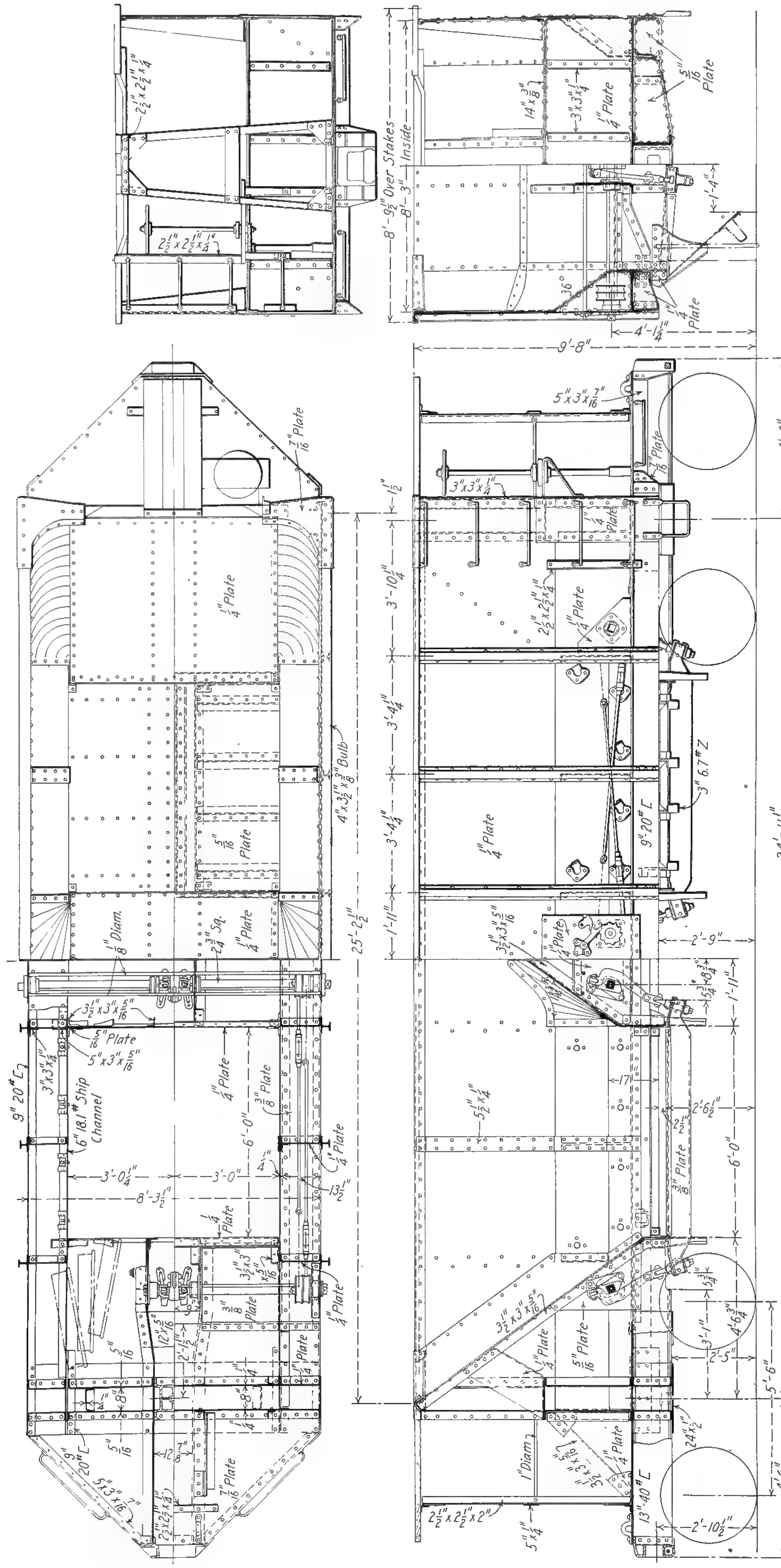


Fig. 312—All-Steel 80-Ton Capacity Center Dump Ore Car. Builder, Enterprise Railway Equipment Co.

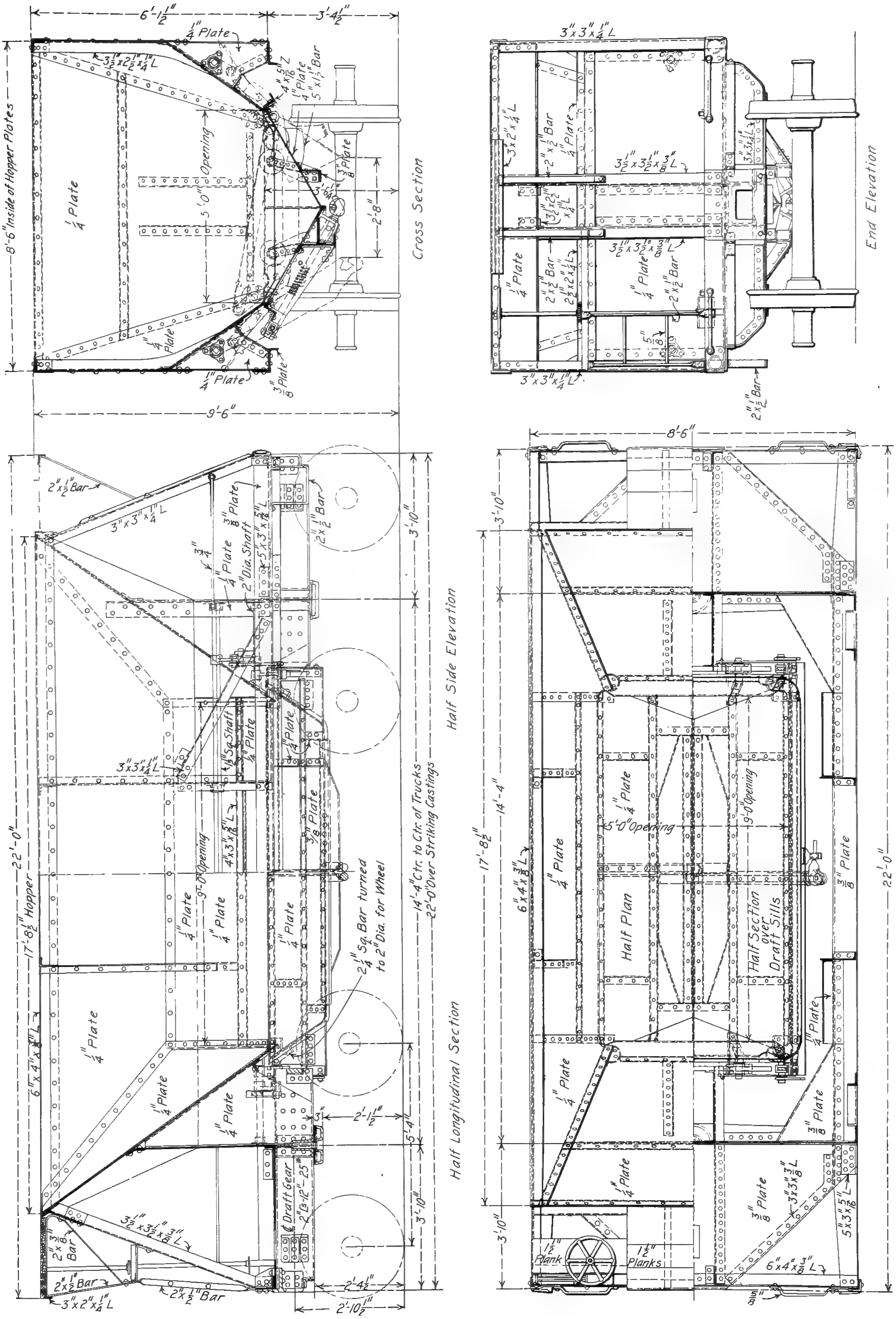


Fig. 313—All-Steel Capacity Hopper Ore Car. Builder, Clark Car Company.

Gondola Car Parts—See Fig. 314.

1	*Center Sill*	6	*End Stiffener*	11	*Crossbearer*
2	*Side Sill*	7	*Side Stake*	13	*Striking Casting*
3	*End Sill*	8	*Drop Door*	14	*Center Plate*
4	*Side Sheet*	9	*Door-Operating Gear*	15	*Draft Castings*
5	*End Sheet*	10	*Body Bolster*	16	*Drawbar*
				17	*Hand Brake Shaft*
				18	*Hand Brake Step*
				19	*Truck*

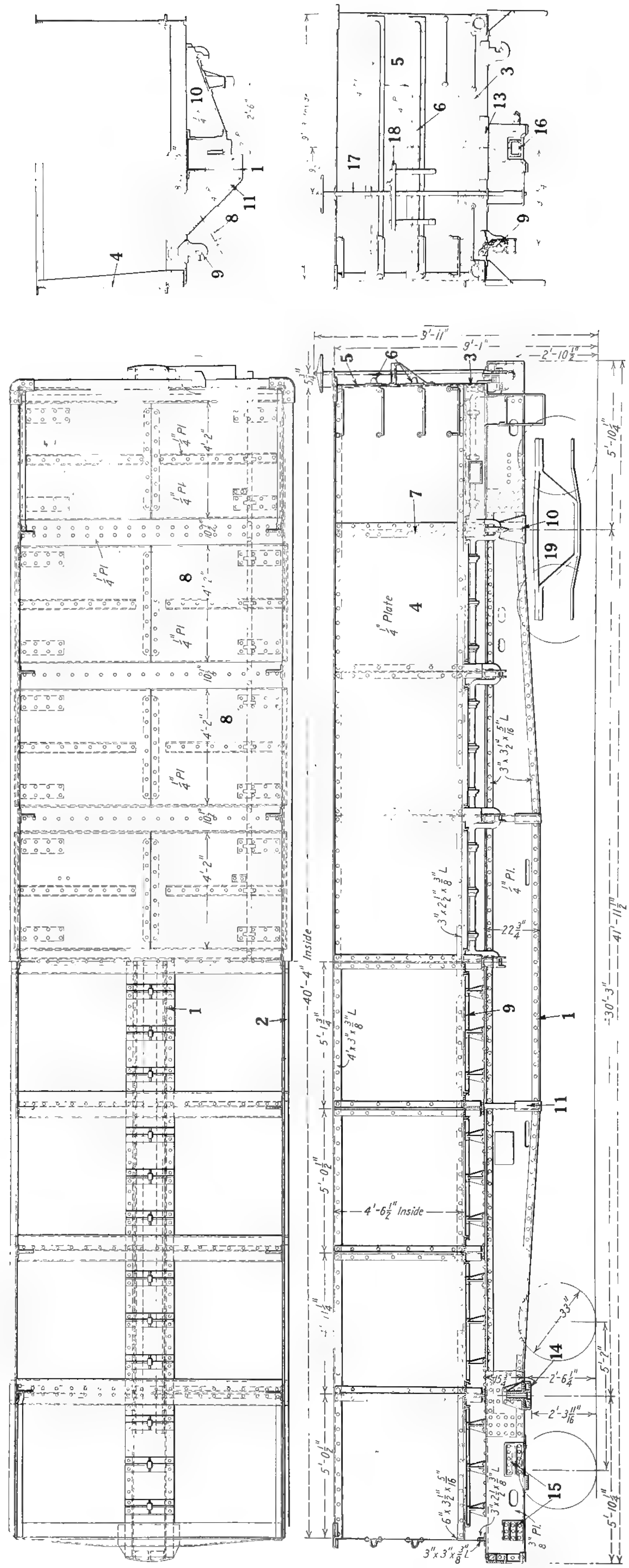


Fig. 314—Kanawha & Michigan 50-Ton Capacity Drop Bottom Gondola Car. Builder, Ralston Steel Car Co.

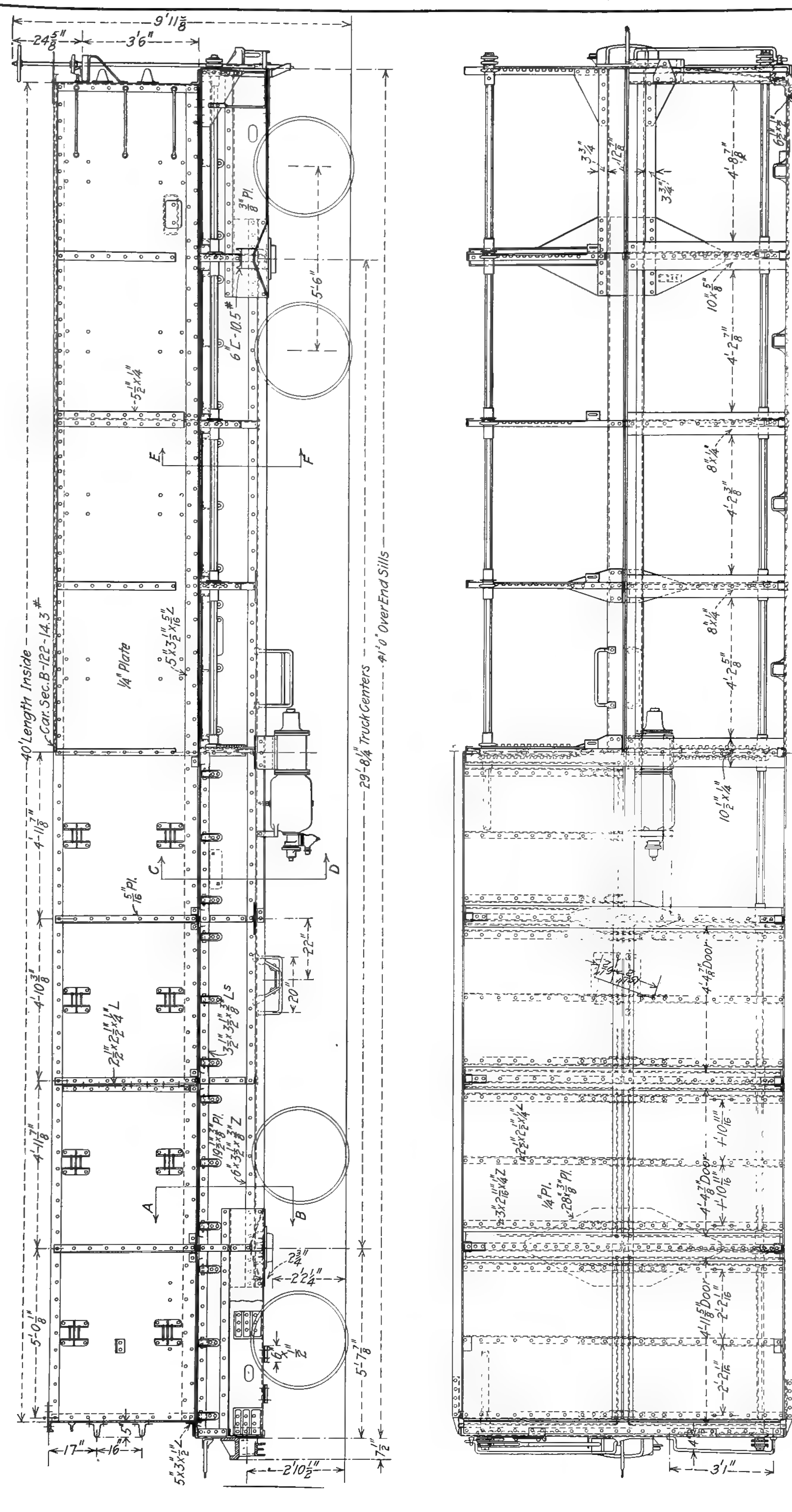


Fig. 315—Cleveland, Cincinnati, Chicago & St. Louis All-Steel 50-Ton Capacity Drop Bottom Gondola Car Shown in Figs. 45 and 316. Builder, National Dump Car Company.

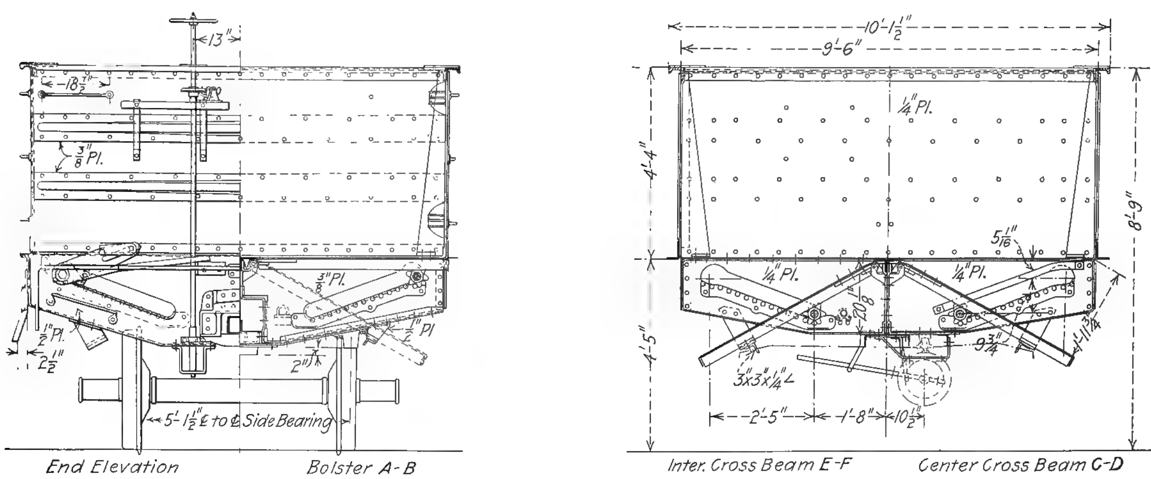


Fig. 316—End Elevation and Cross Sections of Cleveland, Cincinnati, Chicago & St. Louis All-Steel 50-Ton Capacity Drop Bottom Gondola Car Shown in Figs. 45 and 315.

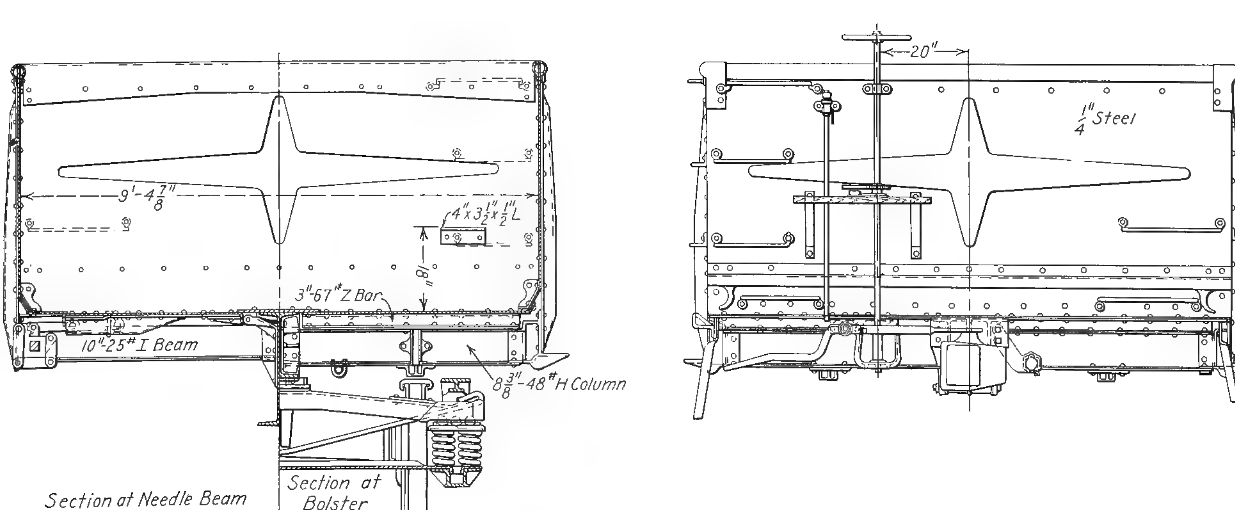


Fig. 317—End Elevation and Cross Sections of Union Pacific All-Steel 50-Ton Capacity Drop Bottom Gondola Car Shown in Figs. 55 and 318.

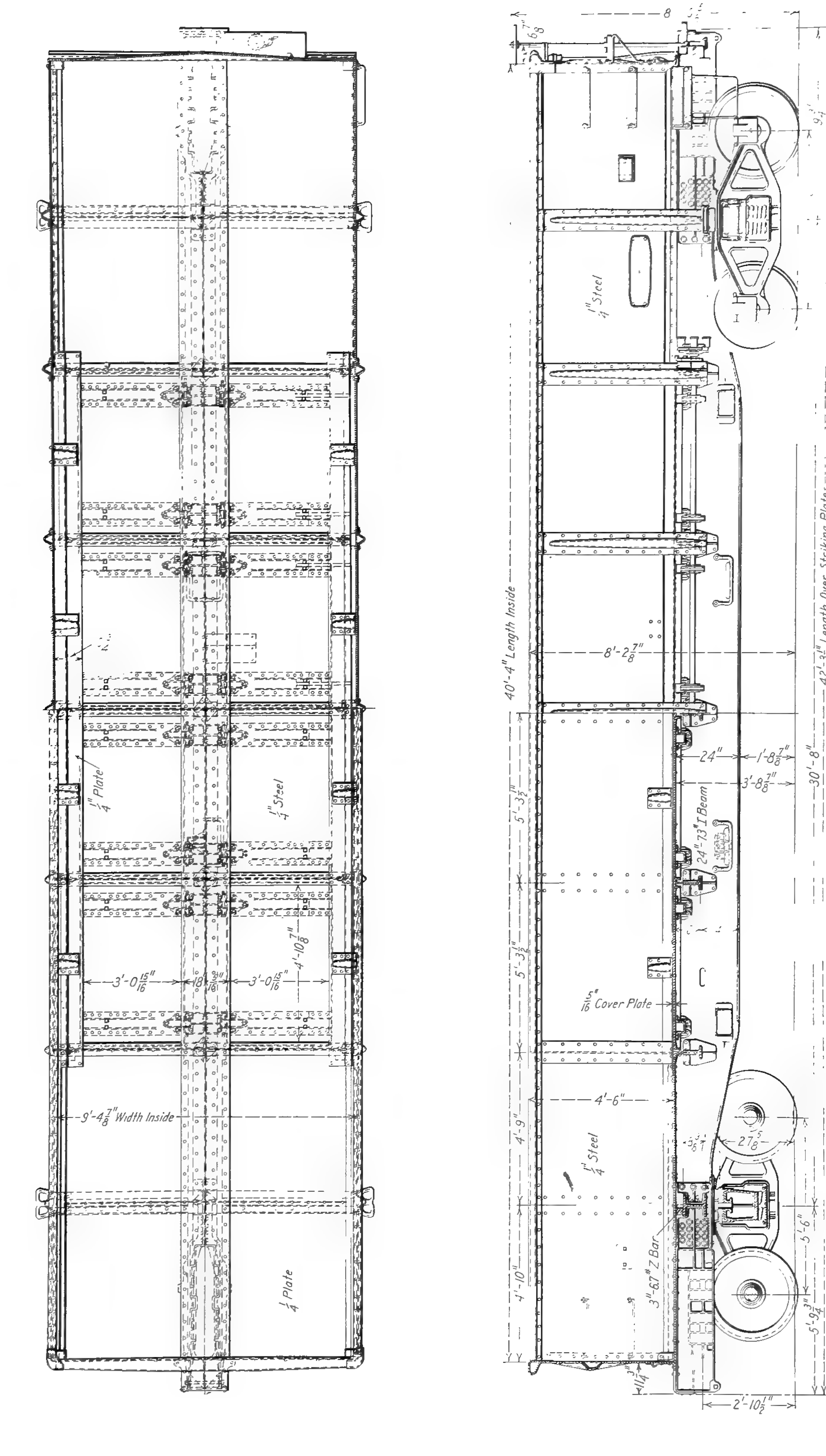


Fig. 318—Union Pacific All-Steel 50-Ton Capacity Drop Bottom Gondola Car. See also Figs. 55 and 317. Builder, The Bettendorf Company.

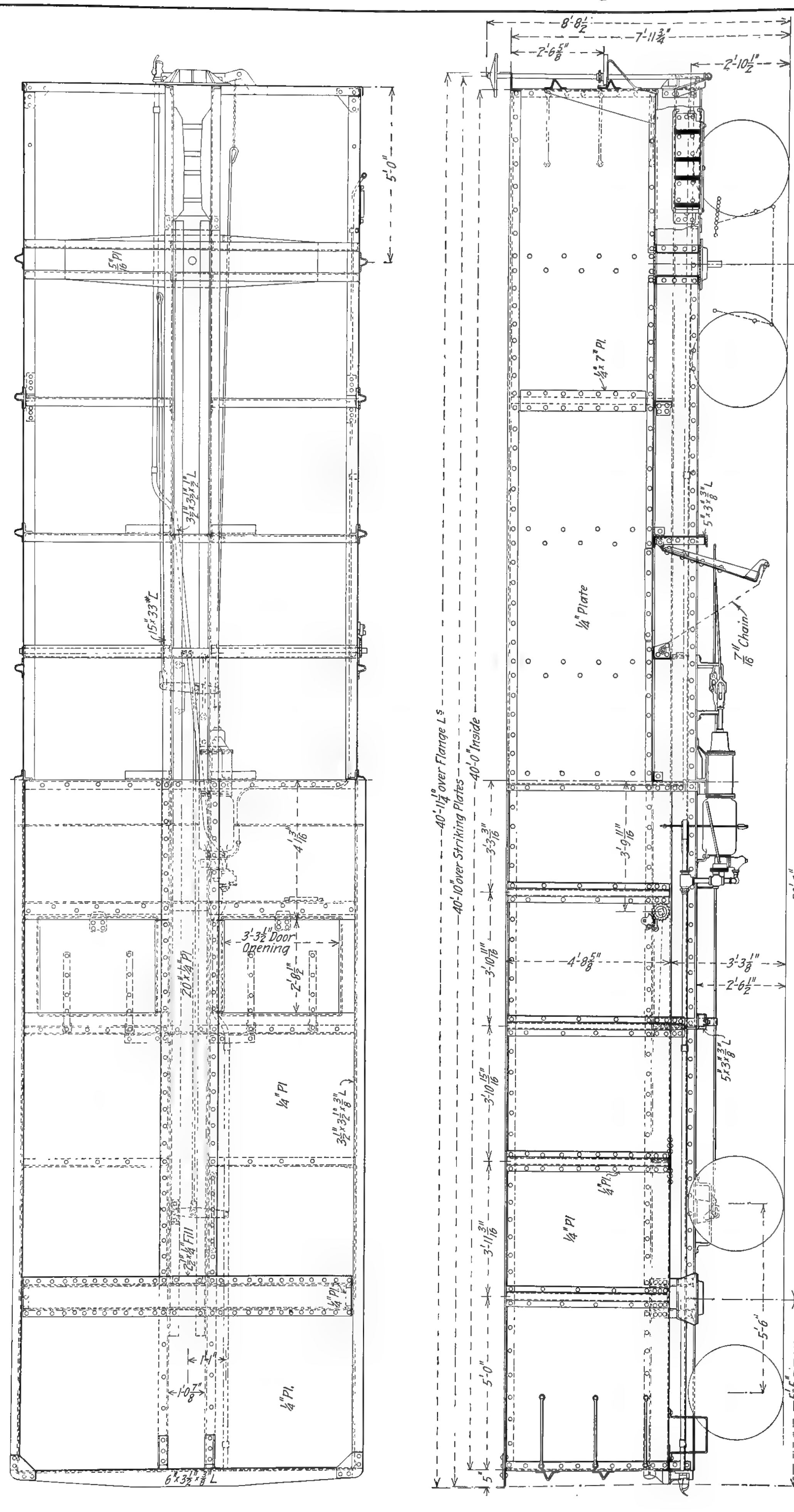


Fig. 319—Cincinnati, Hamilton & Dayton All-Steel 50-Ton Capacity Drop Bottom Gondola Car Shown in Figs. 54, 320 and 321. Builder, Cambria Steel Company.

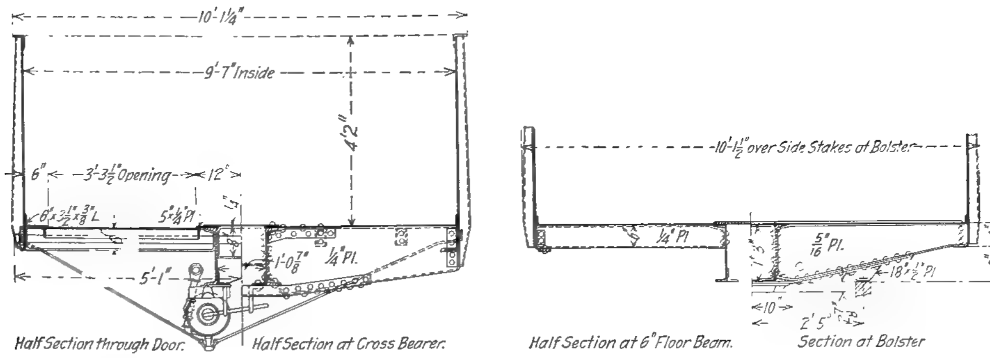


Fig. 320—Cross Sections of Cincinnati, Hamilton & Dayton All-Steel Drop Bottom Gondola Car Shown in Figs. 54, 319 and 321.

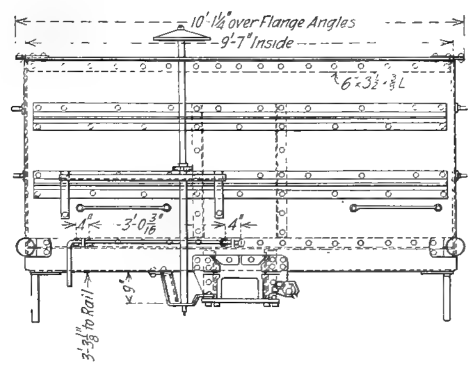


Fig. 321—End Elevation of Cincinnati, Hamilton & Dayton All-Steel Drop Bottom Gondola Car Shown in Figs. 54, 319 and 320.

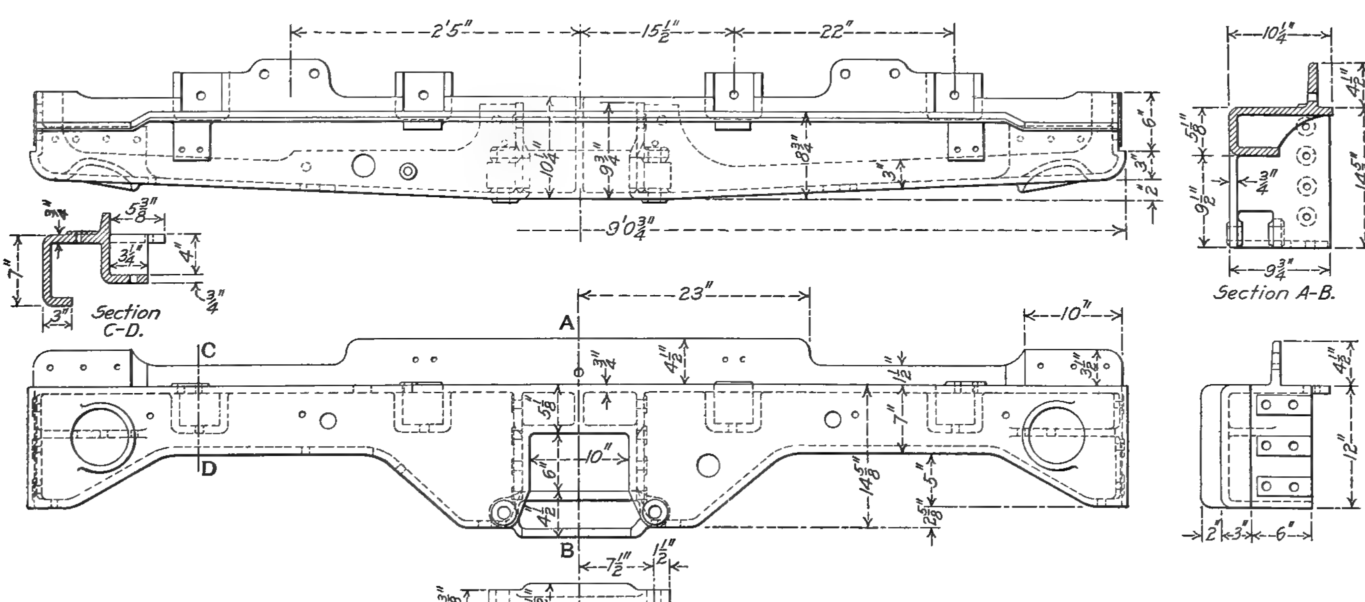


Fig. 322—Arrangement of Cast Steel End Sill for Central Railroad of New Jersey Steel Underframe Gondola Car Shown in Figs. 58 and 323.

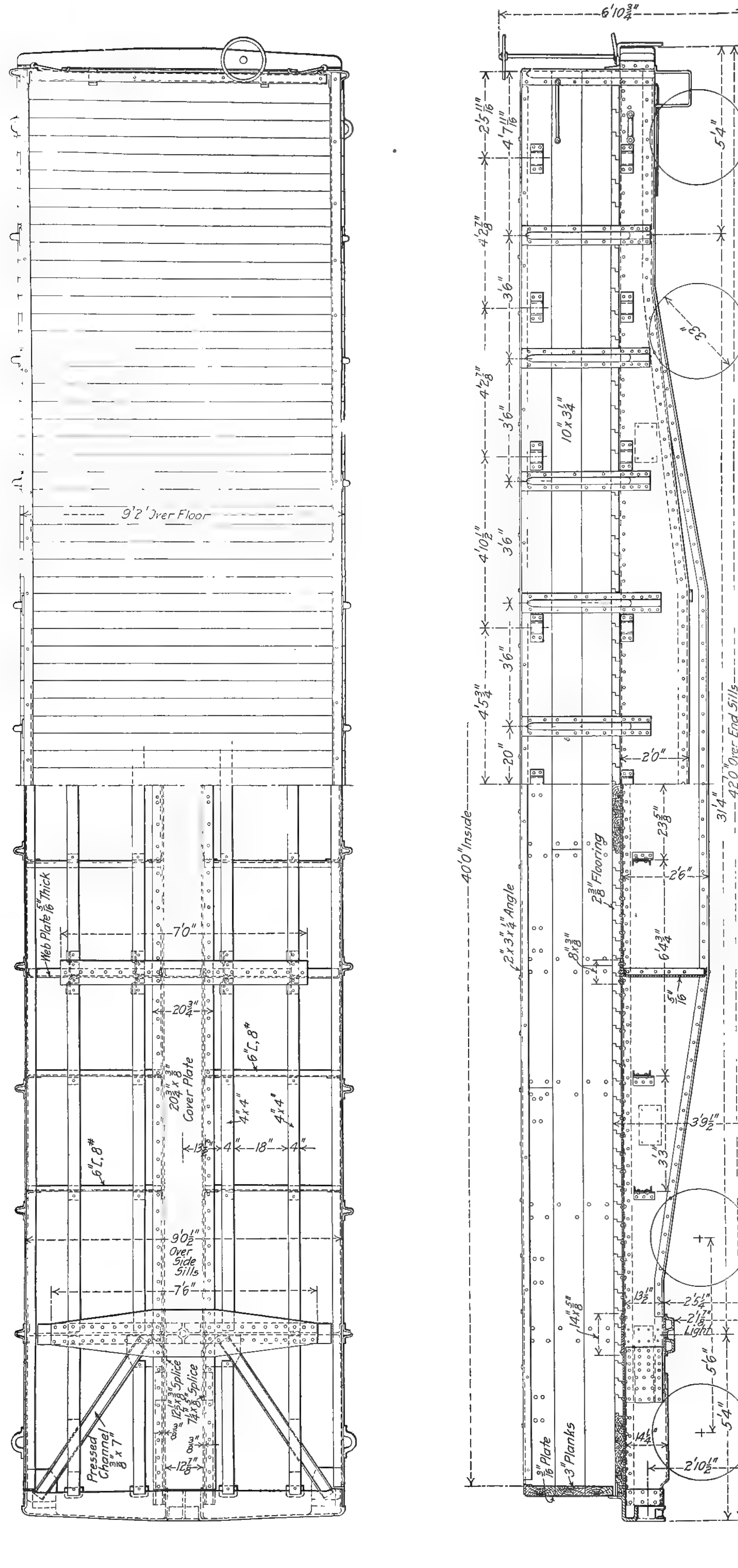


Fig. 323—Central Railroad of New Jersey Steel Underframe 50-Ton Capacity Gondola Car. See Also Figs. 58 and 322. Builder, American Car & Foundry Co.

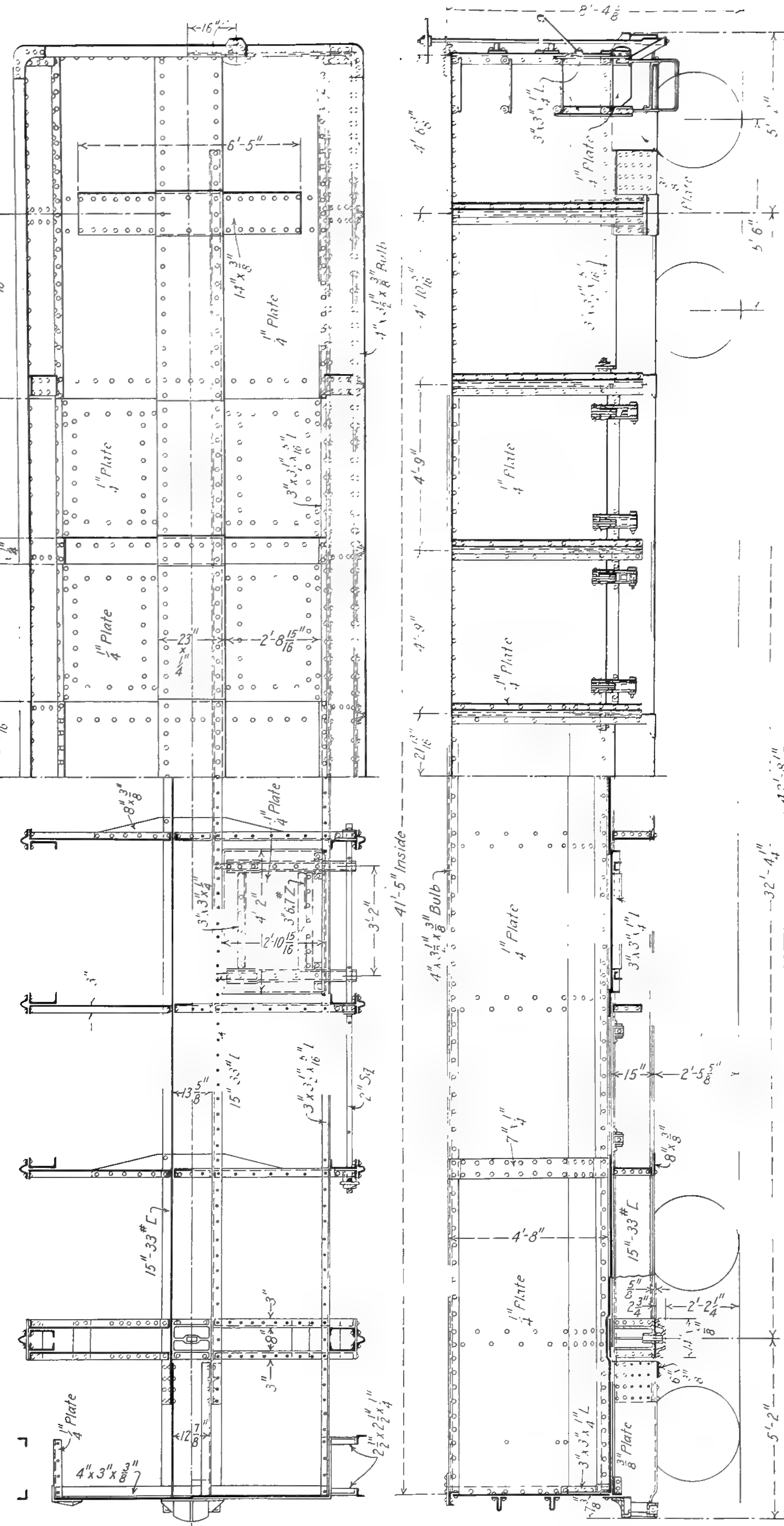


Fig. 324—All-Steel 50-Ton Capacity Side Dump Gondola Car. See also Fig. 325. Builder, Enterprise Railway Equipment Company.

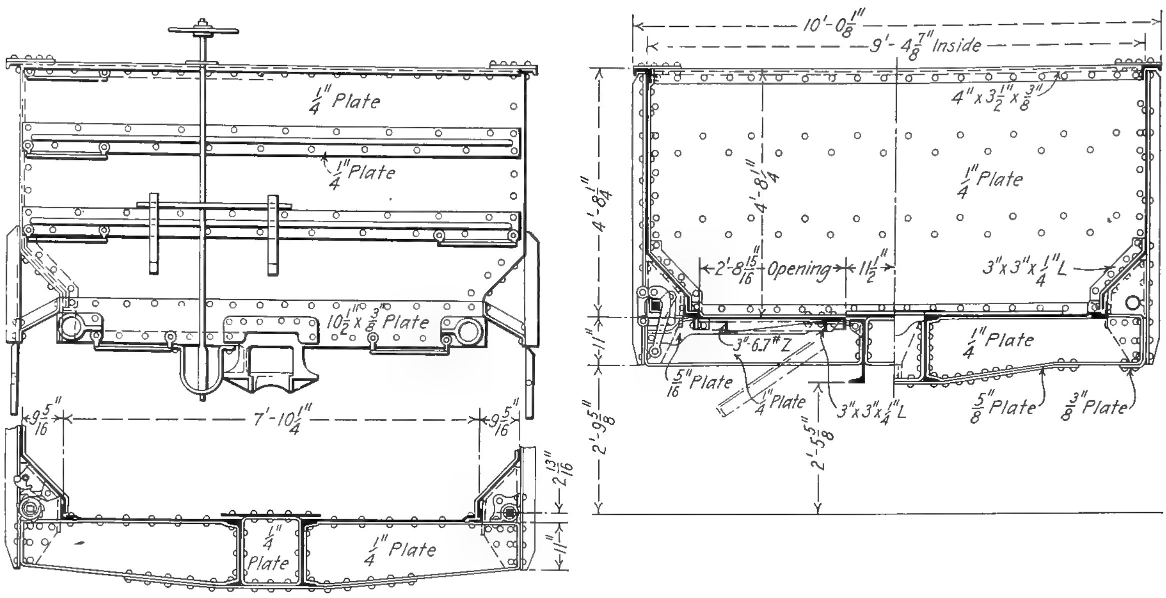


Fig. 325—Cross Sections and End Elevation of All-Steel 50-Ton Capacity Side Dump Gondola Car Shown in Fig. 324.

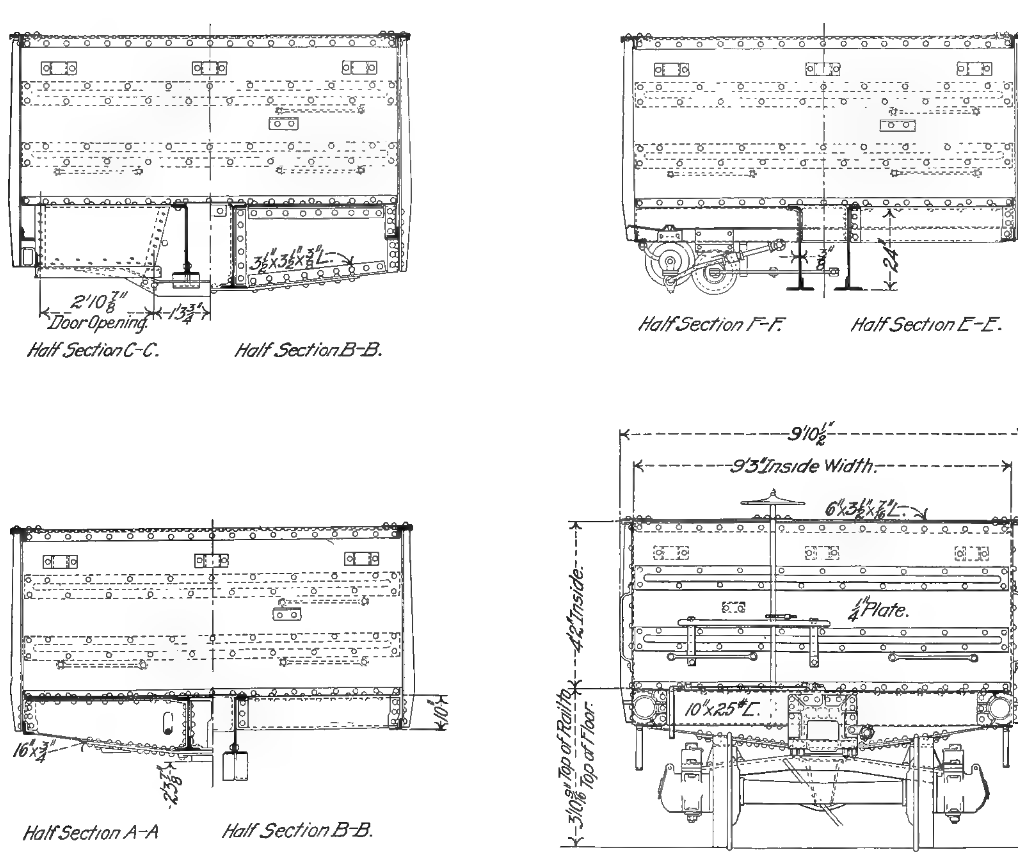


Fig. 326—End Elevation and Cross Sections of Baltimore & Ohio All-Steel 50-Ton Capacity Hopper Bottom Gondola Car Shown in Fig. 327.

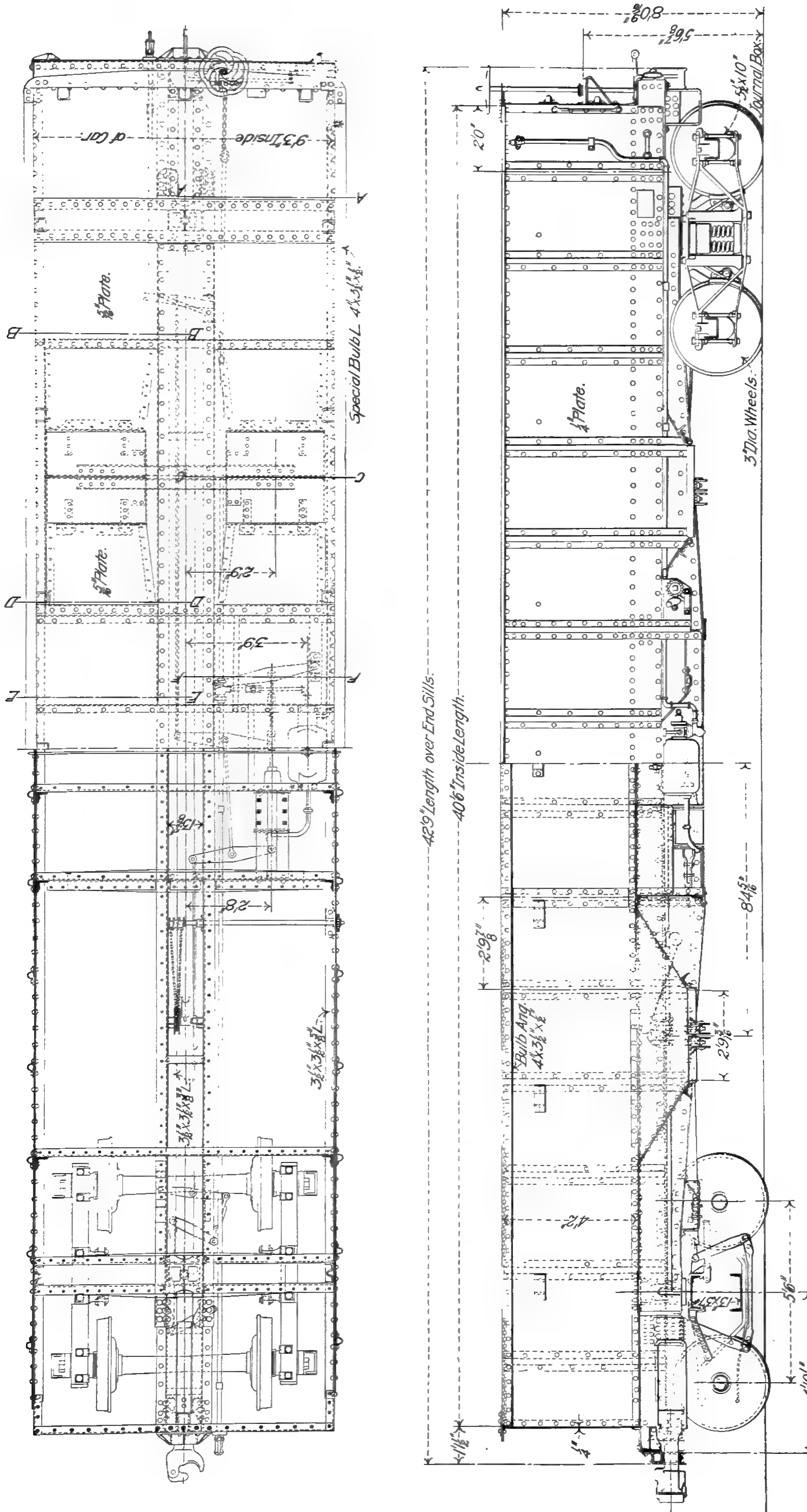


Fig. 327—Baltimore & Ohio All-Steel 50-Ton Capacity Hopper Bottom Gondola Car. See also **Fig. 326**.

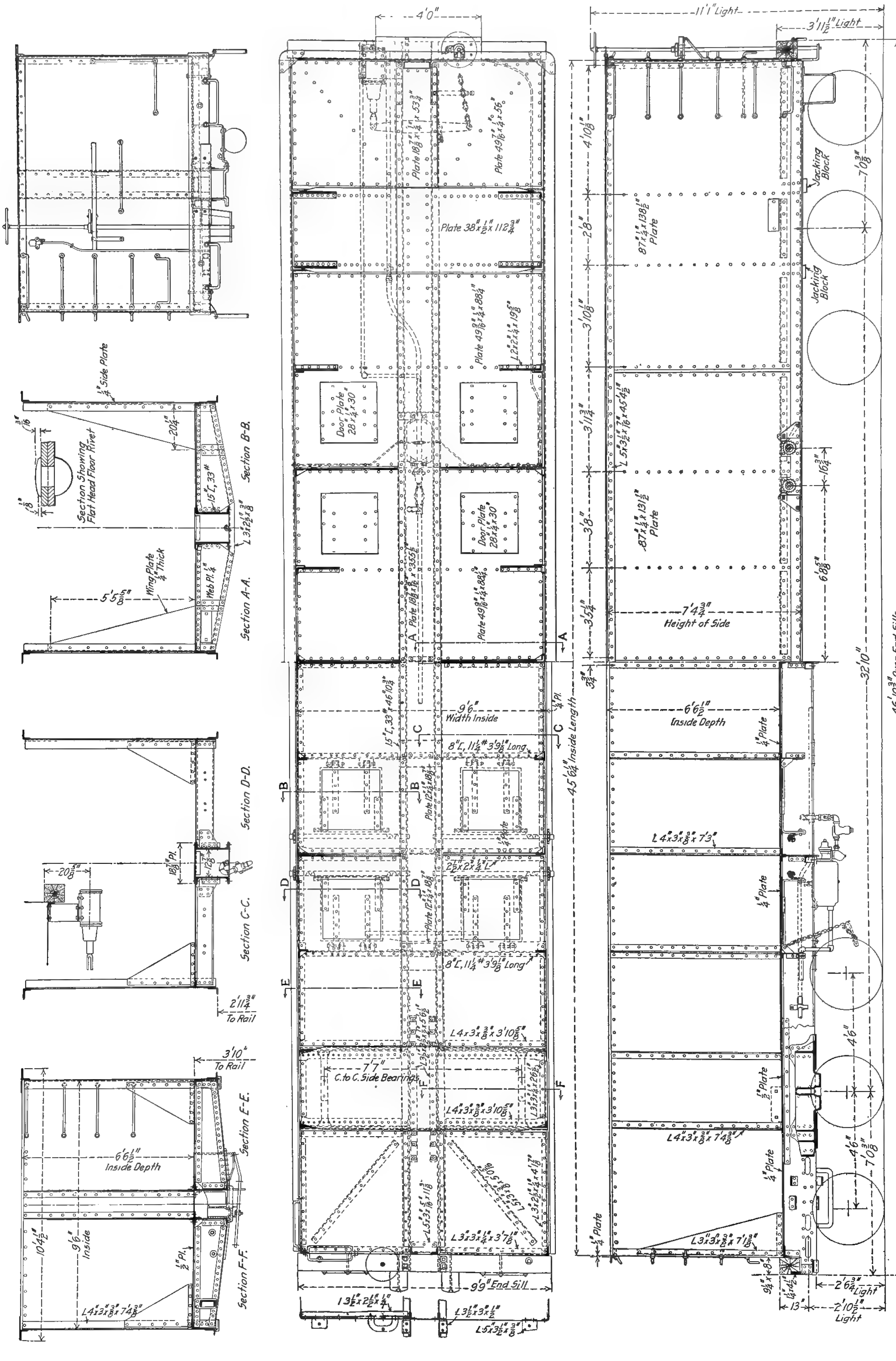


Fig. 328—Norfolk & Western All-Steel 90-Ton Capacity Gondola Car Shown in Fig. 59.

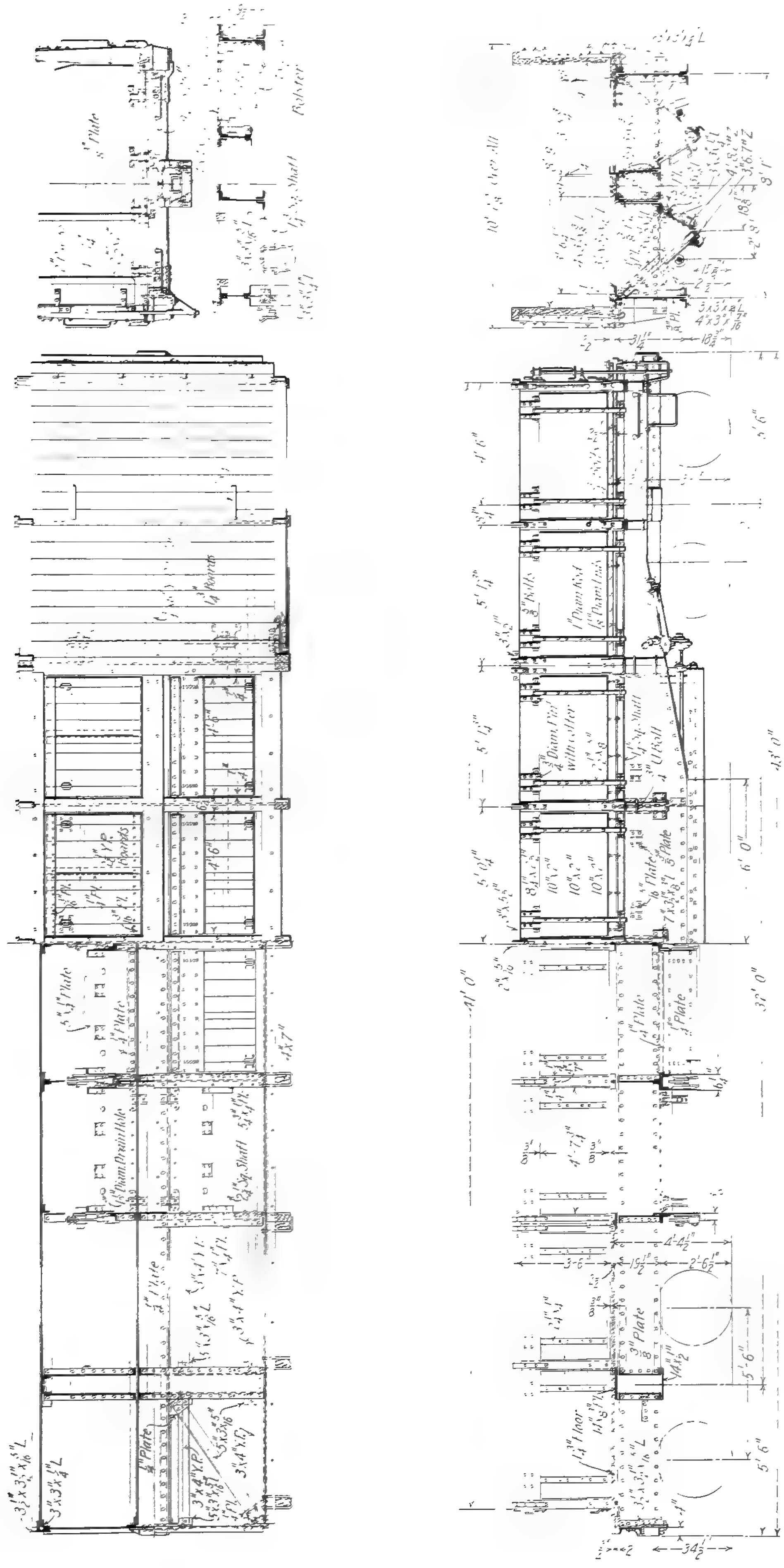


Fig. 329. All-Steel 50-Ton Capacity Convertible Plow, Gondola or Ballast Car. Builder, Enterprise Railway Equipment Co.

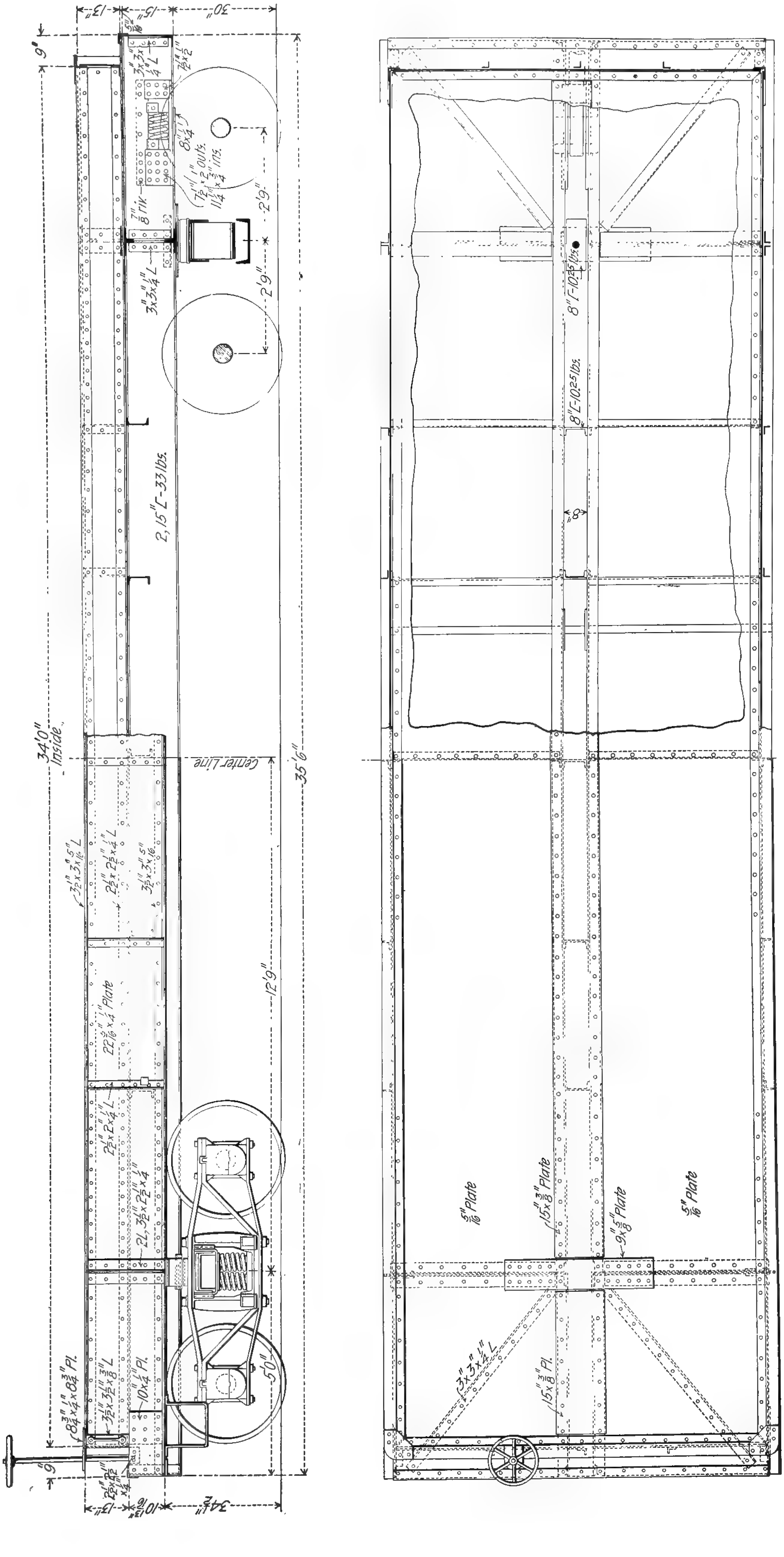


Fig. 330—All-Steel 50-Ton Capacity Solid Bottom Gondola Car with Low Sides.

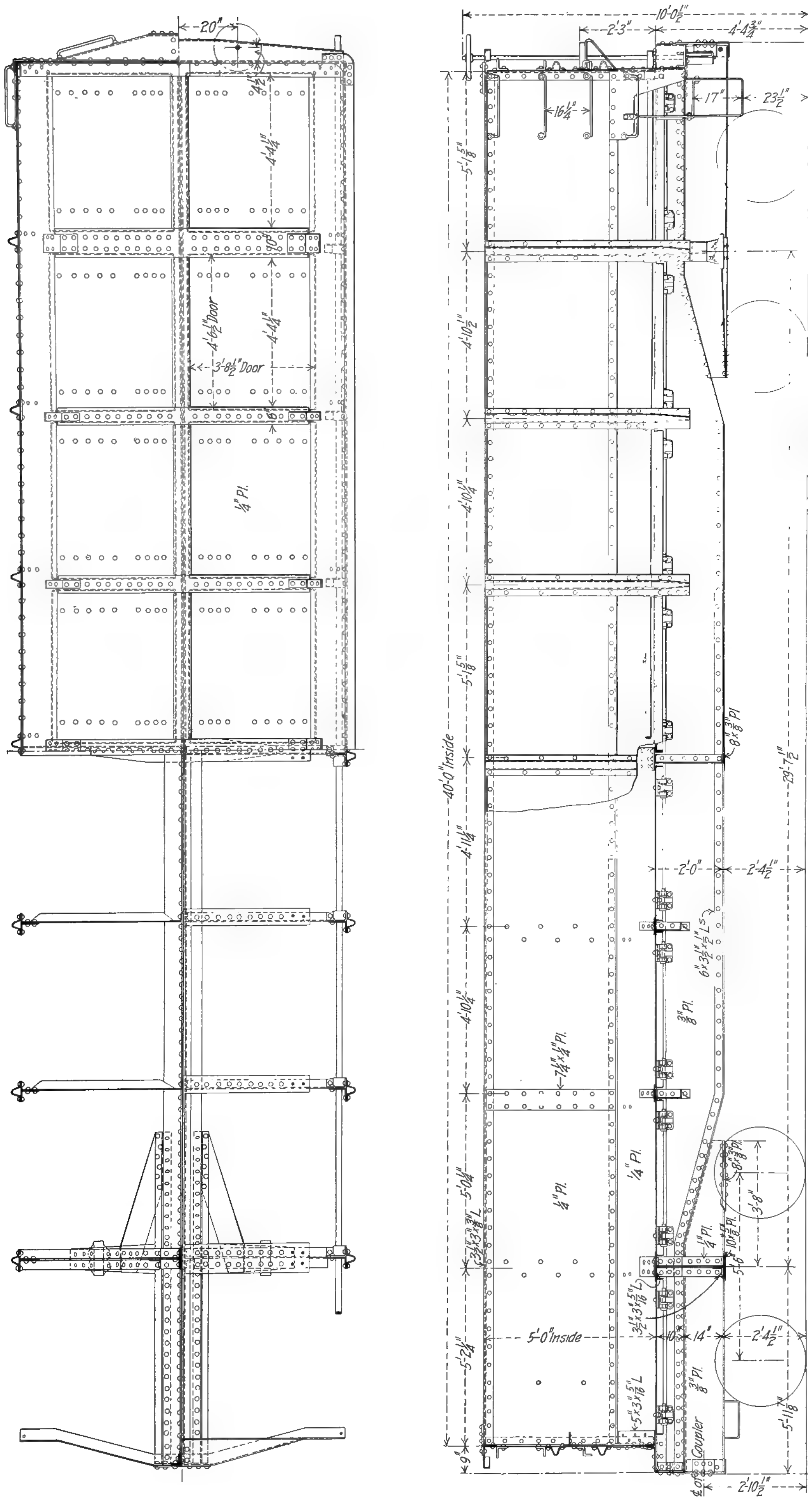


Fig. 331— All-Steel 50-Ton Capacity Drop Bottom Side Dump Gondola Car. See also Fig. 332. Builder, Standard Steel Car Company.

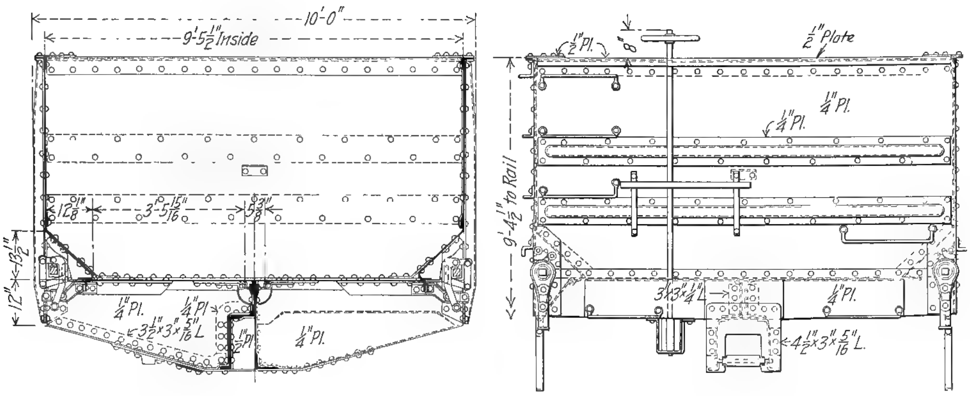


Fig. 332—Cross Sections and End Elevation of All-Steel Drop Bottom Gondola Car Shown in Fig. 335.

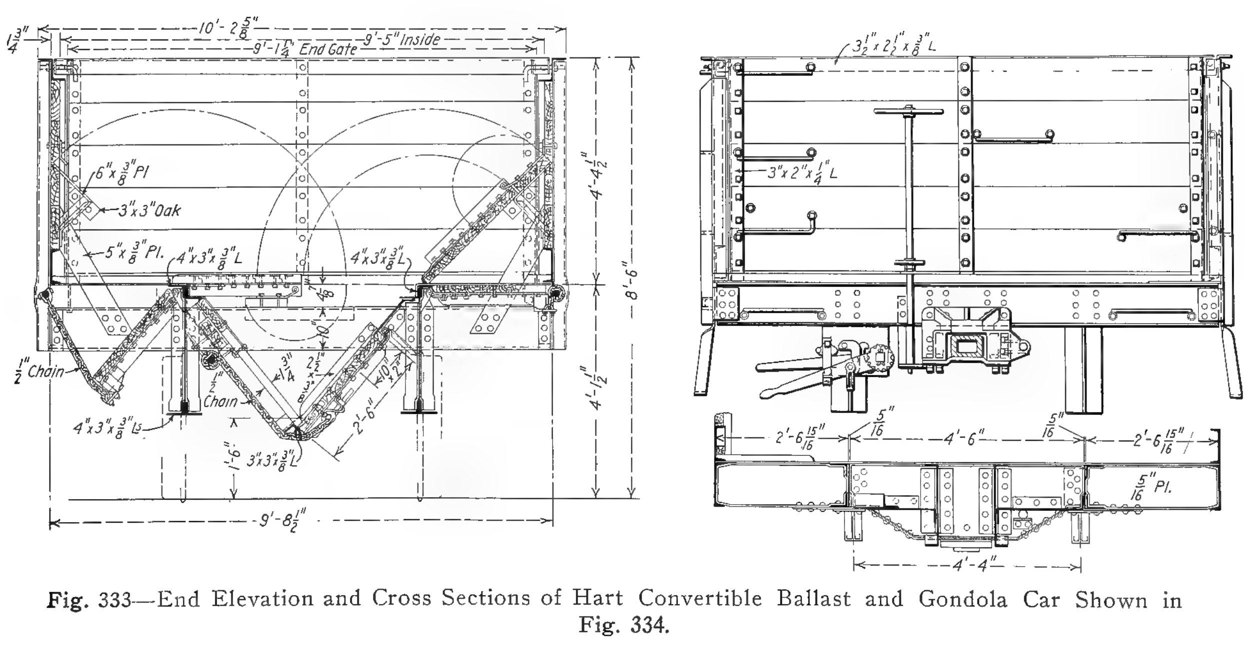


Fig. 333—End Elevation and Cross Sections of Hart Convertible Ballast and Gondola Car Shown in Fig. 334.

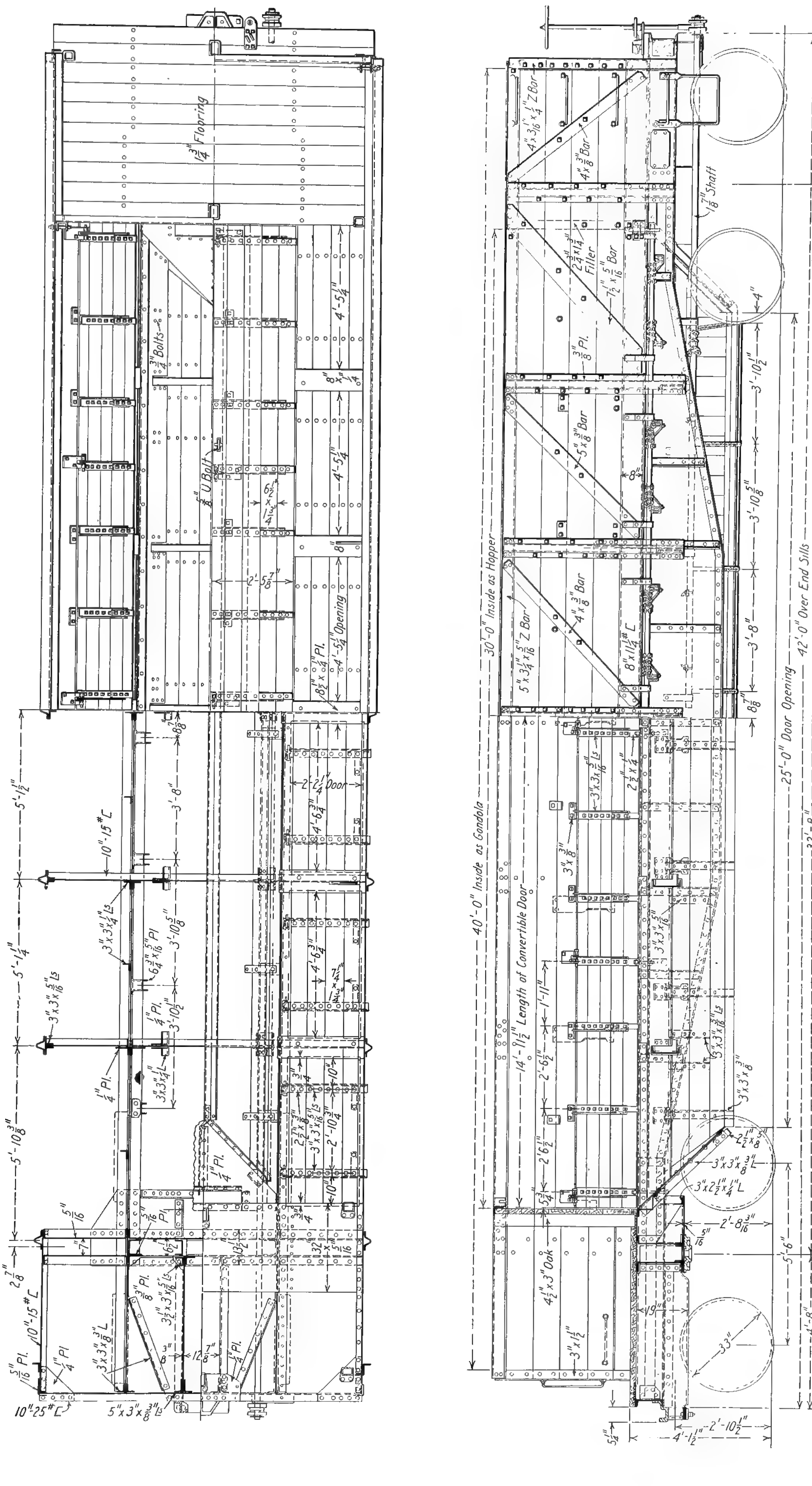


Fig. 334—Steel Underframe 50-Ton Capacity Hart Convertible Ballast and Gondola Car. See also Figs. 44 and 333. Builder, Rodger Ballast Car Co.

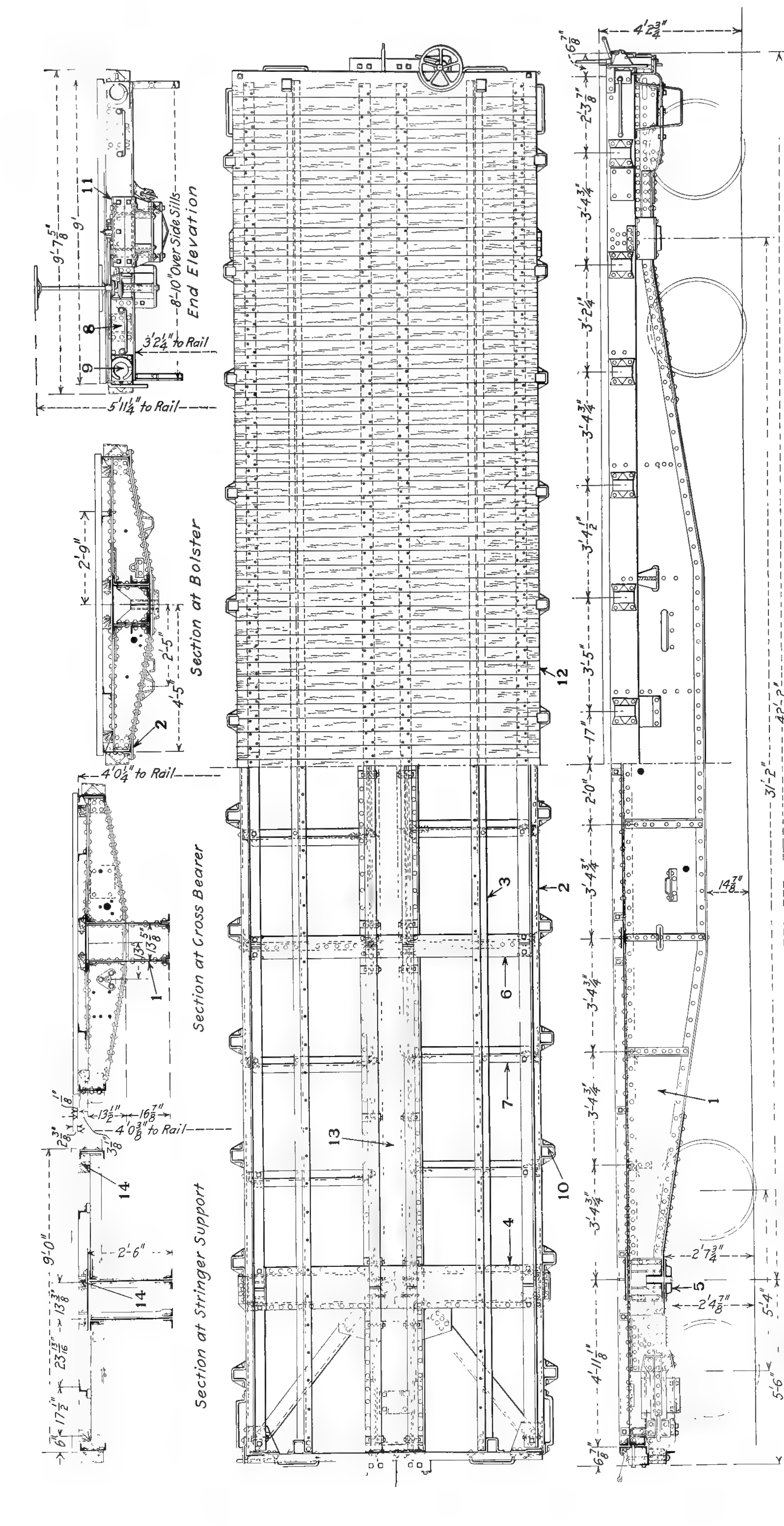


Fig. 335—Canadian Pacific Steel Frame 40-Ton Capacity Flat Car Shown in Fig. 70. Builder, Canadian Car & Foundry Company.

Flat Car Parts.

1 *Center Sill*
2 *Side Sill*
3 *Floor Stringer*
4 *Body Bolster*
5 *Center Plate*
6 *Cross Bearer*
7 *Stringer Support or Floor Beam*
8 *End Sill*
9 *Push Pole Pocket*
10 *Side Stake Pocket*
11 *Dead Wood or Buffer Block*
12 *Floor*
13 *Center Sill Cover Plate*
14 *Floor Nailing Strip*

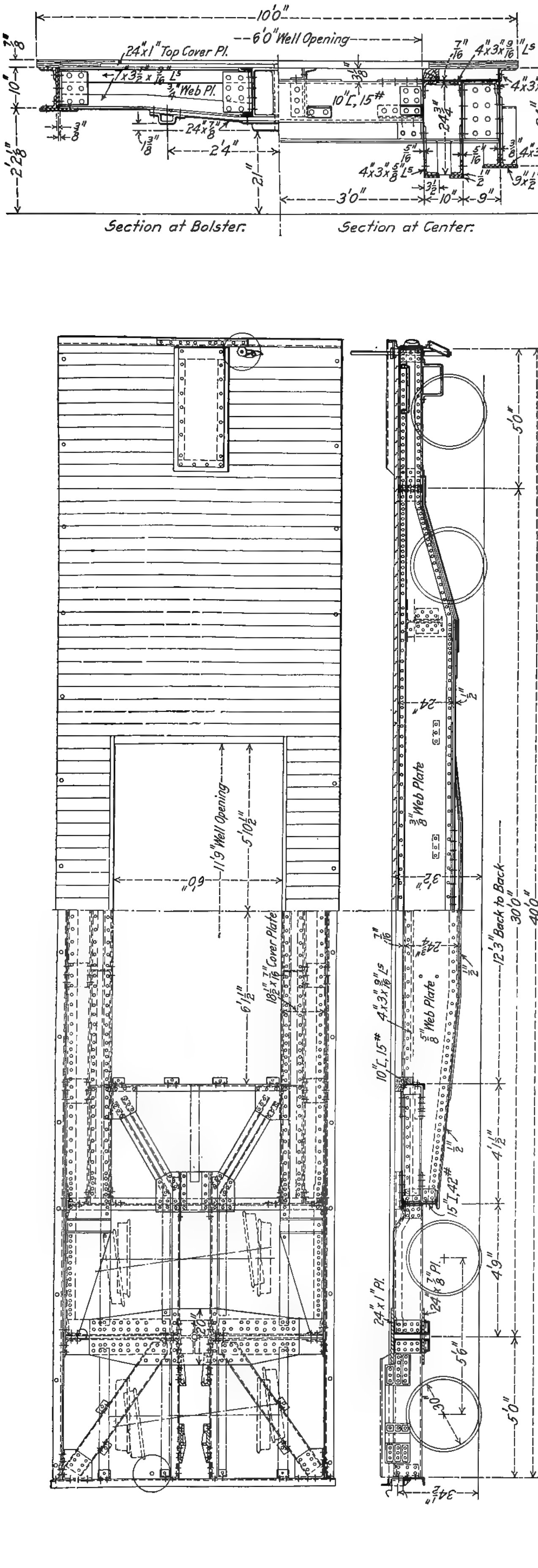


Fig. 336—Erie Railroad Steel Frame 75-Ton Capacity Well Car. Builder, American Car & Foundry Company.

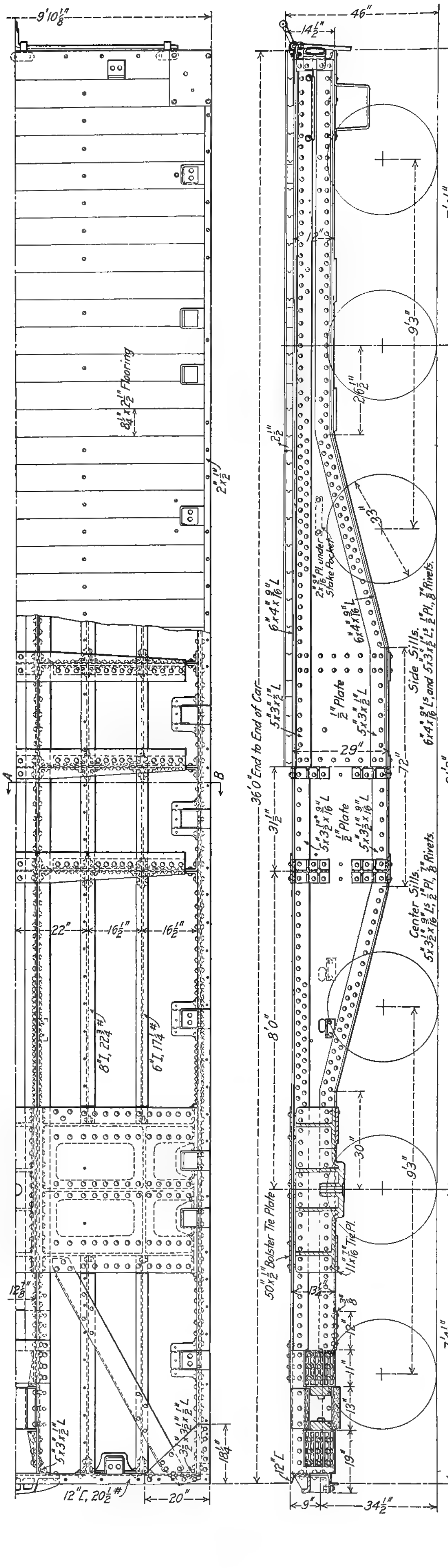


Fig. 336A—Pittsburgh & Lake Erie Steel Frame 100-Ton Capacity Flat Car.

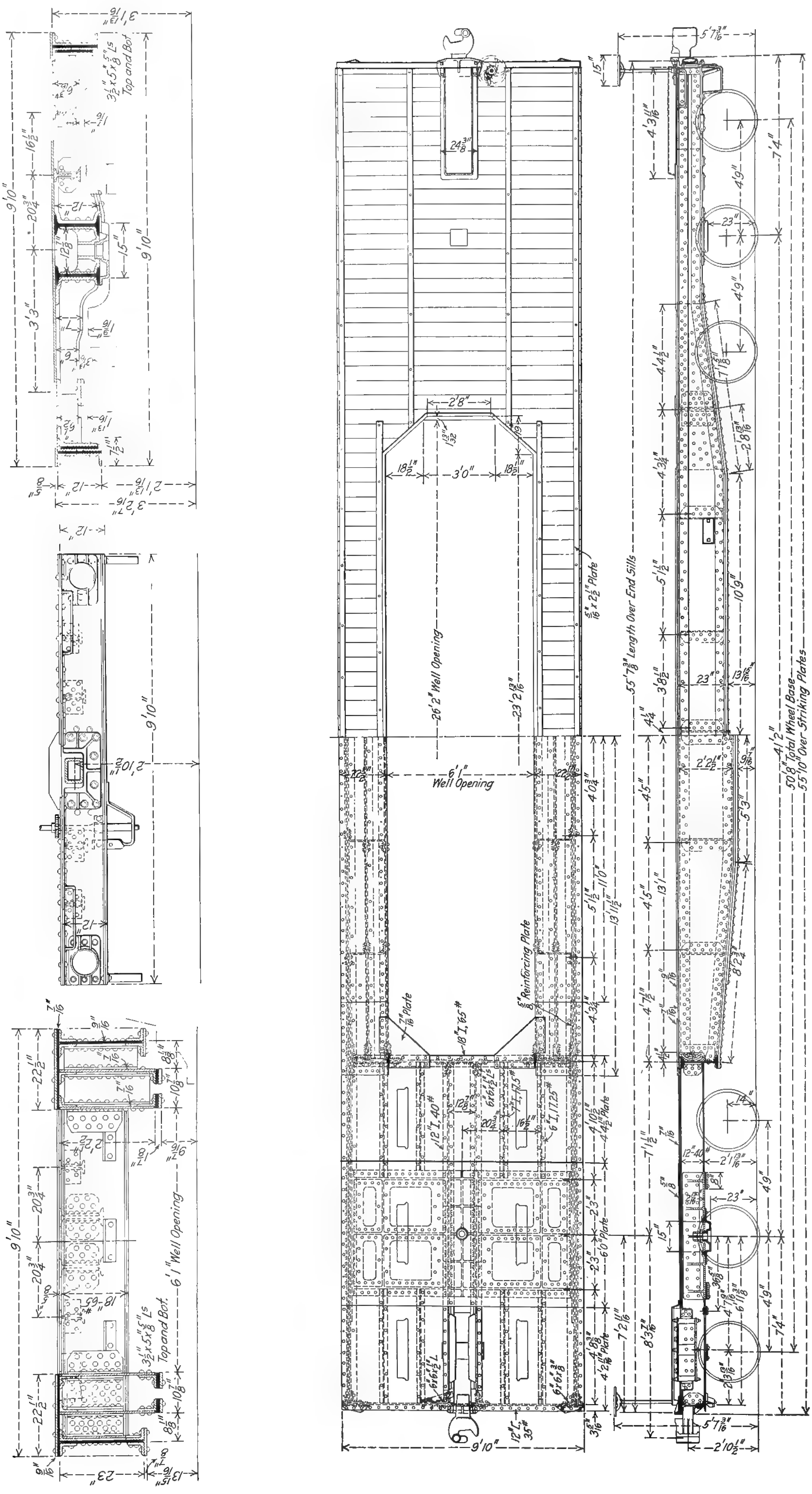


Fig. 337—Lehigh Valley Steel Frame 110-Ton Capacity Well Car Shown in Fig. 78.

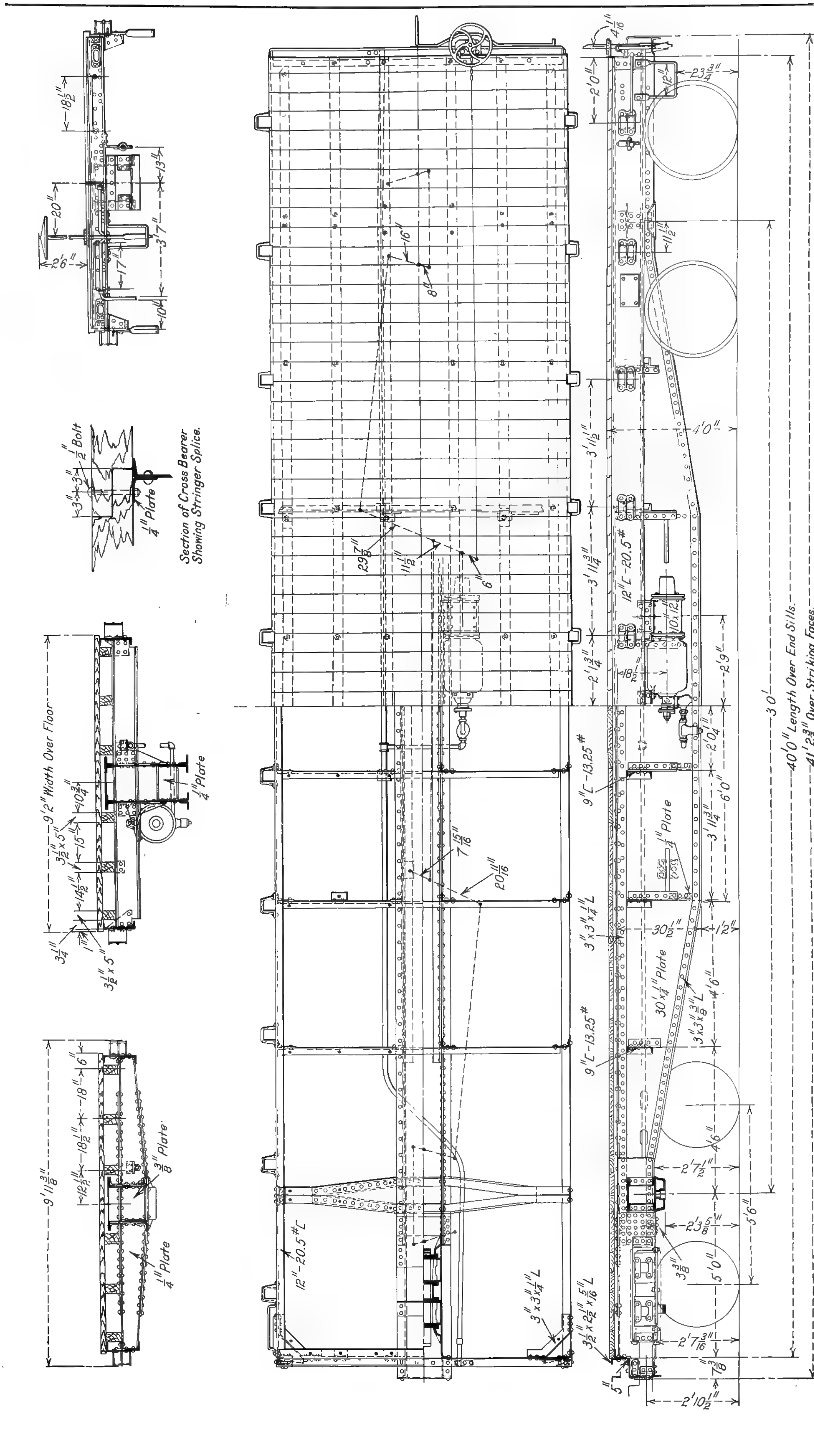


Fig. 338—Akron, Canton & Youngstown Steel Frame 50-Ton Capacity Flat Car. Builder, American Car & Foundry Company.

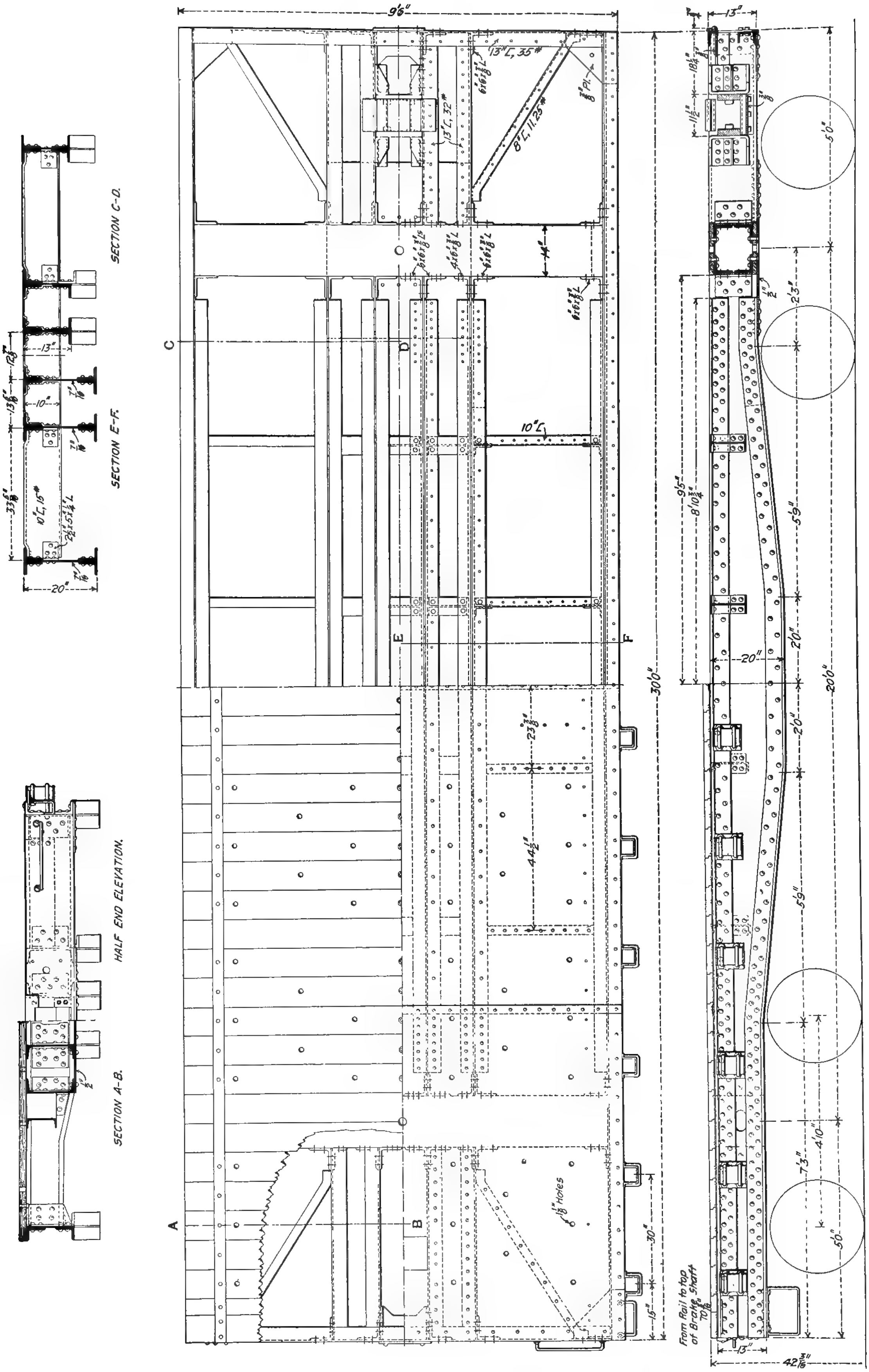


Fig. 339—Pittsburgh & Lake Erie Steel Frame 75-Ton Capacity Flat Car.

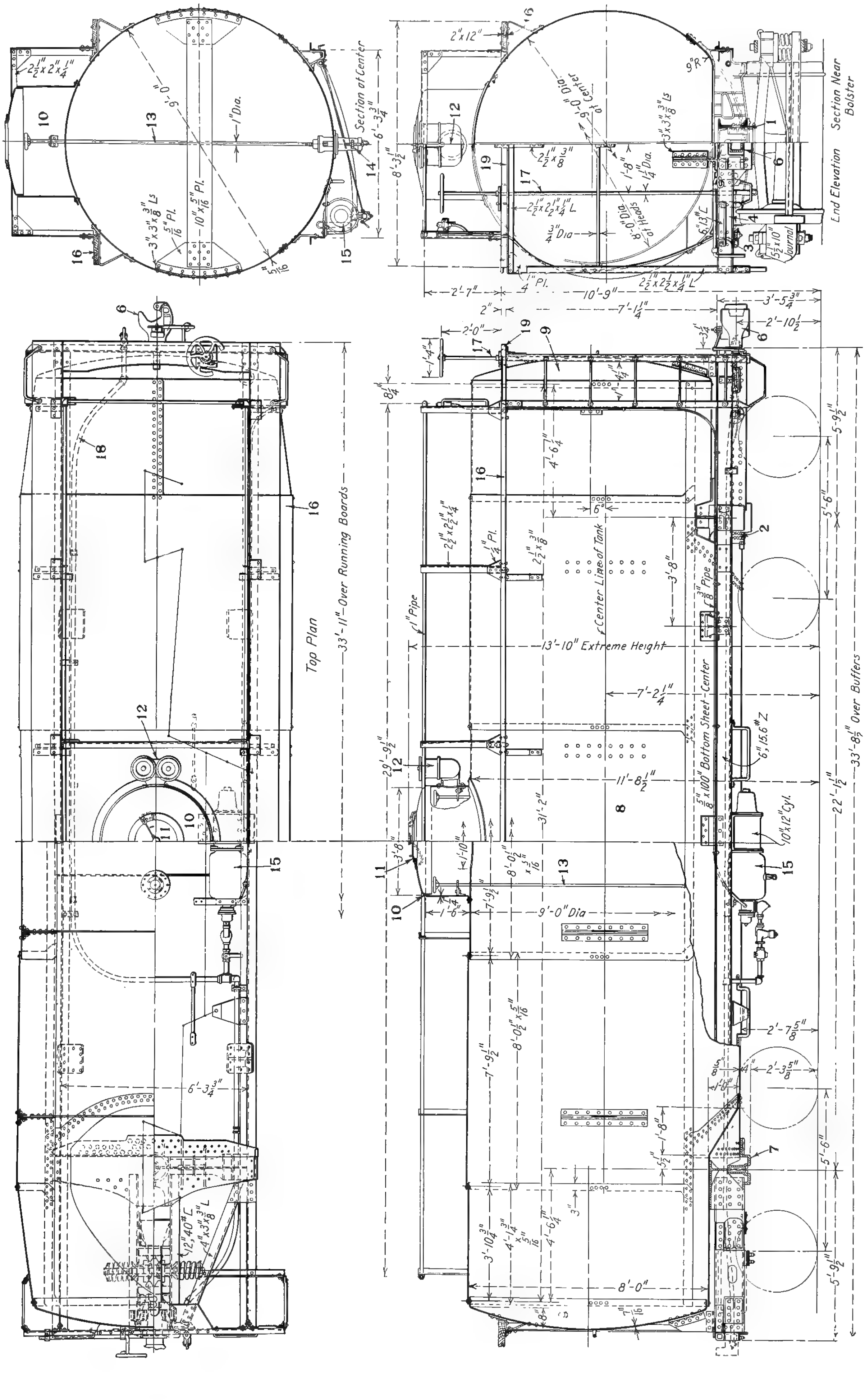
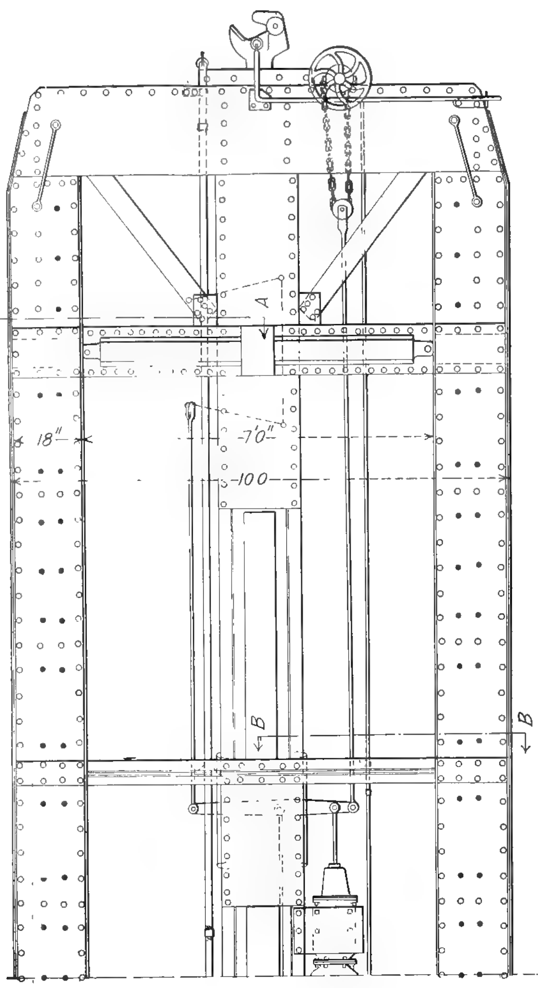
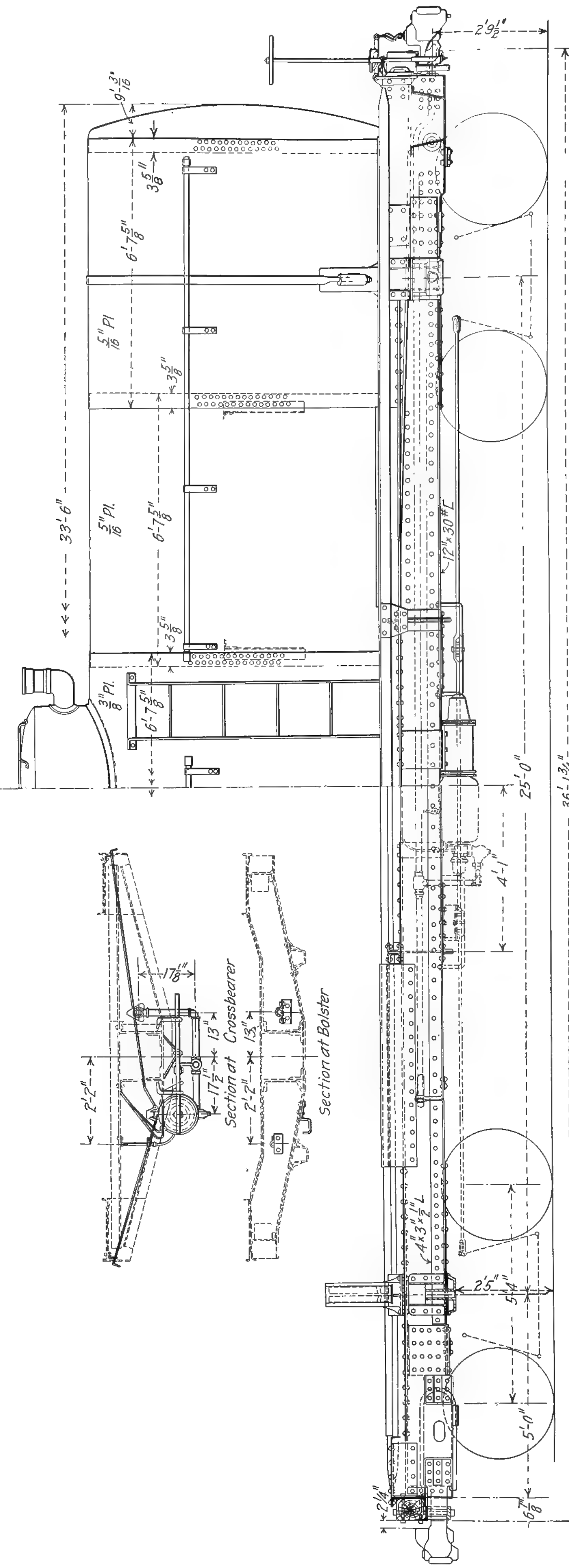


Fig. 340—Steel Tank Car Shown in Fig. 84. Capacity, 14,500 U. S. Gallons. Builder, Chicago Steel Car Co.

See Page 336 for Names of Numbered Parts.





Tank Car Parts—See Fig. 340.

1 Center Sill
2 Body Bolster
3 Side Sill
4 End Sill
6 Coupler or Drawbar
7 Center Plate
8 Tank
9 Tank Head
10 Dome
11 Manhole Cover
12 Safety Valve
13 Valve Rod
14 Outlet Valve
15 Brake Cylinder
16 Running Board
17 Hand Brake Shaft
18 Brake Pipe
19 Hand Brake Step

Fig. 341—Canadian Pacific Steel Frame Tank Car Shown in Fig. 81. Capacity, 8,000 Imperial Gallons. Builder, Canadian Car & Foundry Company.

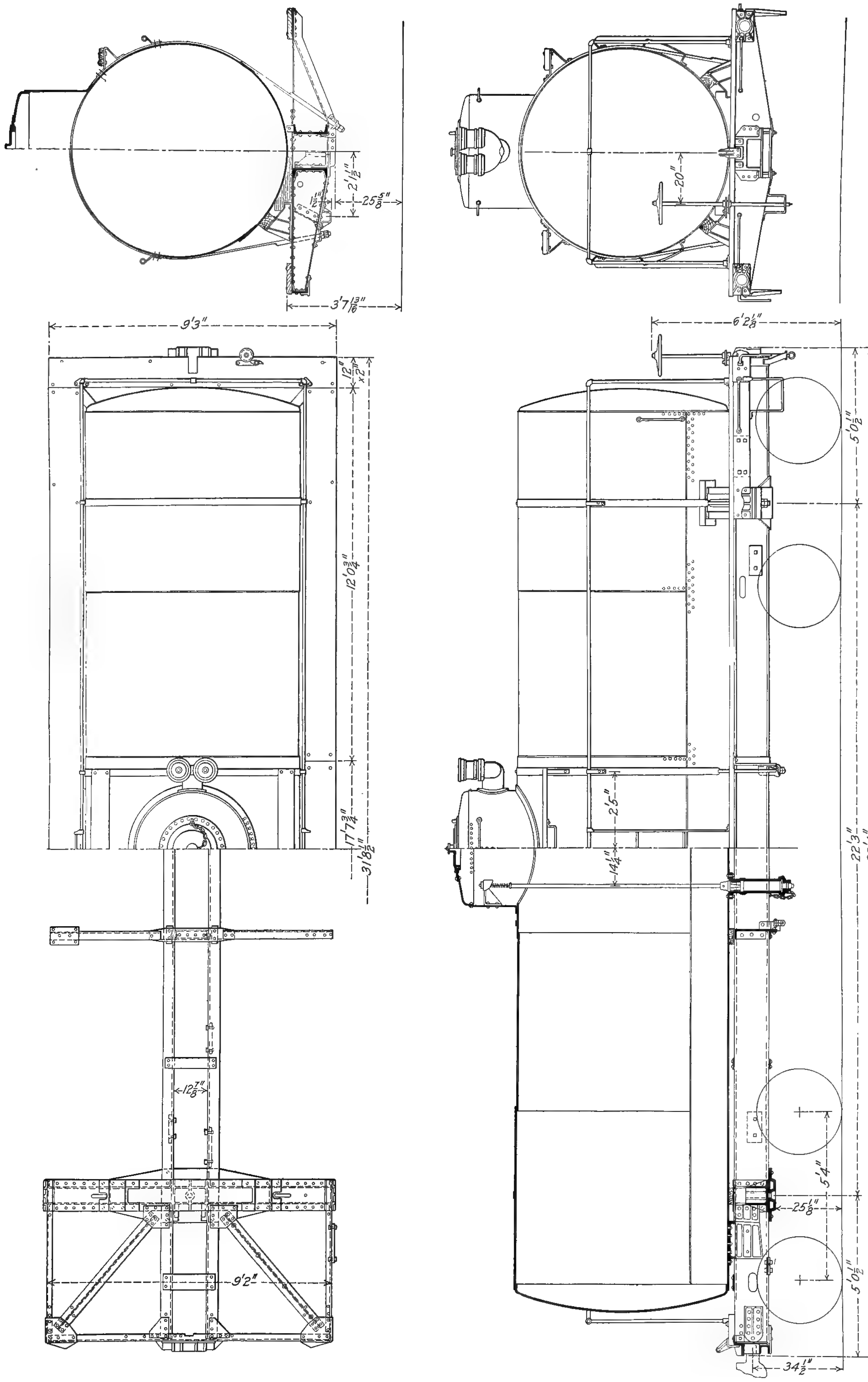


Fig. 342—American Car & Foundry Company Type 7 Tank Car, Capacity 8,000 U. S. Gallons.

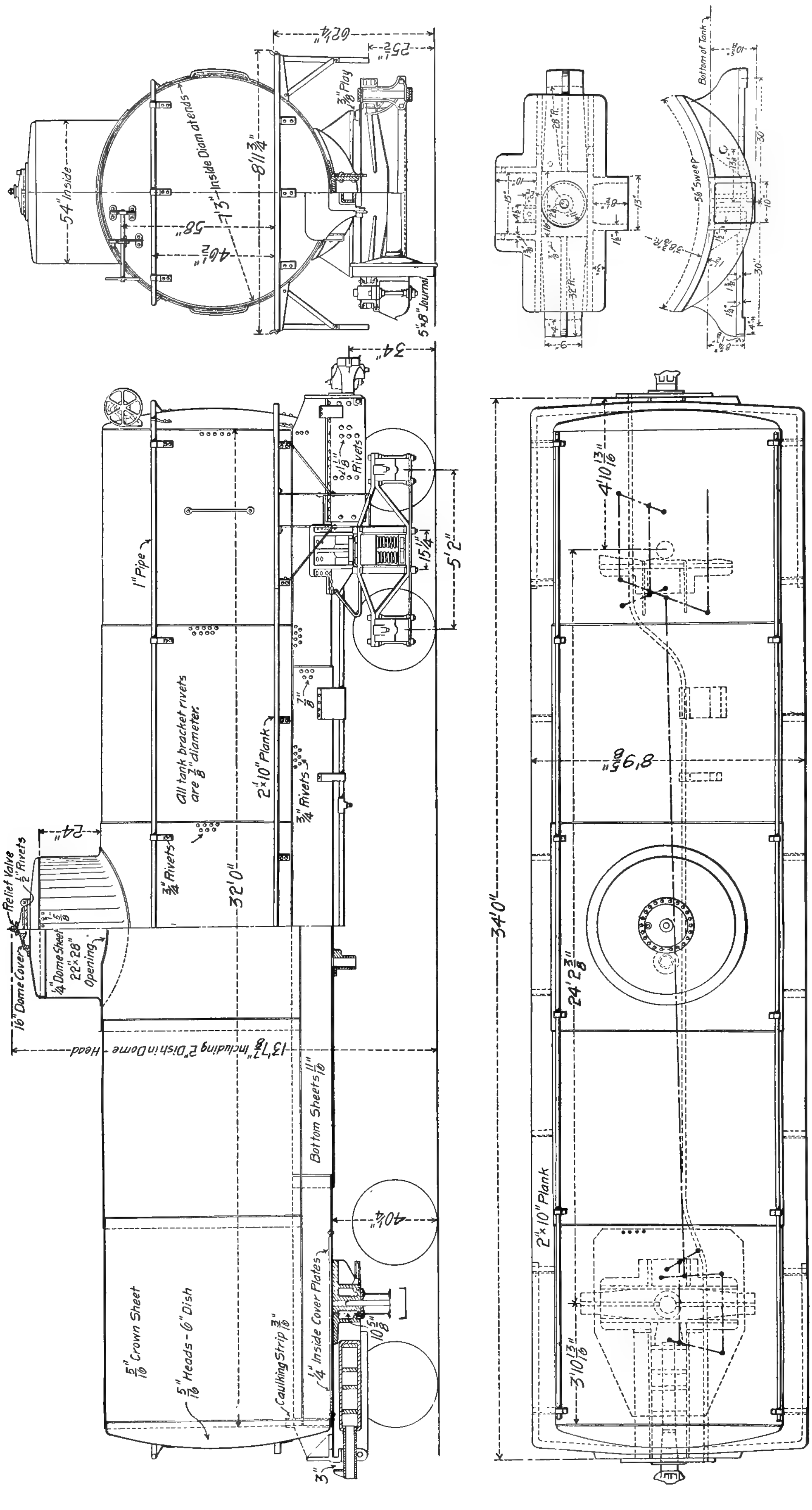


Fig. 343—Union Tank Line Steel Frame Tank Car. Built Under the Van Dyke Patents. Capacity, 10,000 U. S. Gallons.

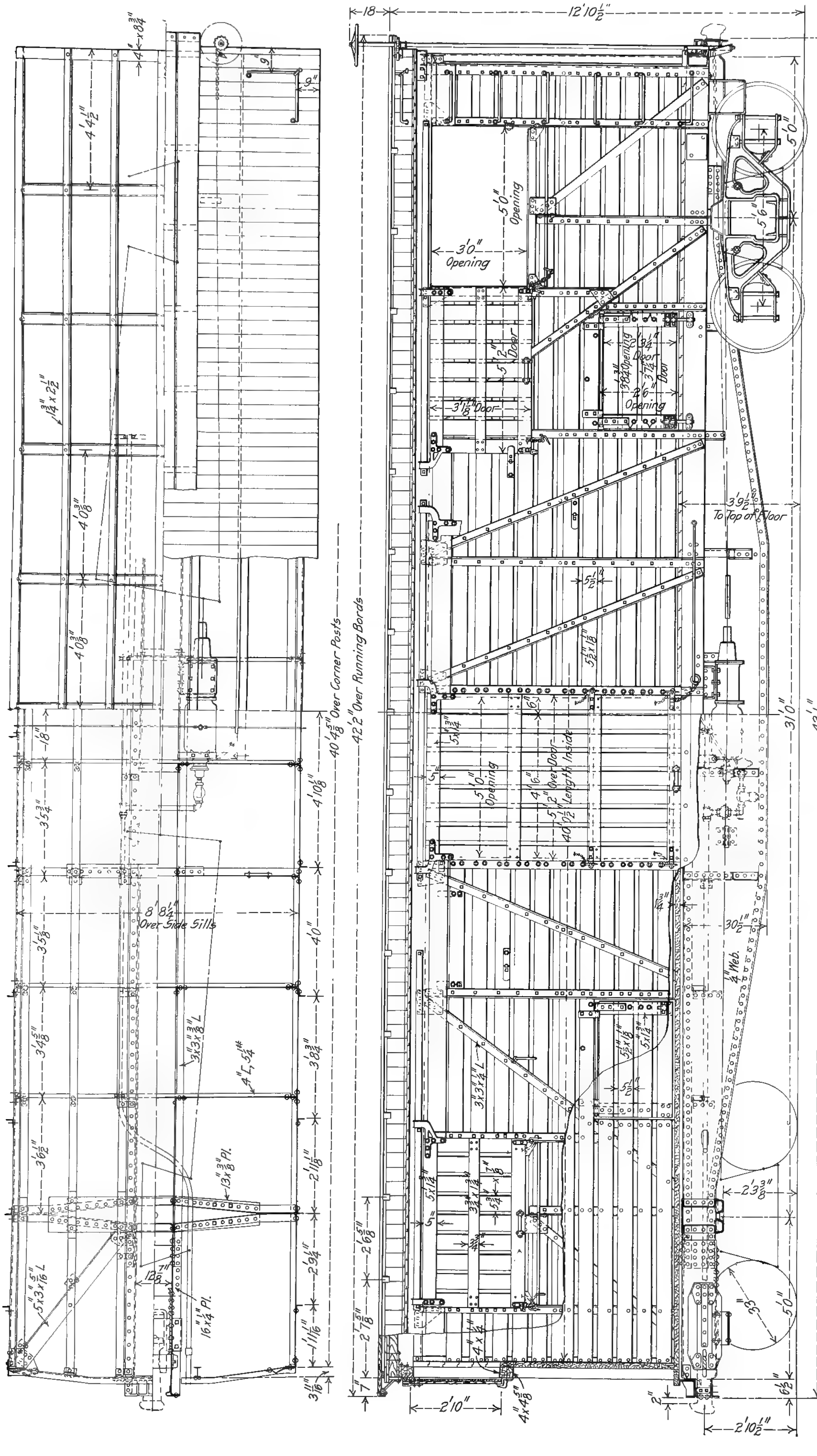


Fig. 344—Missouri Pacific Steel Frame 40-Ton Capacity Stock Car. Builder, American Car & Foundry Company. See also Fig. 345.

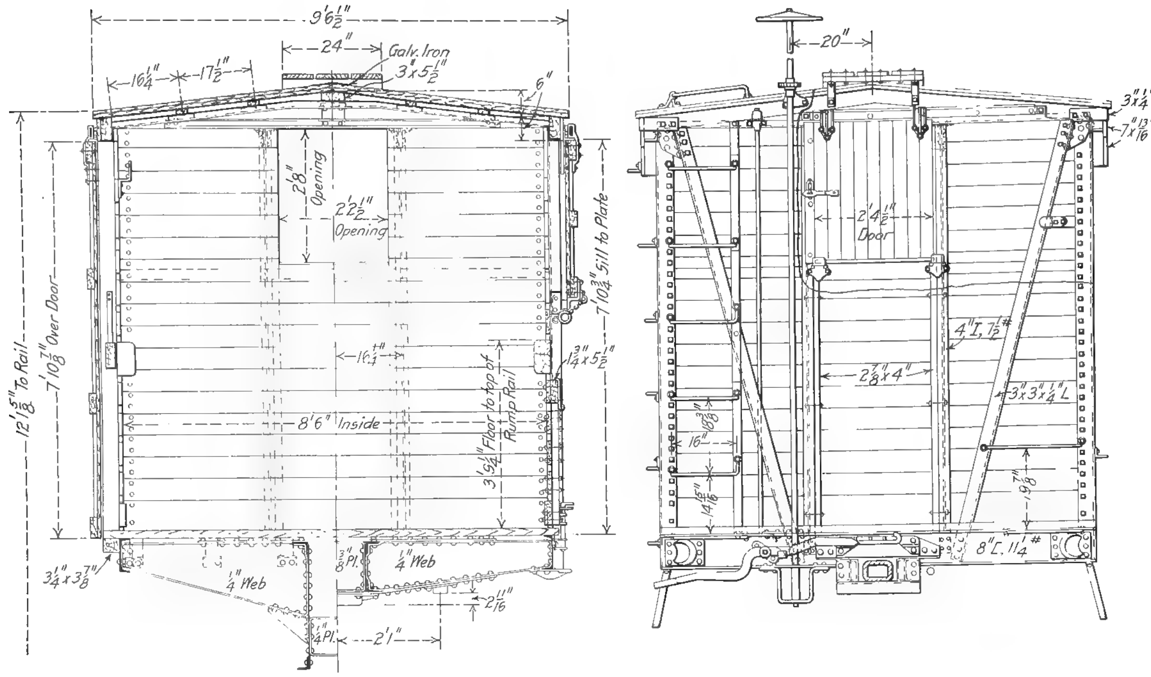


Fig. 345—Cross Sections and End Elevation of Missouri Pacific Steel Frame Stock Car Shown in Fig. 344.

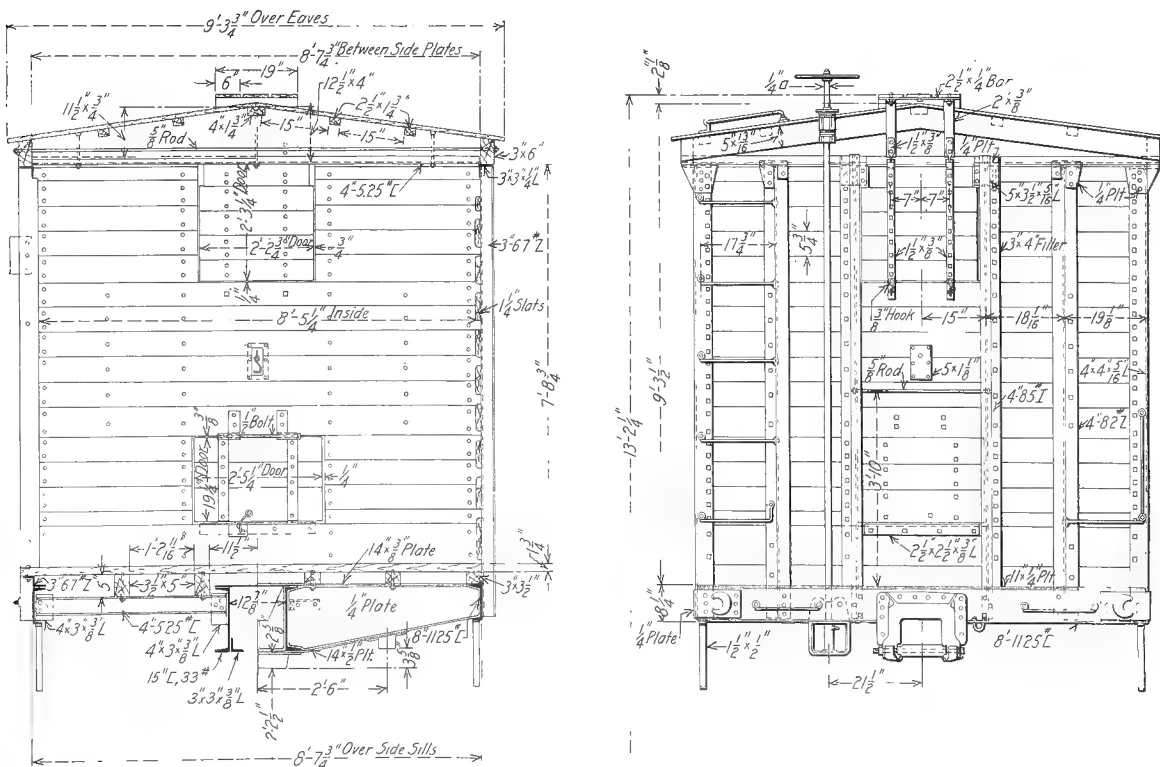


Fig. 346—End Elevation and Cross Sections of Mather 40-Ton Capacity Steel Frame Stock Car. See also Fig. 347.

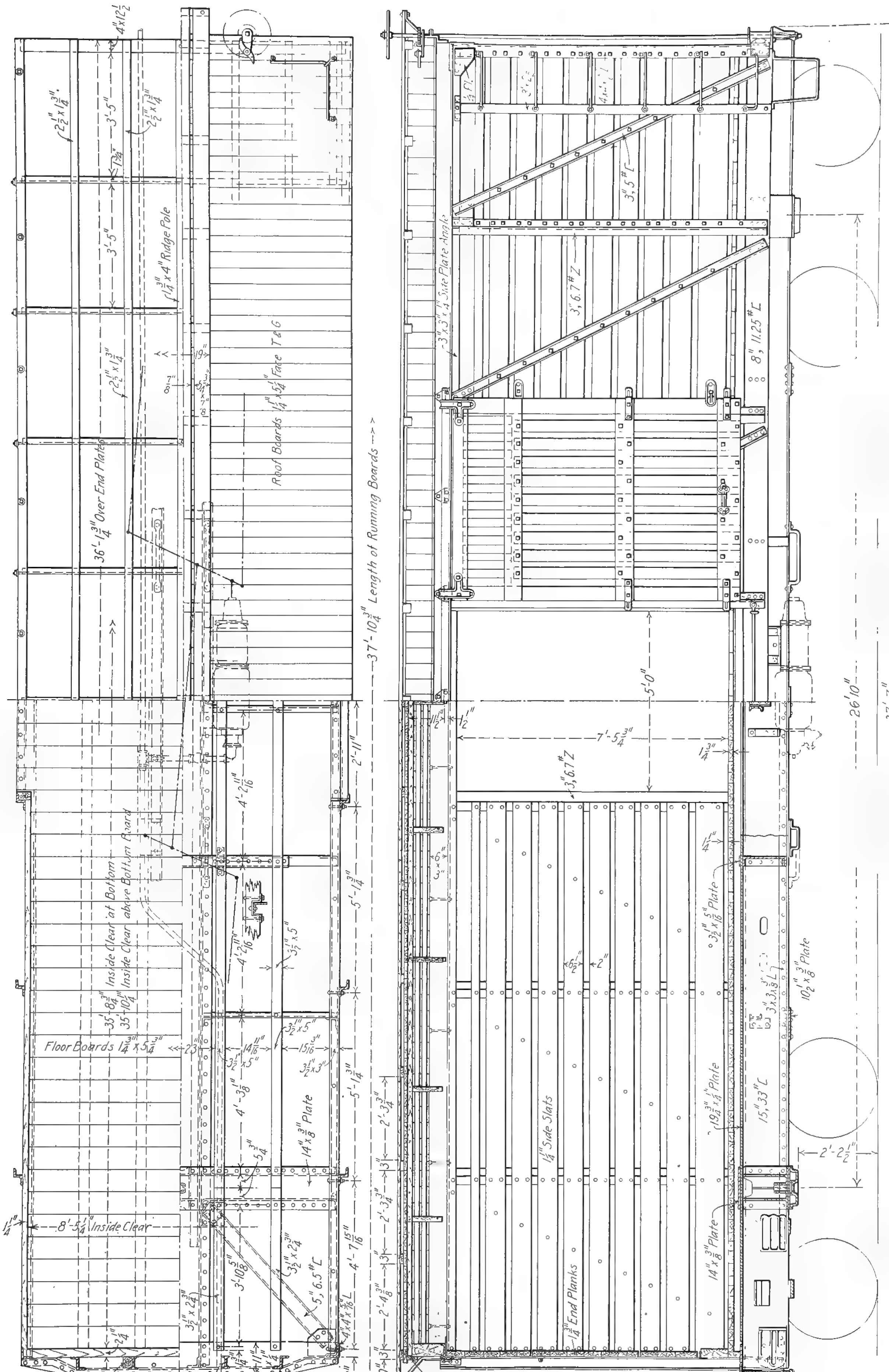


Fig. 347—Mather 40-Ton Capacity Steel Frame Stock Car Shown in Figs. 94 and 346.

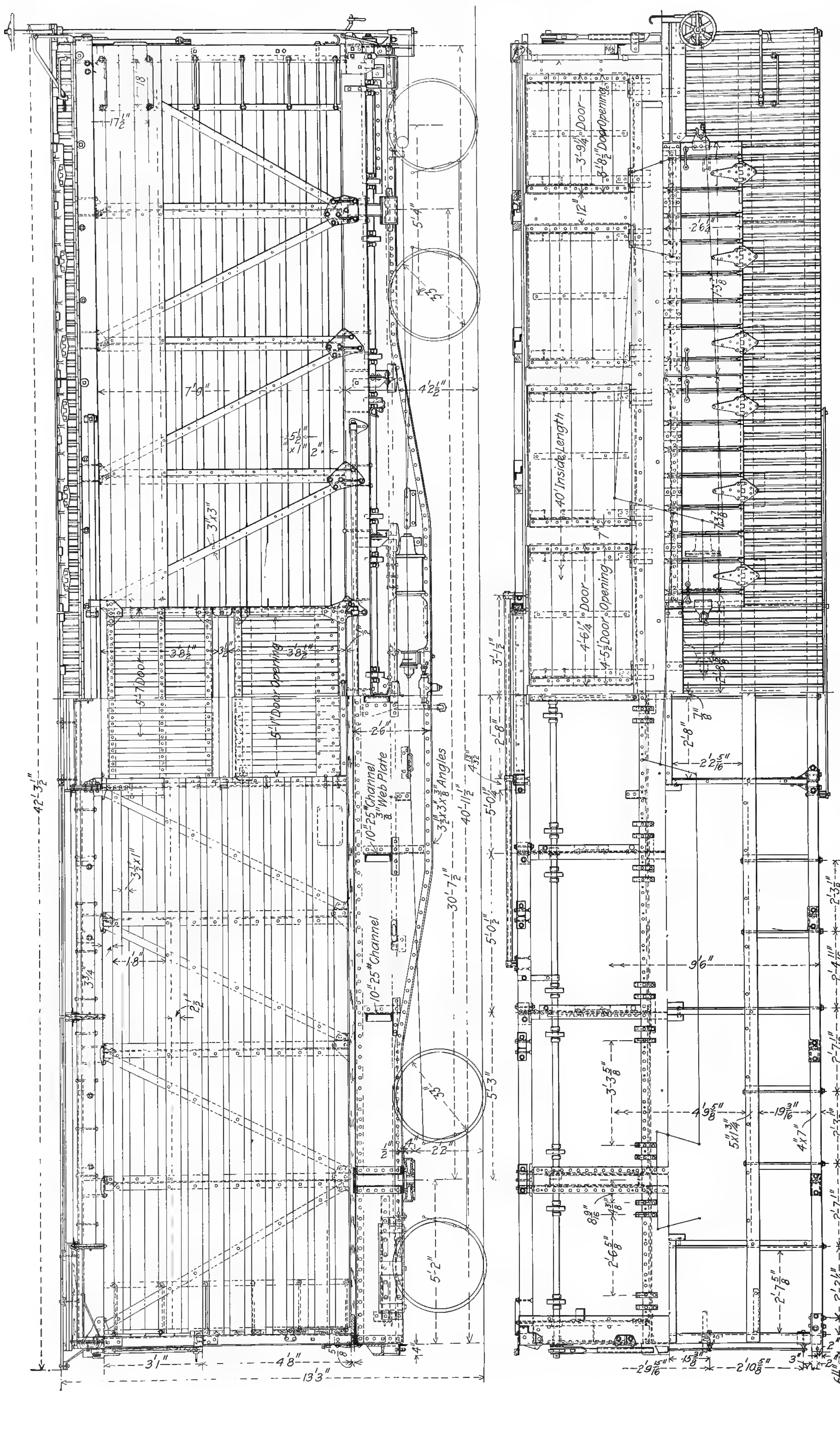


Fig. 348—Atchison, Topeka & Santa Fe Steel Frame 40-Ton Capacity Drop Bottom Stock and General Service Car. See Also Fig. 349. Builder, National Dump Car Company.

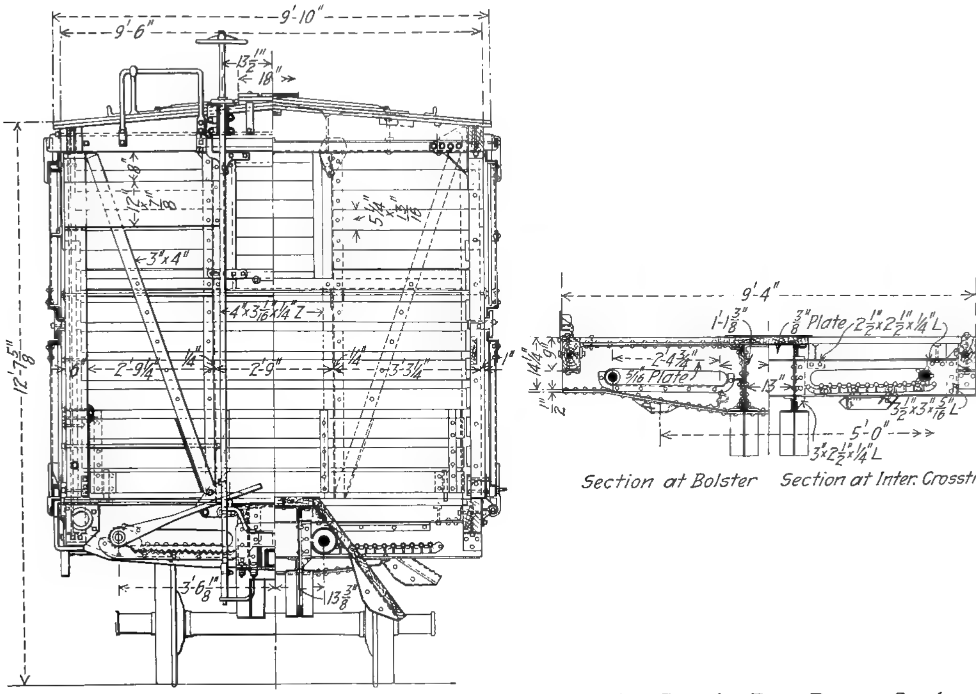


Fig. 349—End Elevation and Cross Sections of Steel Frame 40-Ton Capacity Drop Bottom Stock and General Service Car Shown in Fig. 348.

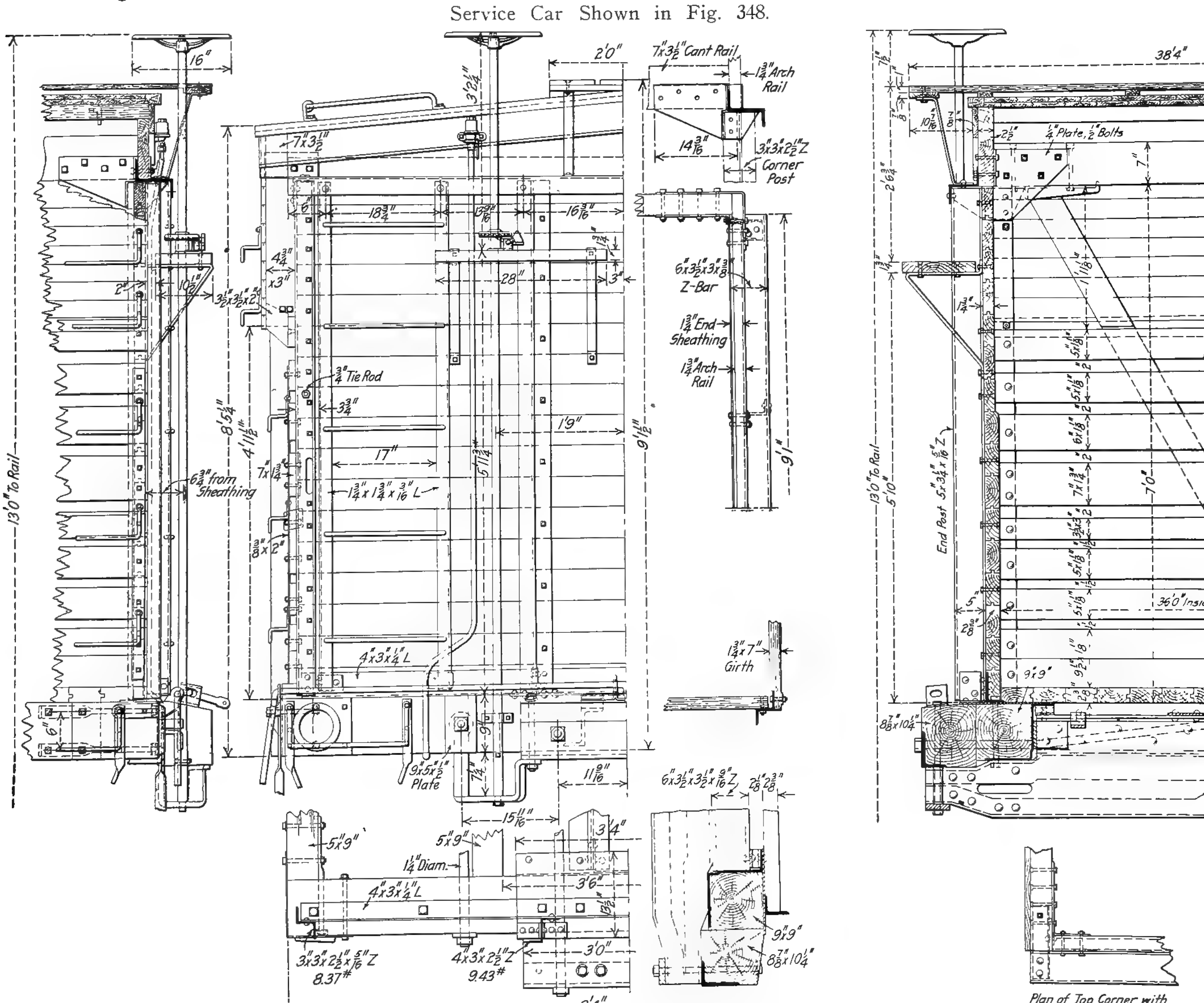


Fig. 350—End Arrangement Used on Canadian Pacific Stock Cars.

Refrigerator Car Parts—See Figs. 351 and 352.

1	*Center Sill*	14	*Floor Stringer*
2	*Side Sill*	16	*Floor Grating*
3	*End Sill*	17	*Roof*
4	*Body Bolster*	18	*Ceiling*
5	*Crossbearer*	19	*Side Door*
6	*Sheathing*	20	*Main Floor*
7	*Hand Brake Shaft*	21	*End Brace*
8	*Hatch*	22	*End Post*
9	*Ice Bunker*	23	*Furring*
10	*Bulkhead*	24	*Ladder*
11	*Insulation*	25	*Running Board*
12	*Brace*	26	*Center Plate*
13	*Post*		

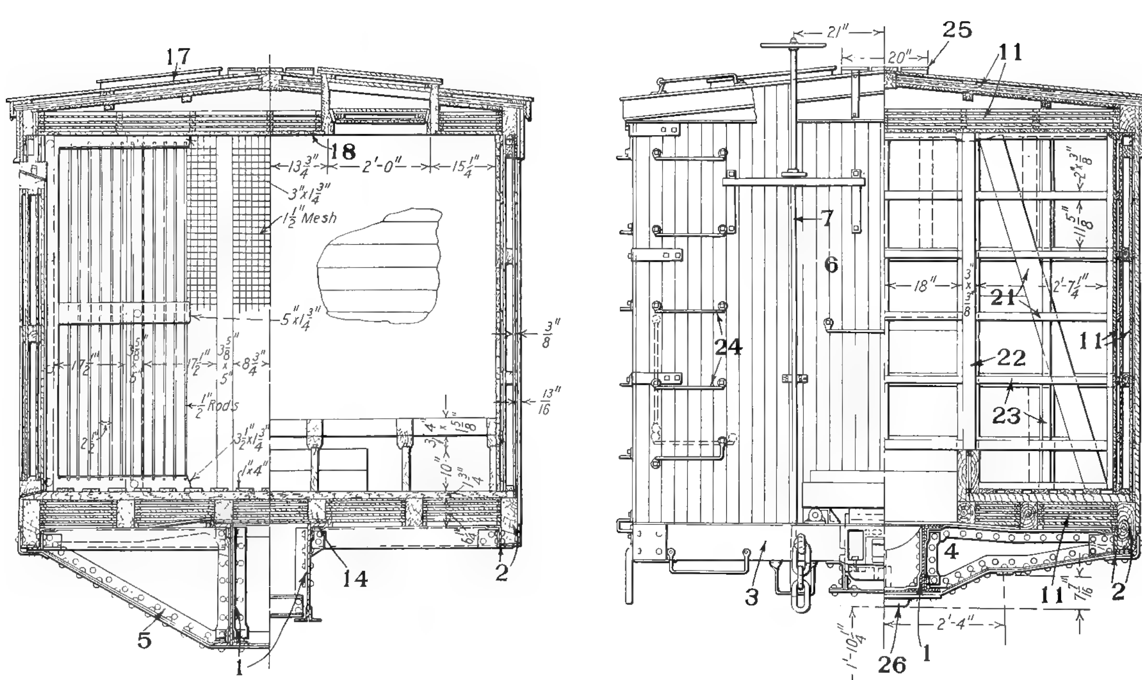


Fig. 351—End Elevation and Cross Sections of Northern Pacific Steel Underframe Refrigerator Car for Express Service. See also Fig. 352.

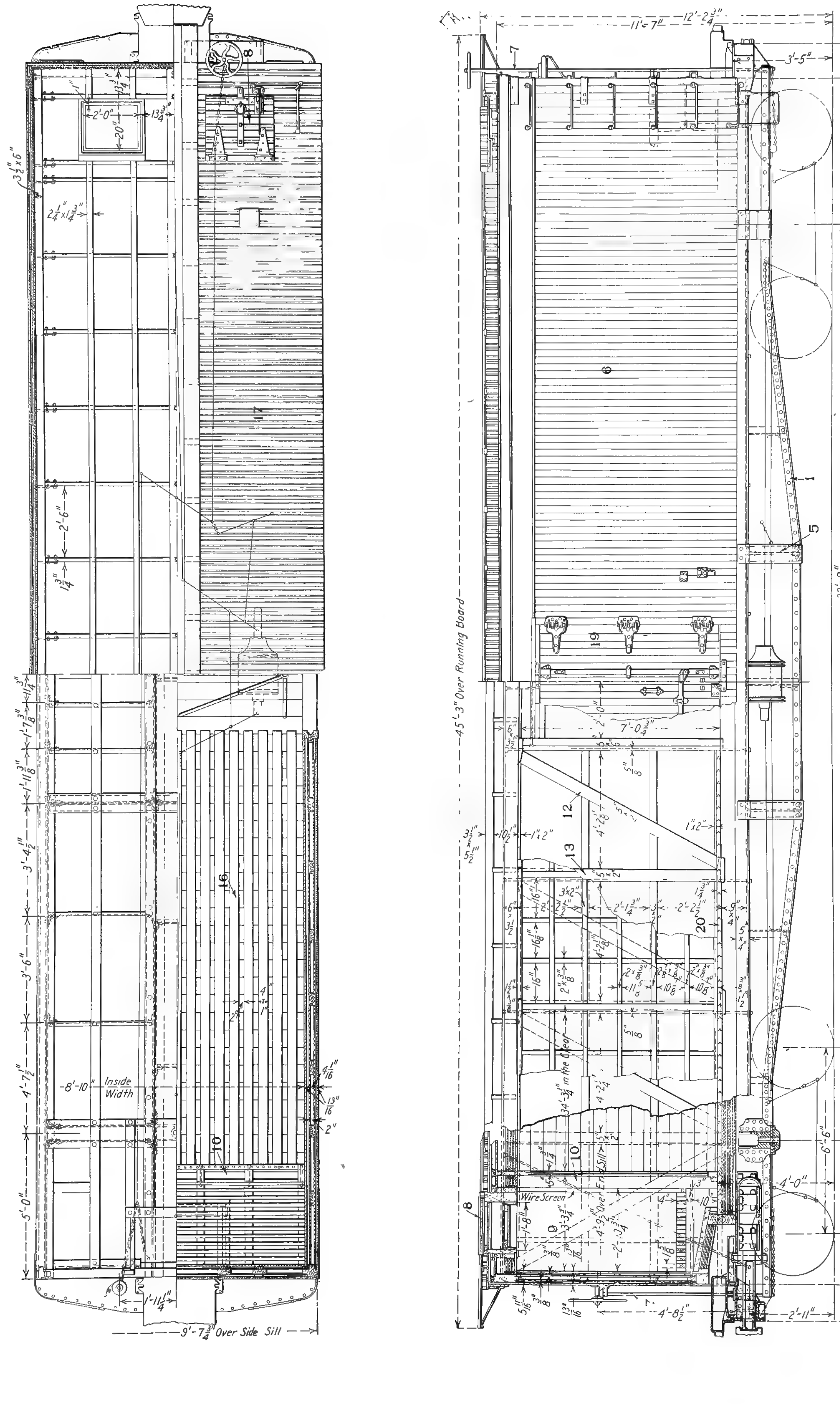


Fig. 352—Northern Pacific Steel Underframe Refrigerator Car for Express Service. See also Figs. 108 and 351. Builder, Pressed Steel Car Co.

See Page 344 for Names of Numbered Parts.

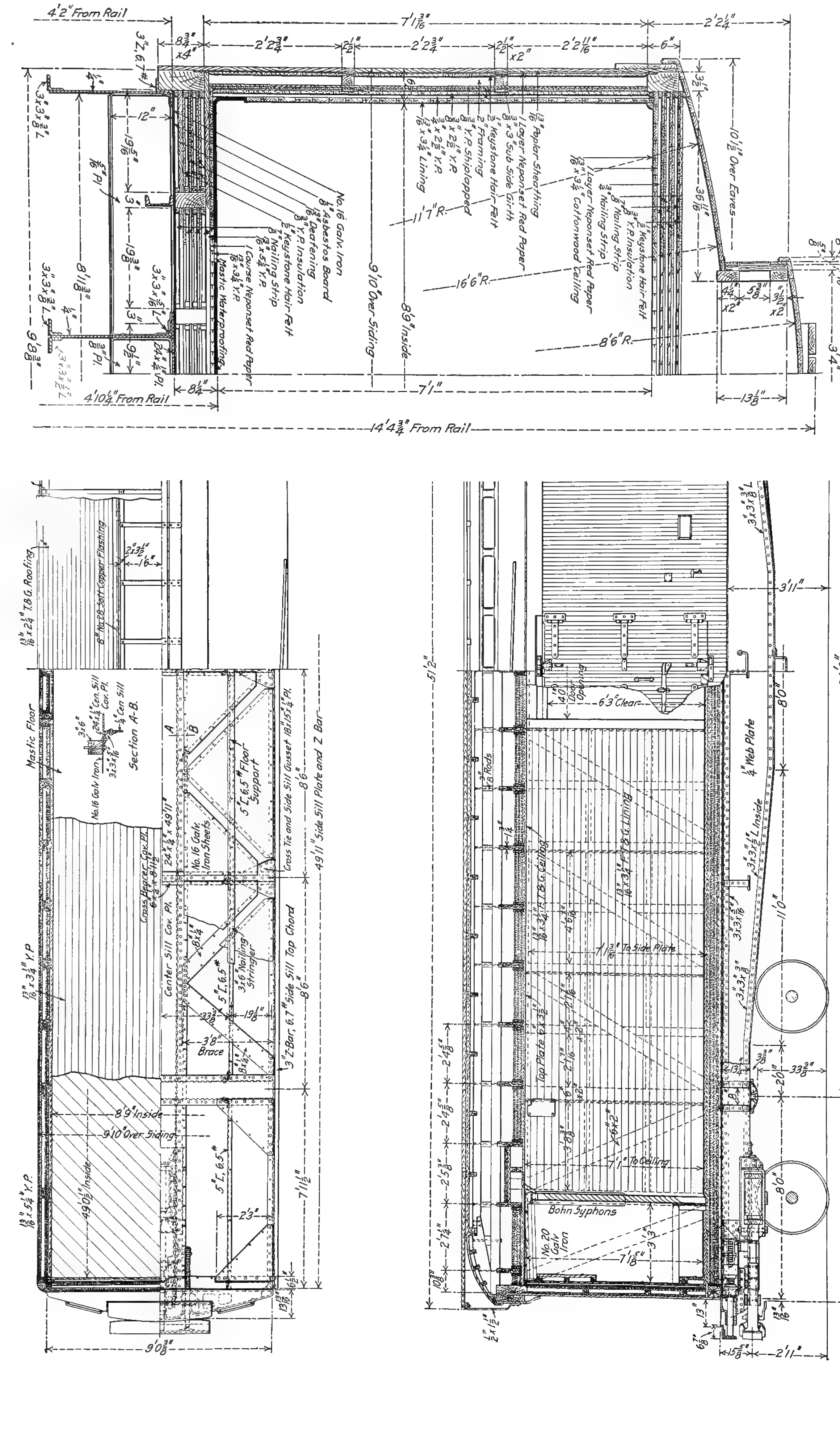


Fig. 353—Wells, Fargo & Co. Steel Underframe 30-Ton Capacity Refrigerator Car for Express Service. Builder, American Car & Foundry Co.

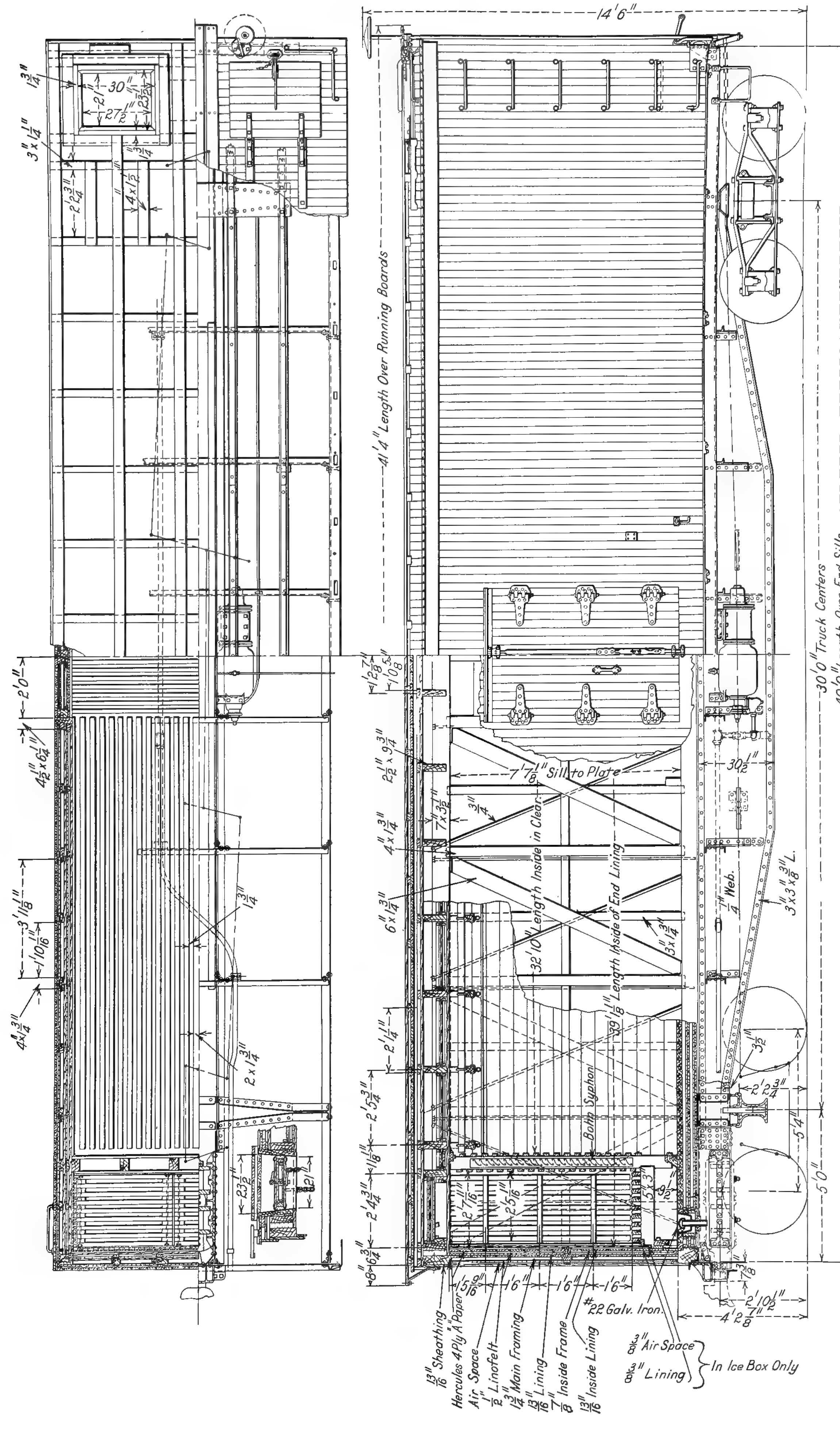


Fig. 354—American Refrigerator Transit Company Steel Underframe 30-Ton Capacity Refrigerator Car Shown in Figs. 110 and 356. Builder, American Car & Foundry Company.

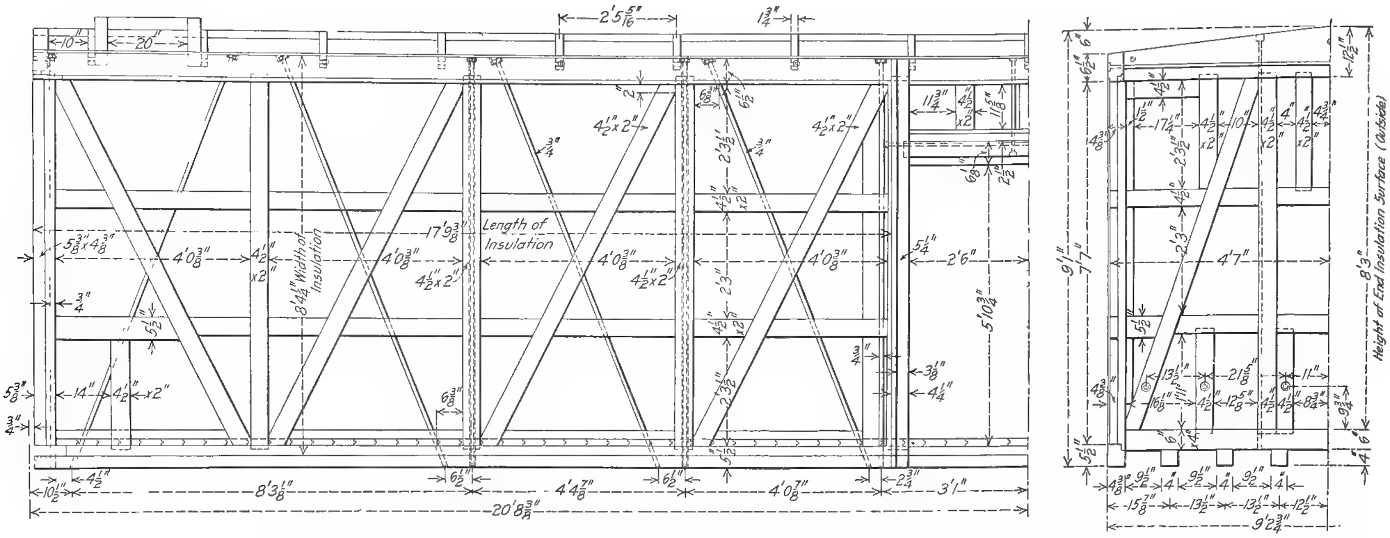


Fig. 355—Arrangement of the Body Framing, Merchants' Despatch Dairy Car.

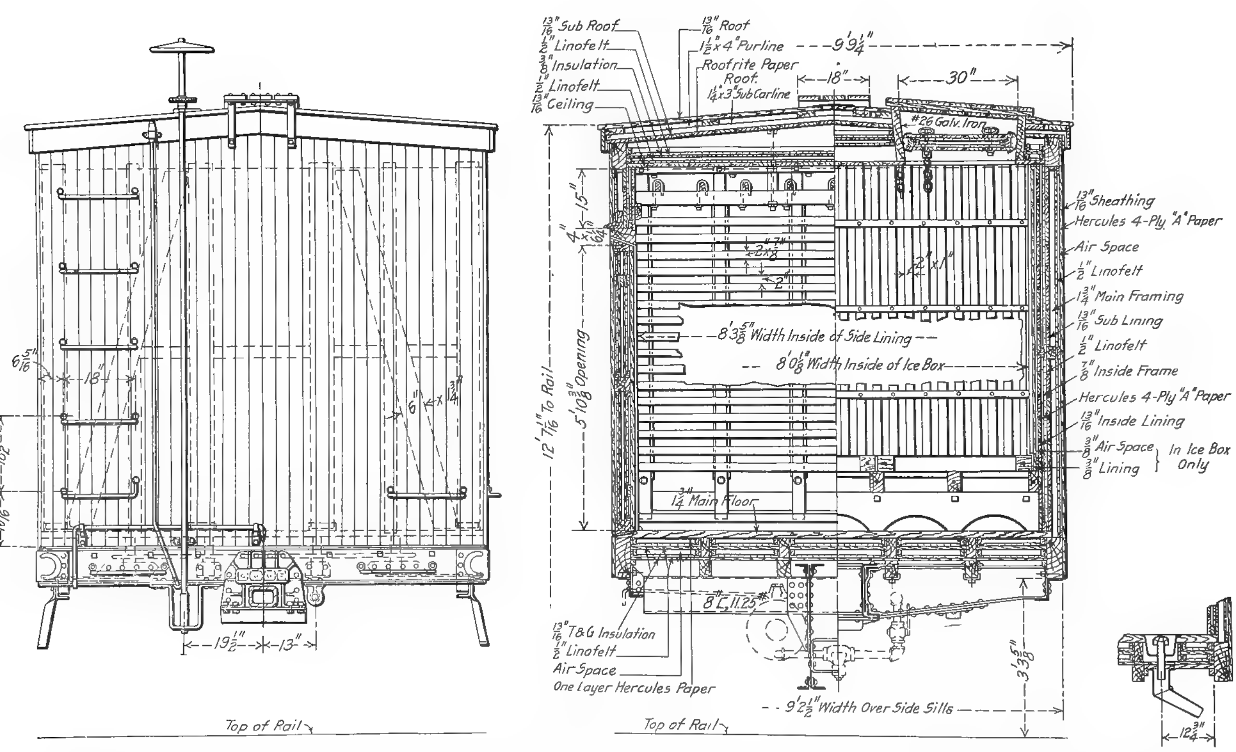


Fig. 356—End Elevation and Cross Sections of American Refrigerator Transit Company Steel Underframe Refrigerator Car Shown in Figs. 110 and 354.

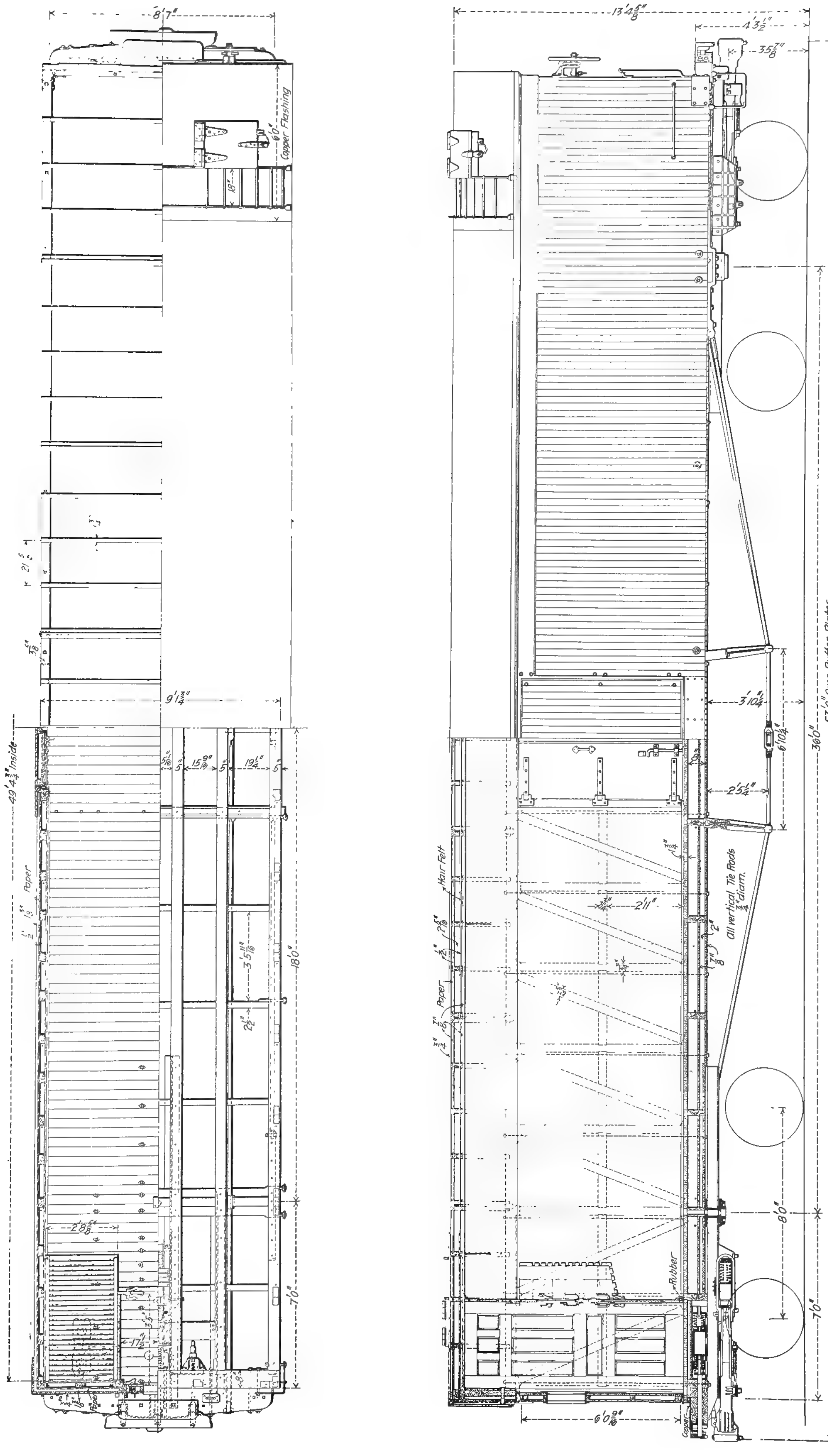


Fig. 357—Lehigh Valley Wooden Car for Milk Transportation. See also Fig. 358.

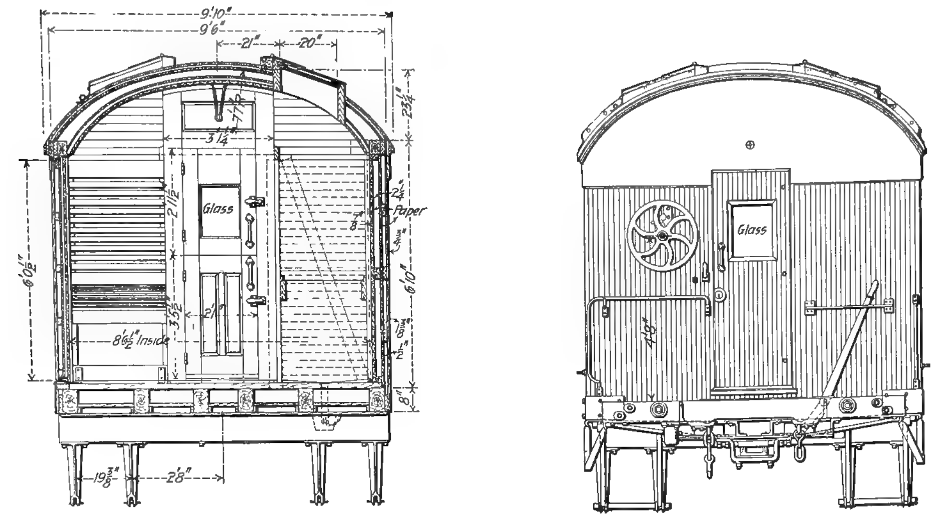


Fig. 358—Cross Sections and End Elevation of Lehigh Valley Wooden Car for Milk Transportation Shown in Fig. 357.

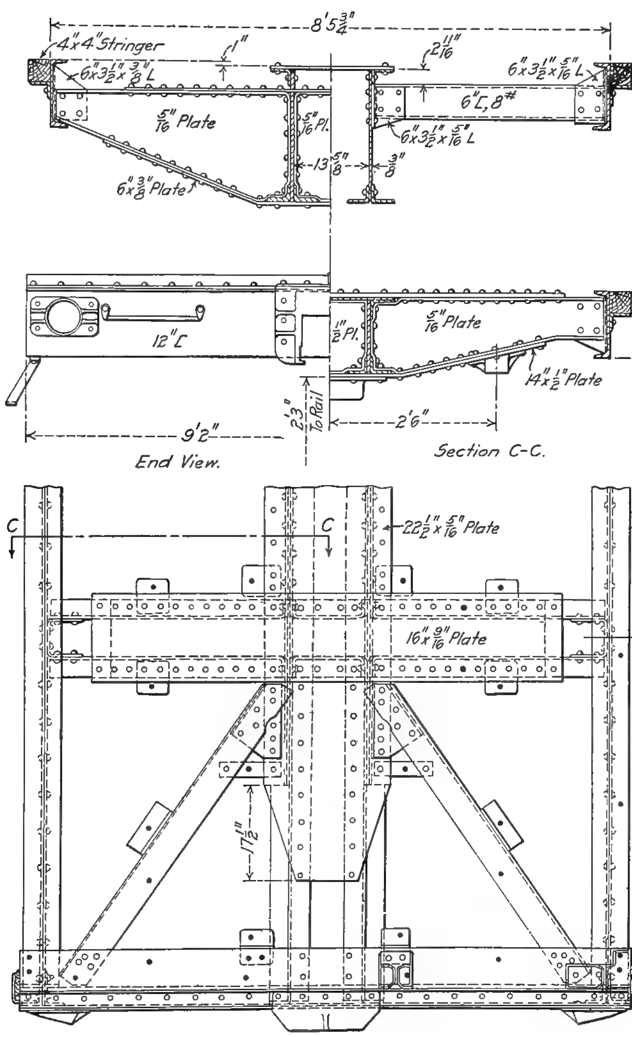


Fig. 359—Underframe of Central of New Jersey 40-Ton Capacity Ice Car Shown in Figs. 361 and 362.

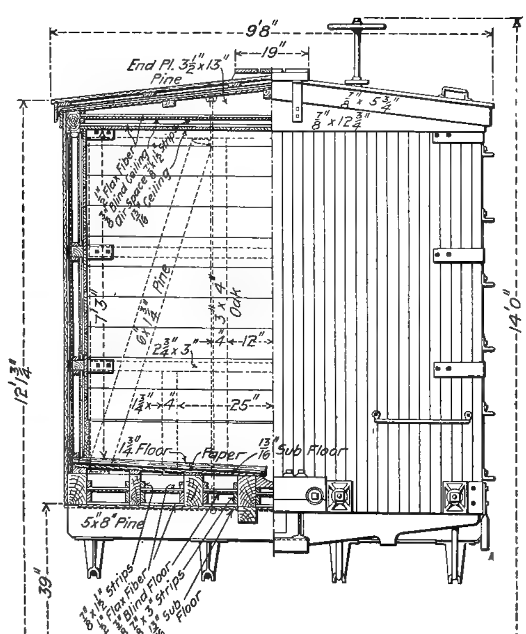


Fig. 360—Cross Section and End Elevation of Wooden 30-Ton Capacity Refrigerator Car. Builder, Milwaukee Refrigerator Transit & Car Company.

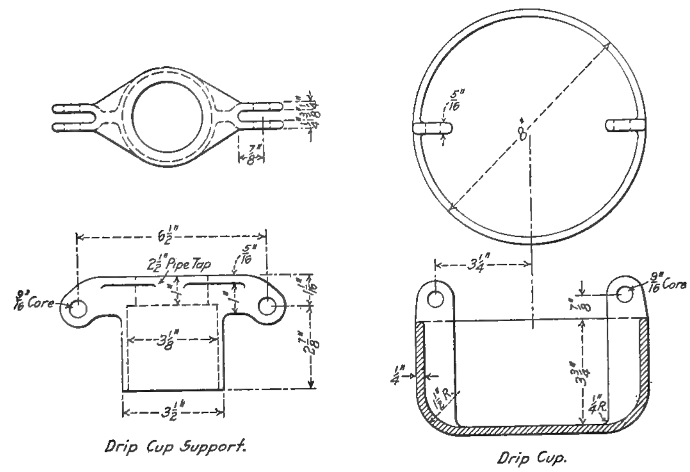


Fig. 361—Drip Cup and Support for Central of New Jersey Ice Car Shown in Figs. 359 and 362.

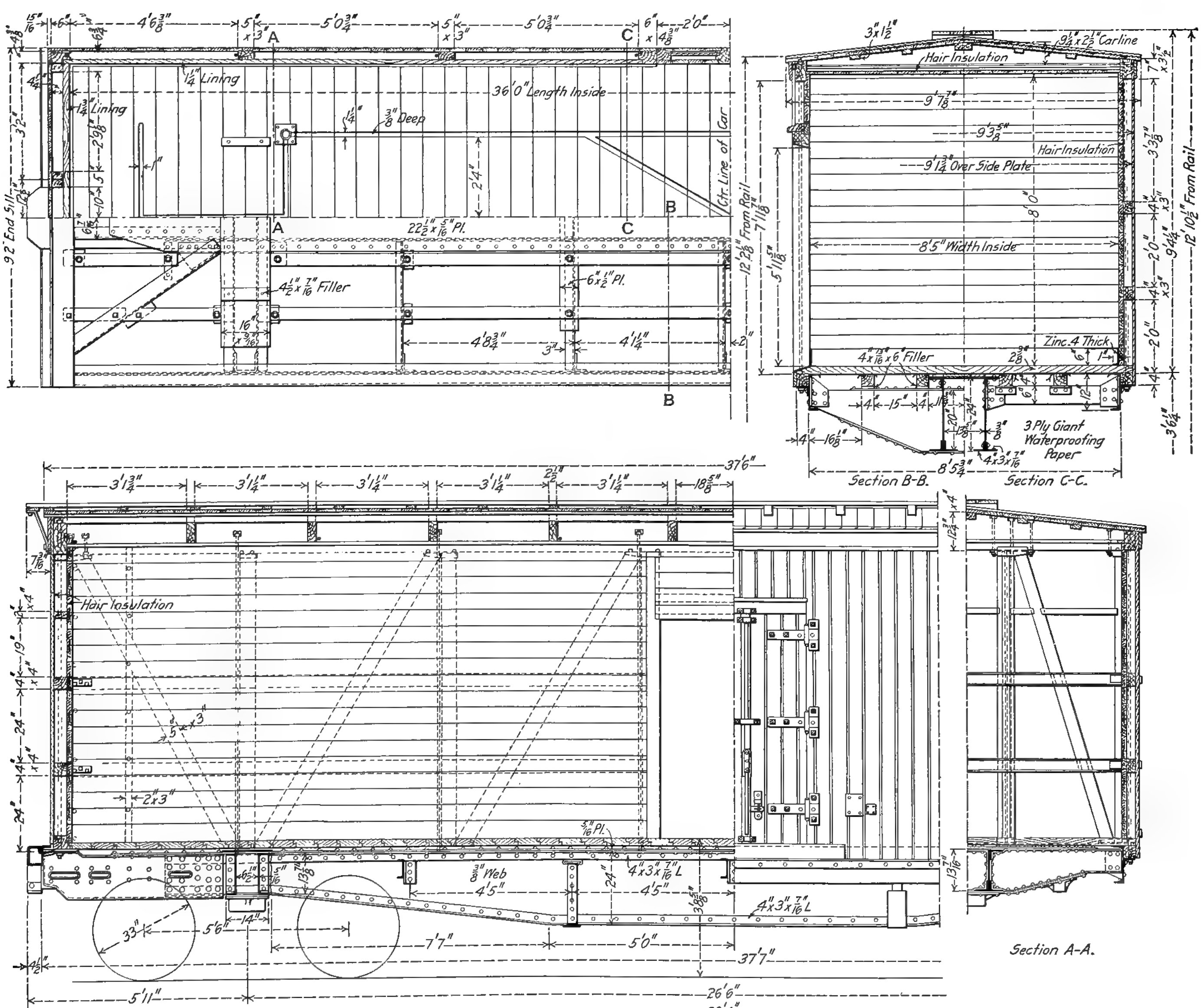


Fig. 362—Central of New Jersey Steel Underframe 40-Ton Capacity Car for Ice Transportation. See also Figs. 359 and 361.

Parts of Caboose or Cabin Cars. See Fig. 364.

1 *Center Sill*
2 *Center Nailing Sill*
3 *Intermediate Sill*
4 *Side Sill*
5 *Body Bolster*
6 *Side Step*
7 *Platform Railing*
8 *Brake Wheel*
9 *Side Grab Iron*
10 *End Grab Iron*
11 *Side Fascia*
12 *Side Brace*
13 *Side Brace*
14 *Sill and Plate Tie Rod*
15 *Side Plate*
16 *Platform End Sill*
17 *Running Board*
18 *Carline*
19 *Cupola Hand Rail*
20 *Smoke Jack*
21 *Cupola Signal Lamp*
22 *Cupola*
23 *End Ladder*
24 *Bunk or Seat*
25 *Cupola Inside Step*
26 *Sheathing*
27 *Lining*
28 *Cross Tie or Needlebeam*
29 *Striking Casting*
30 *Cupboard*
31 *Center Plate*
32 *Center Pin*
33 *Truss Rod*
34 *Truss Rod Strut or Queen Post*
35 *Main Roof*
36 *Corner Post*
37 *End or Door Post*
38 *End Door*
39 *Side Window*
40 *Window Sill*

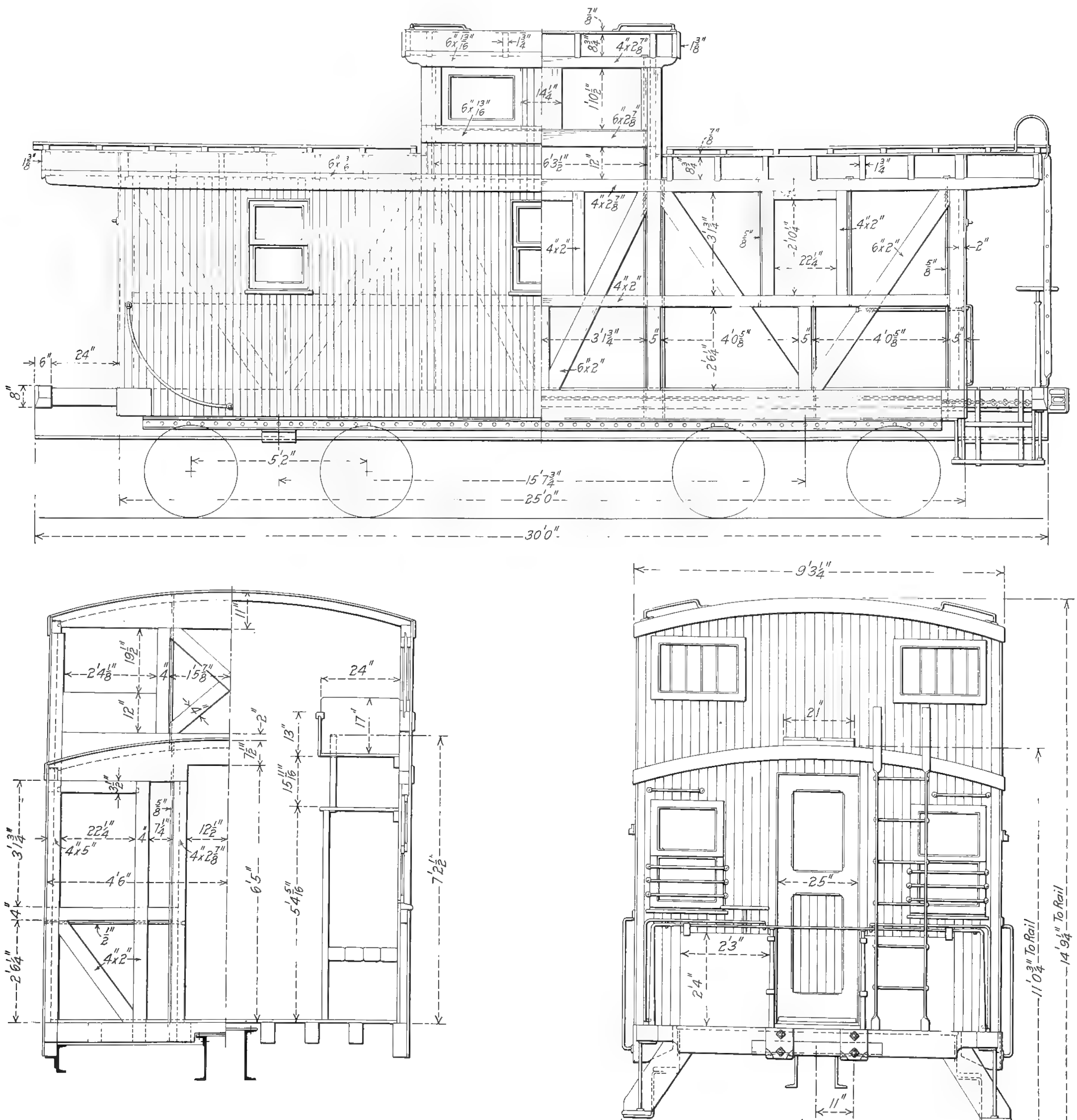


Fig. 363—Pittsburg, Shawmut & Northern Steel Underframe 8-Wheel Caboose. See also Fig. 123.
Builder, Russell Car & Snow Plow Co.

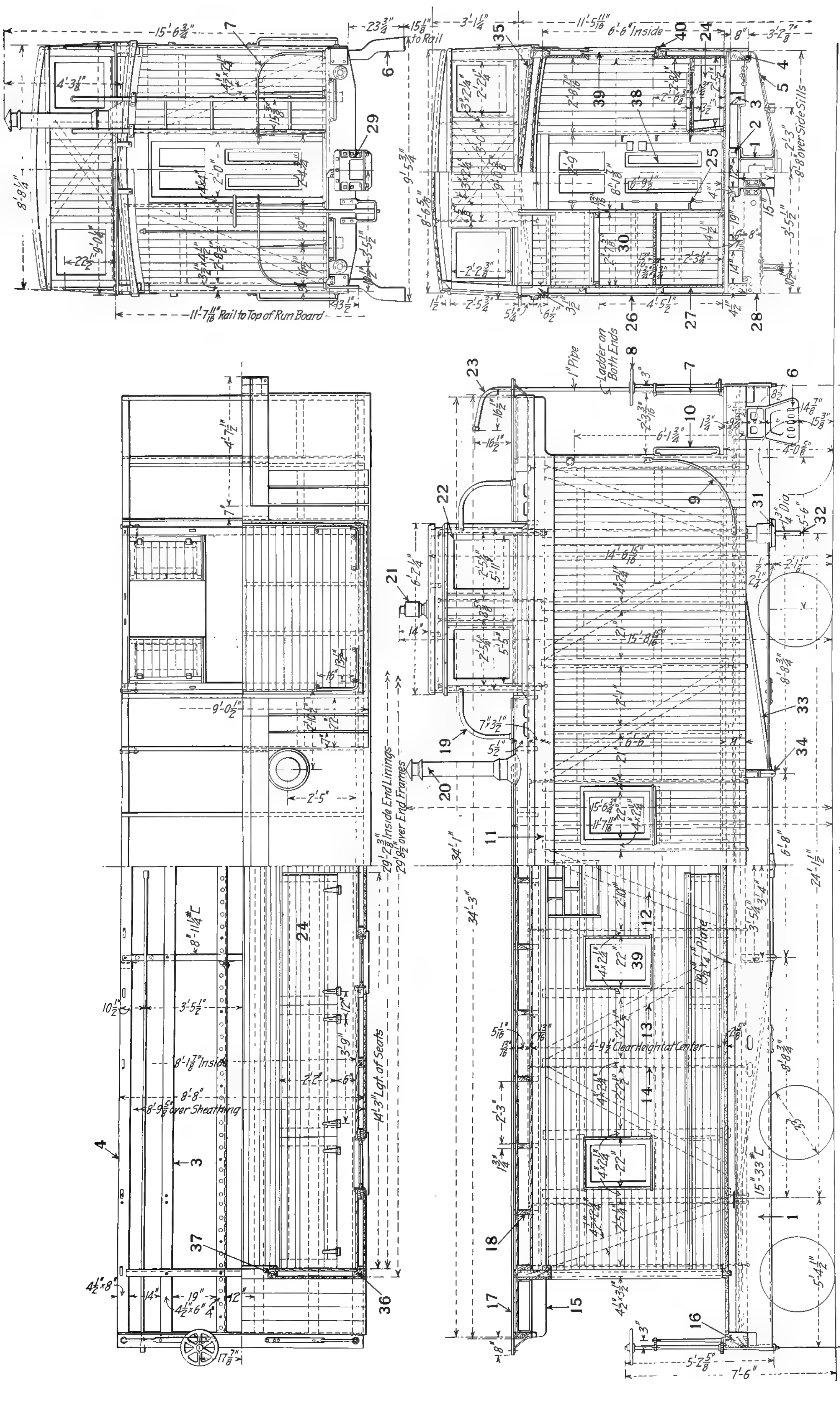


Fig. 364—Missouri Pacific Steel Underframe 8-Wheel Caboose Shown in Figs. 119 and 121. Builder, American Car & Foundry Company.

See Page 352 for Names of Numbered Parts.

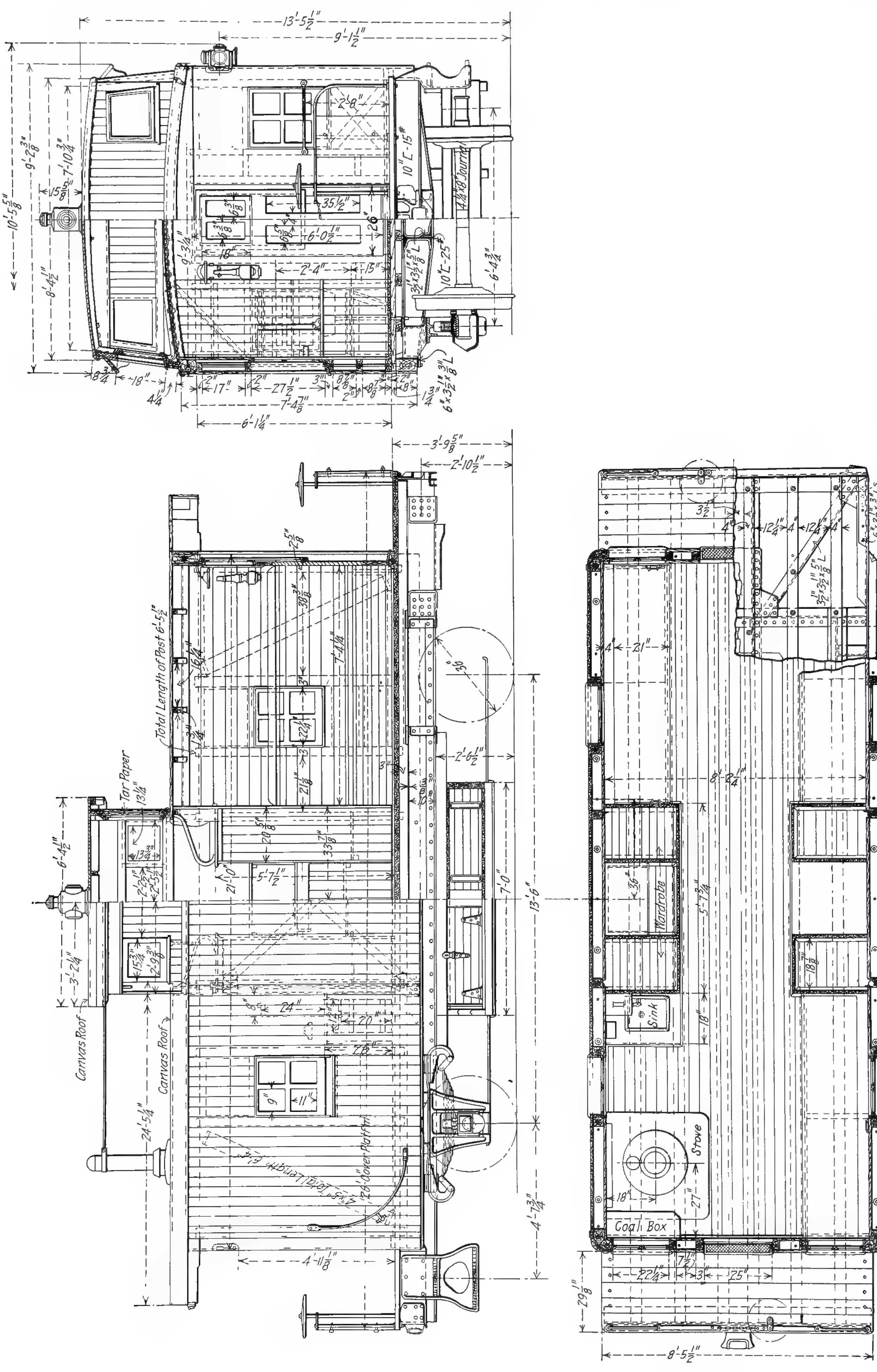


Fig. 365—Pennsylvania Railroad Steel Underframe 4-Wheel Caboose or Cabin Car Shown in Fig. 117.

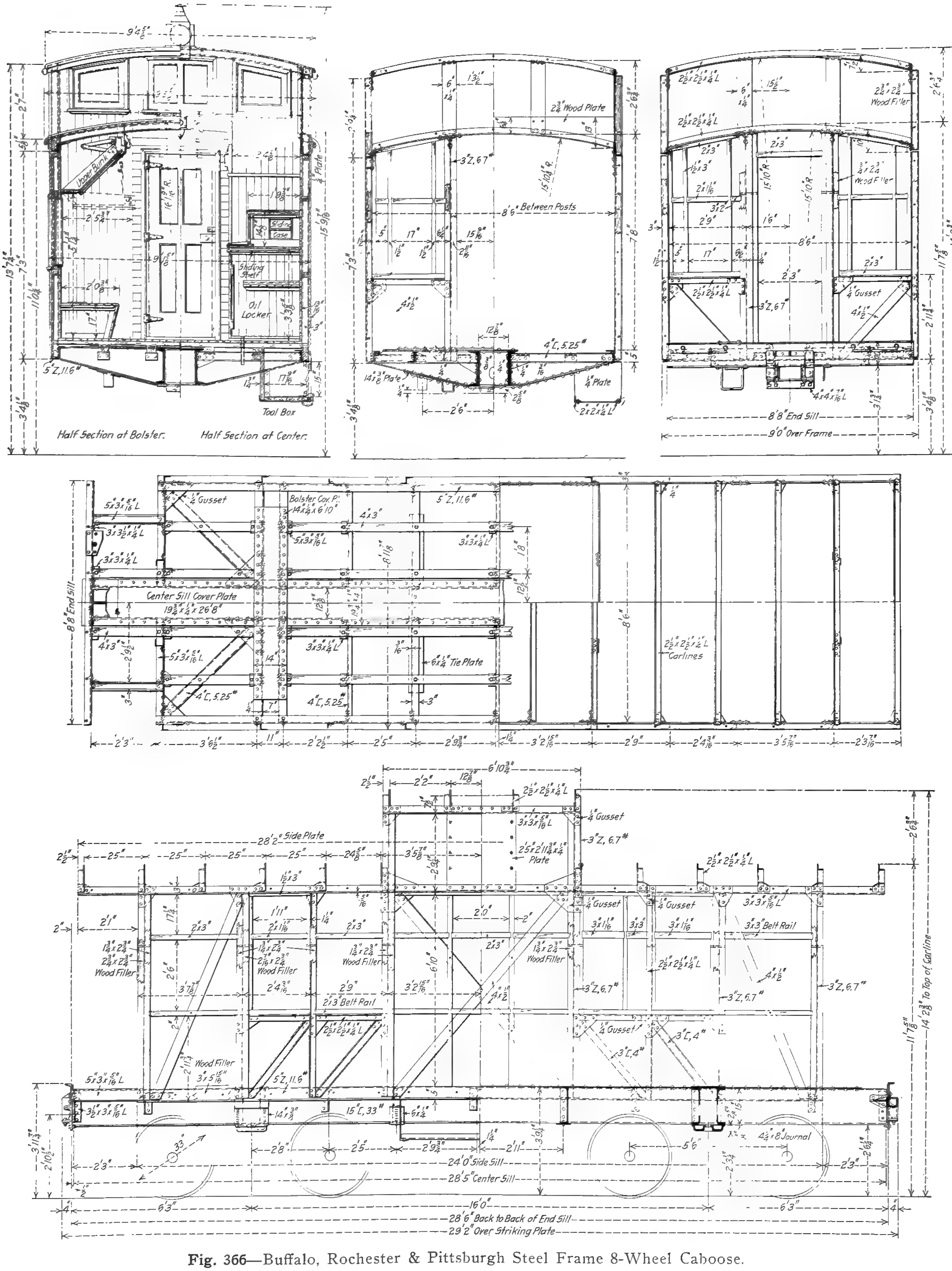


Fig. 366—Buffalo, Rochester & Pittsburgh Steel Frame 8-Wheel Caboose.

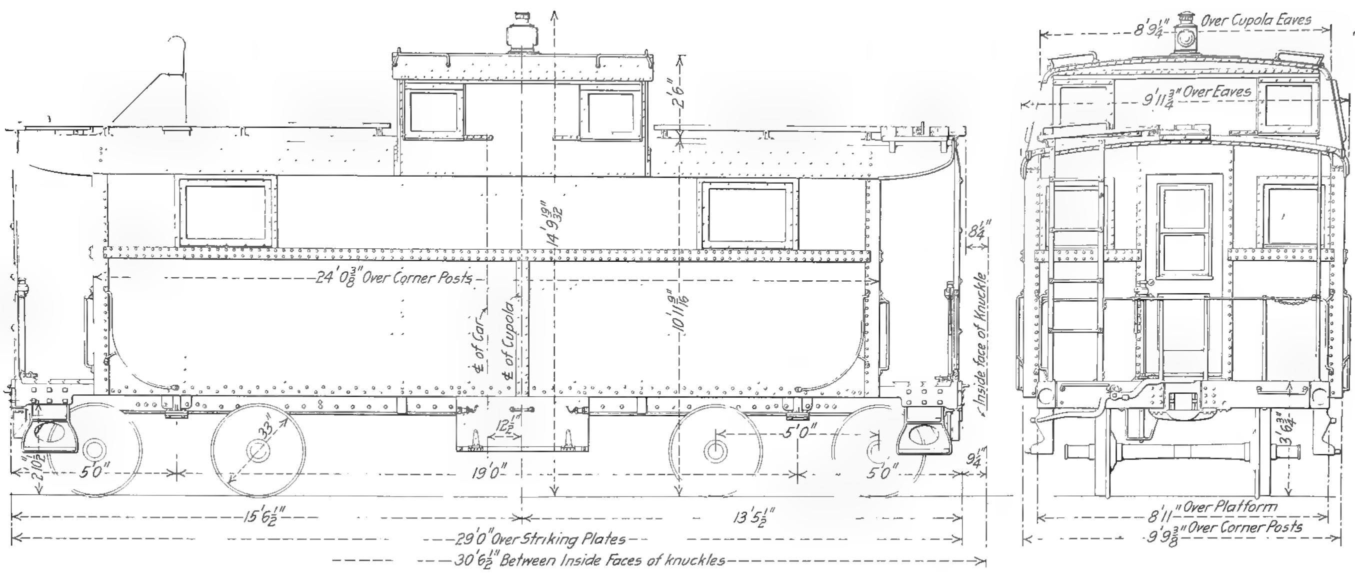


Fig. 367—Elevations of Pennsylvania Railroad Steel Caboose Shown in Figs. 118, 120 and 368-370.

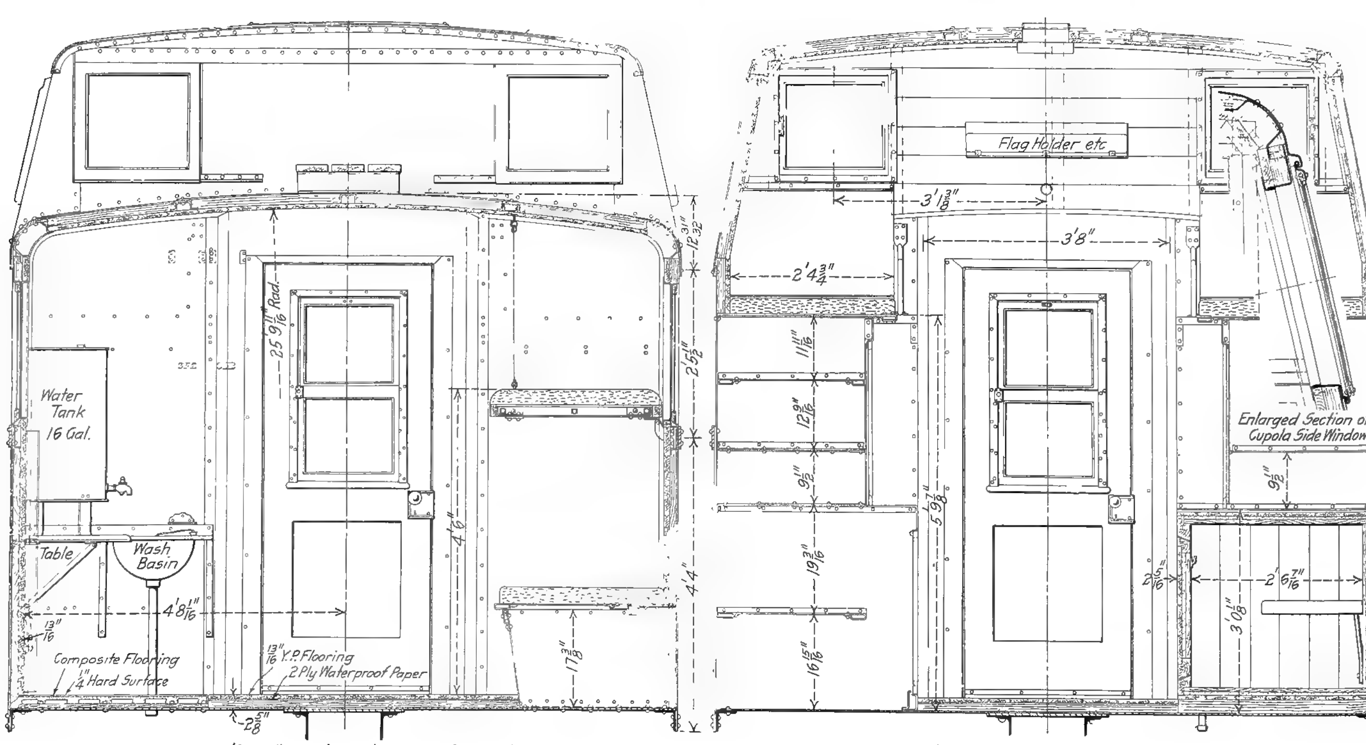


Fig. 368—Cross Sections of Pennsylvania Railroad Steel Caboose Shown in Figs. 118, 120, 367, 369 and 370.

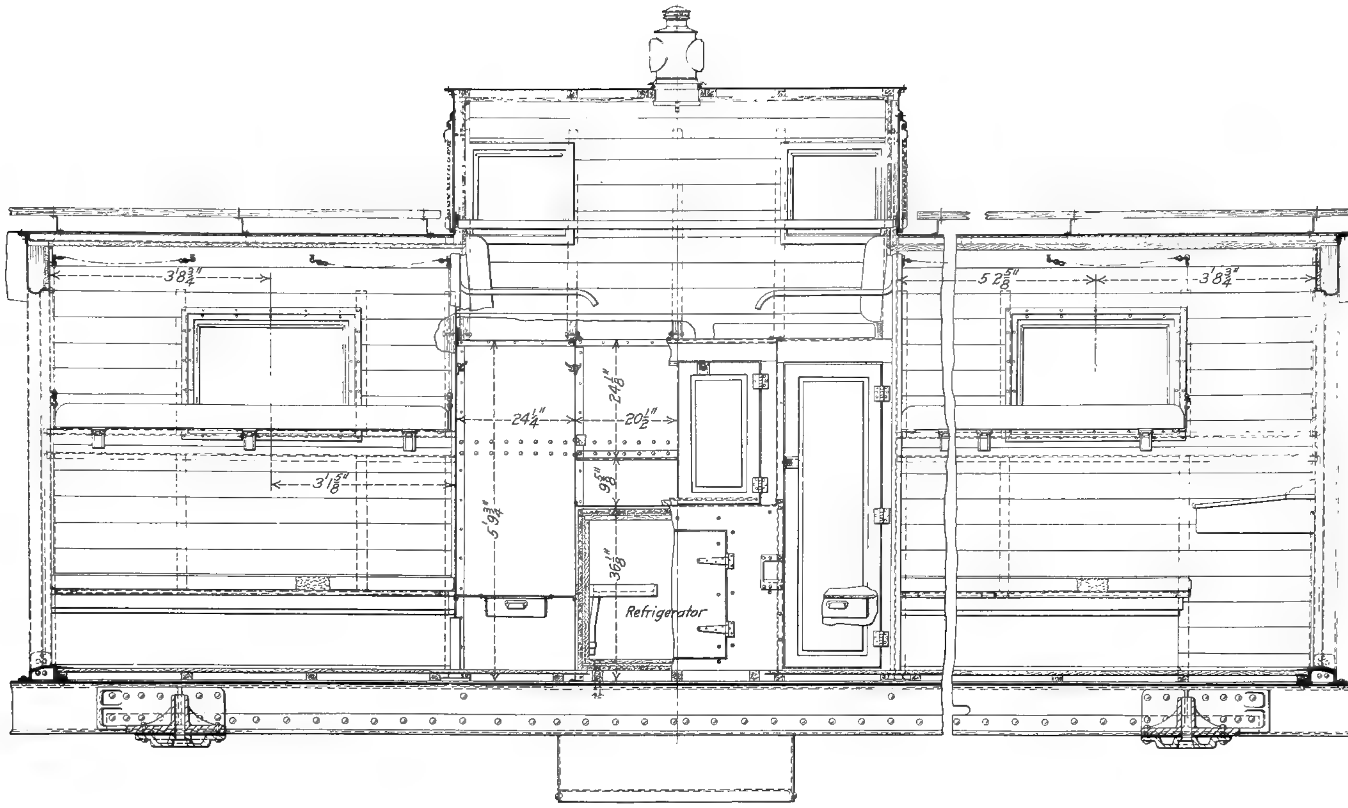


Fig. 369—Longitudinal Section Through Pennsylvania Railroad Steel Caboose Shown in Figs. 118, 120, 367, 368 and 370.

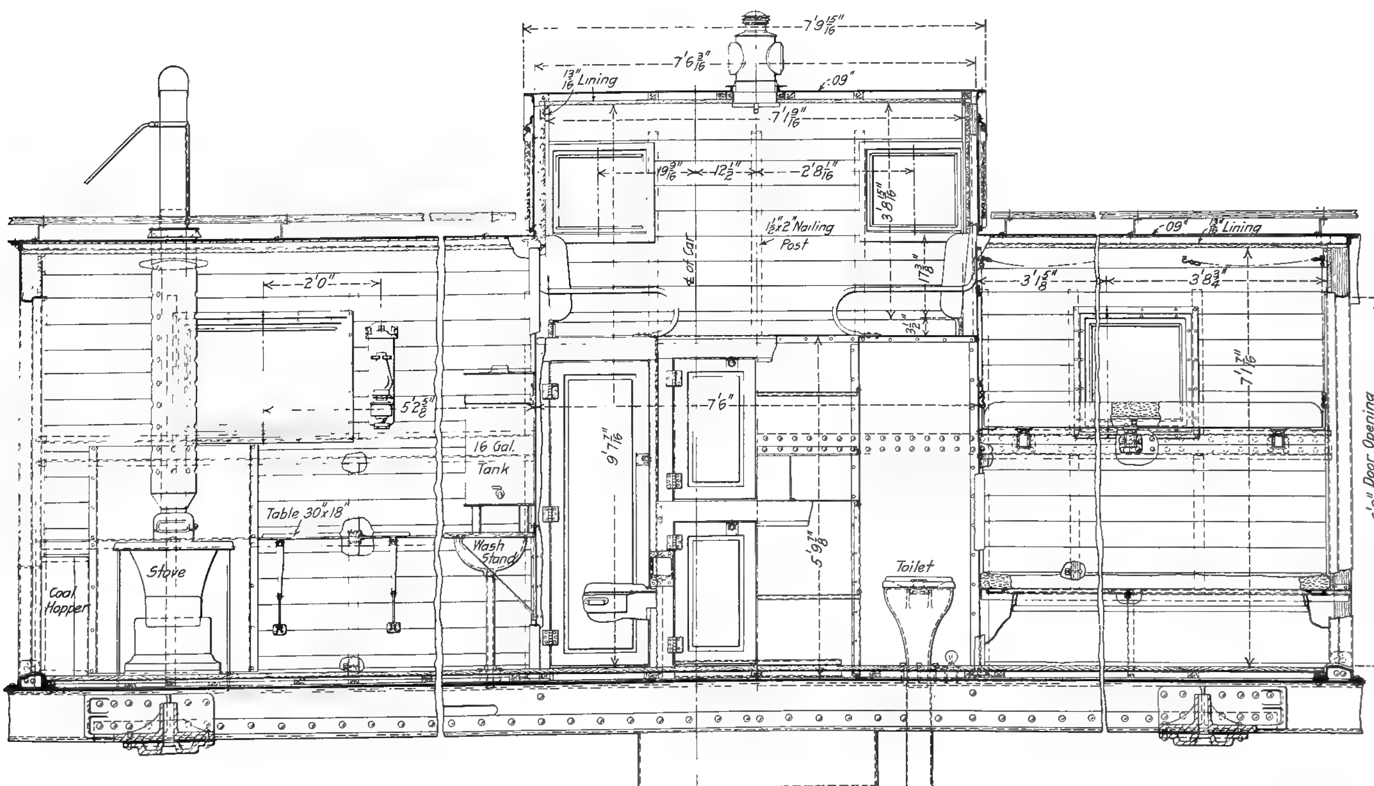


Fig. 370—Longitudinal Section Through Pennsylvania Railroad Steel Caboose Shown in Figs. 118, 120 and 367-369.

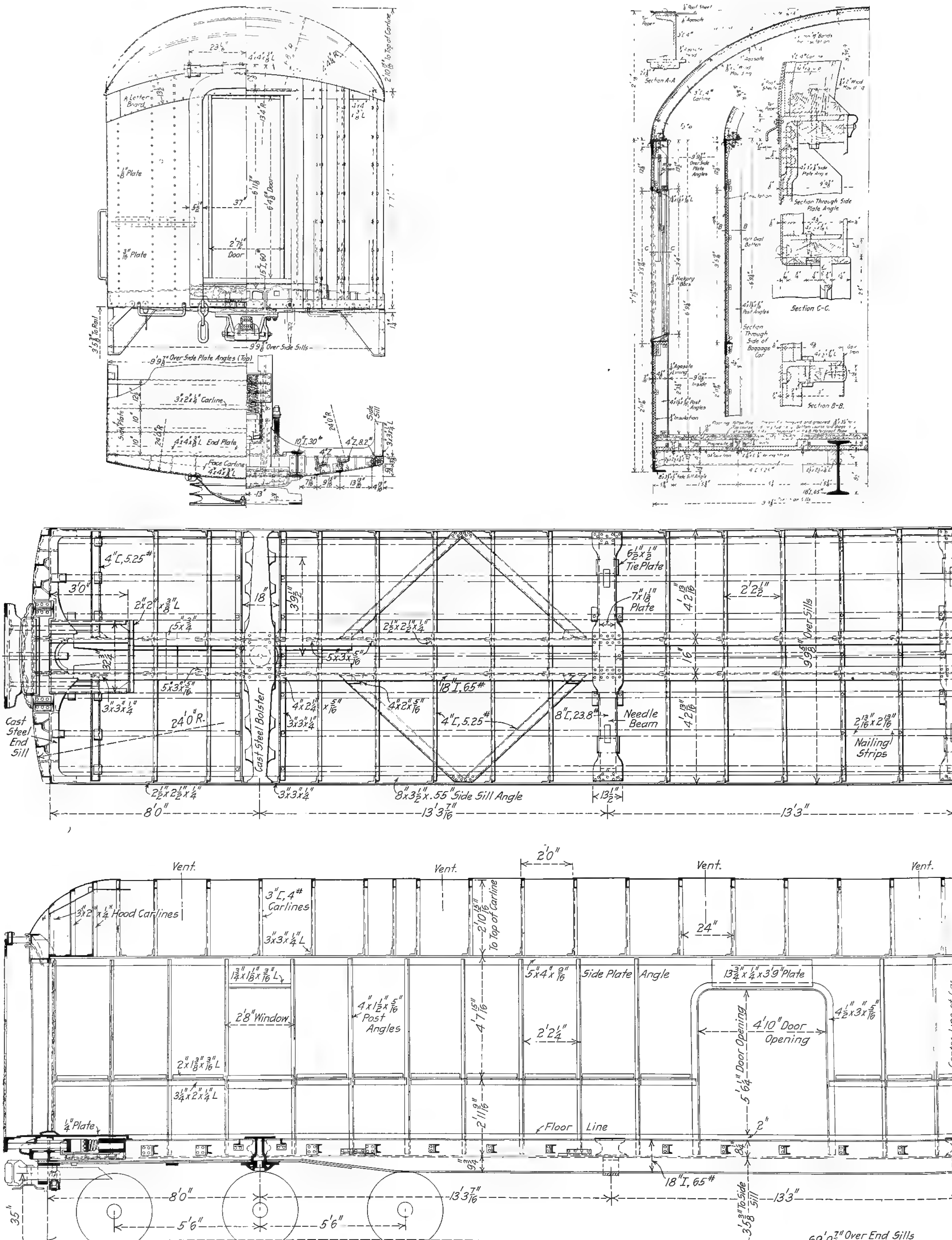


Fig. 371—Union Pacific Steel Baggage Car. Builder, The Pullman Company.

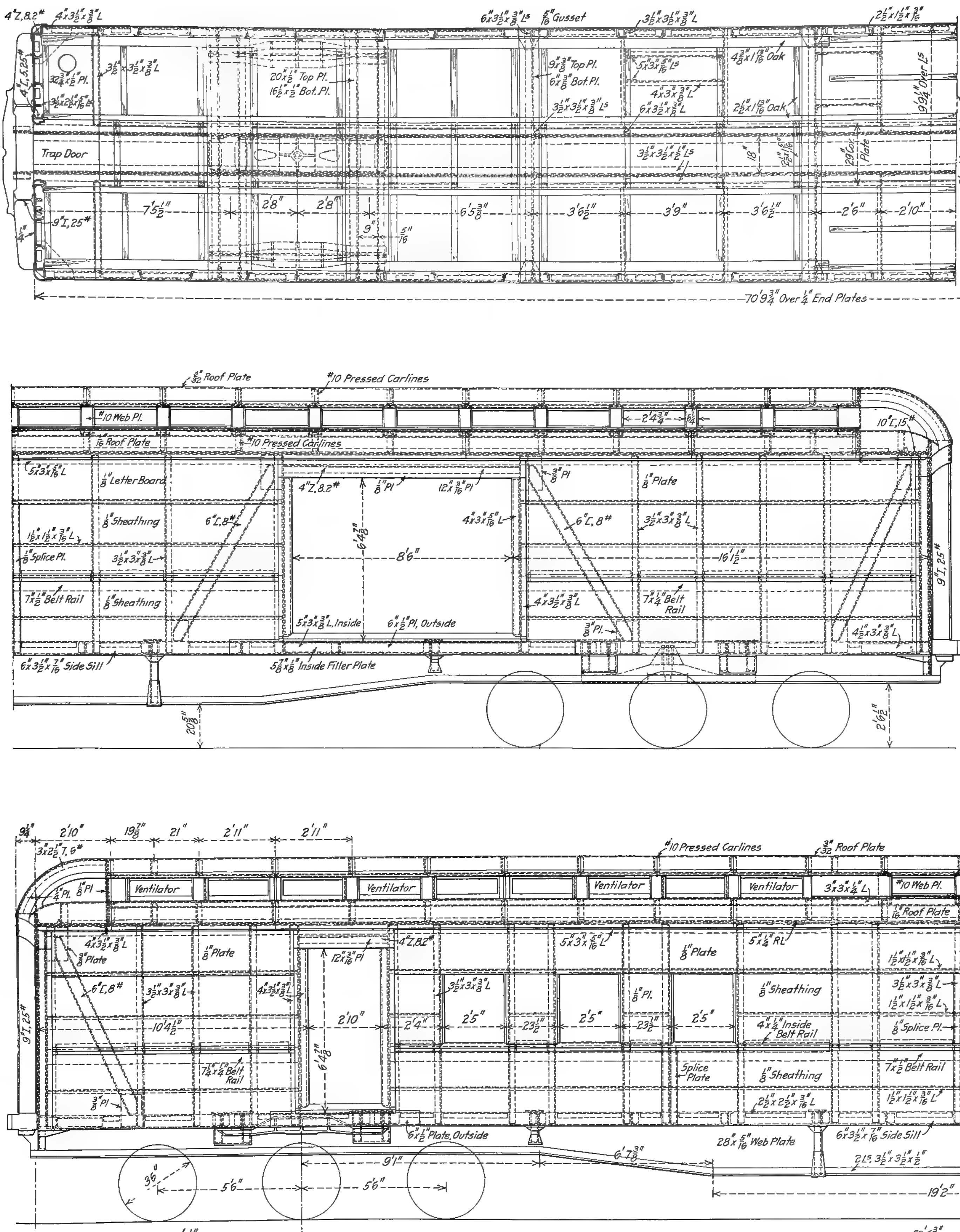


Fig. 372—Central Railroad of New Jersey Steel Baggage and Mail Car Shown in Figs. 130, 131, 373 and 374. Builder, The Harlan & Hollingsworth Corporation.

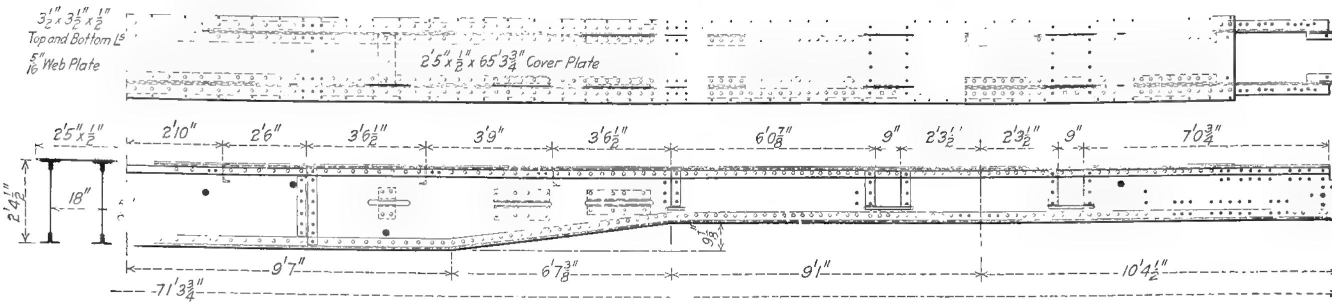


Fig. 373—Center Sill Construction of Central Railroad of New Jersey Steel Baggage and Mail Car. See also Figs. 372 and 374.

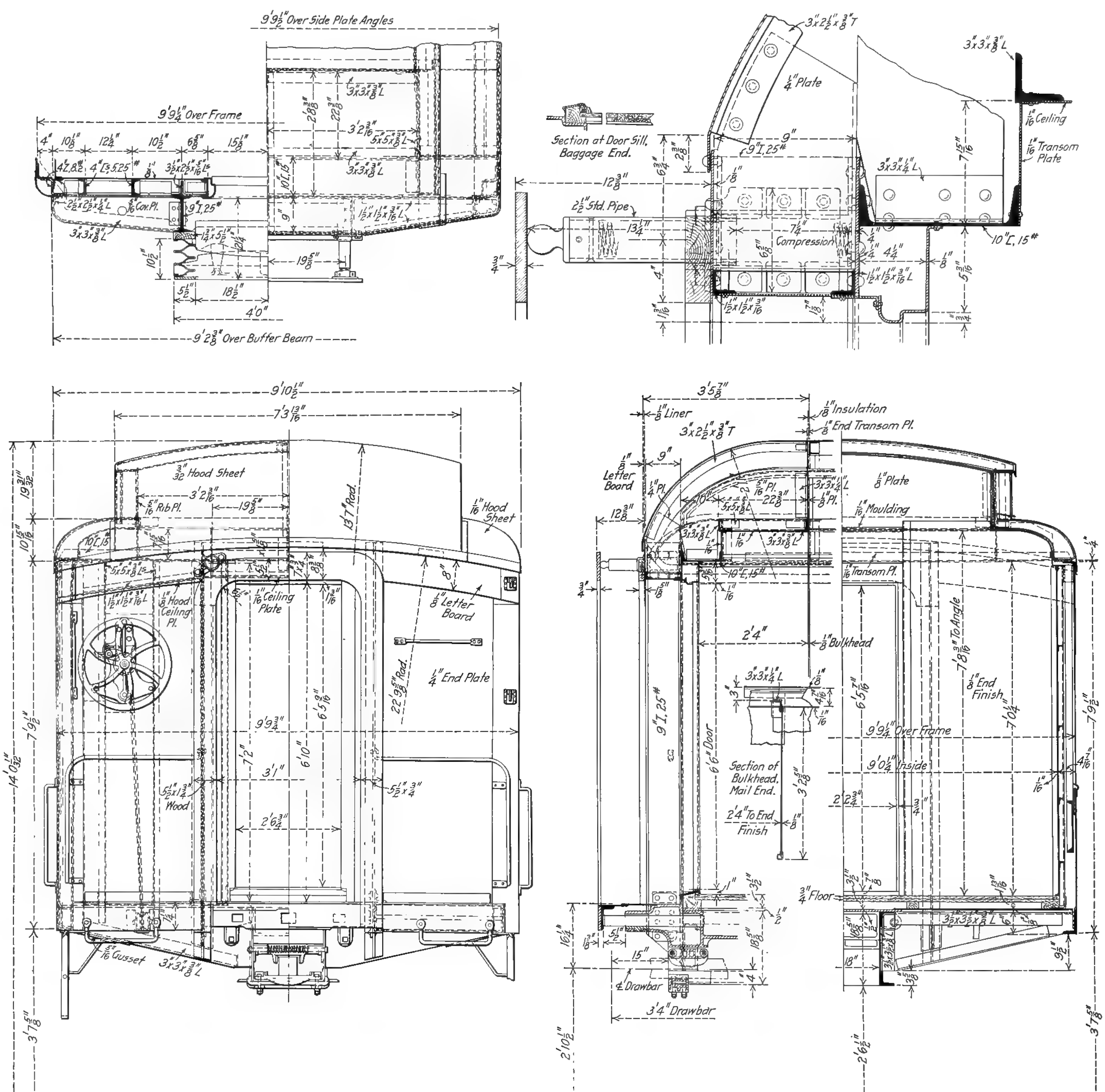


Fig. 374—End Construction of Central Railroad of New Jersey Steel Baggage and Mail Car. See also Figs. 372 and 373.

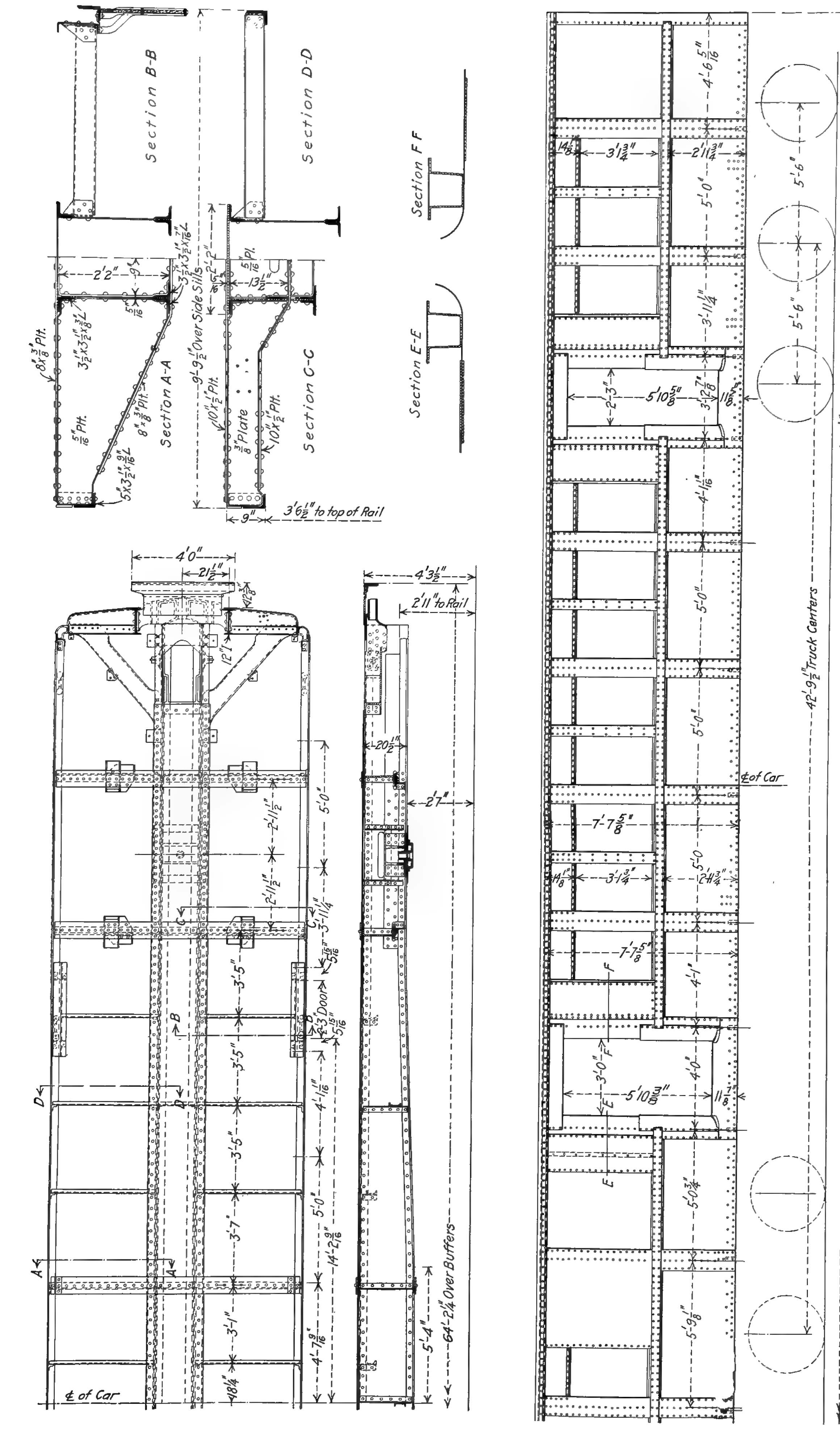


Fig. 375—Chesapeake & Ohio Steel Postal Car. See also Figs. 376 and 377. Builder, Pressed Steel Car Company.

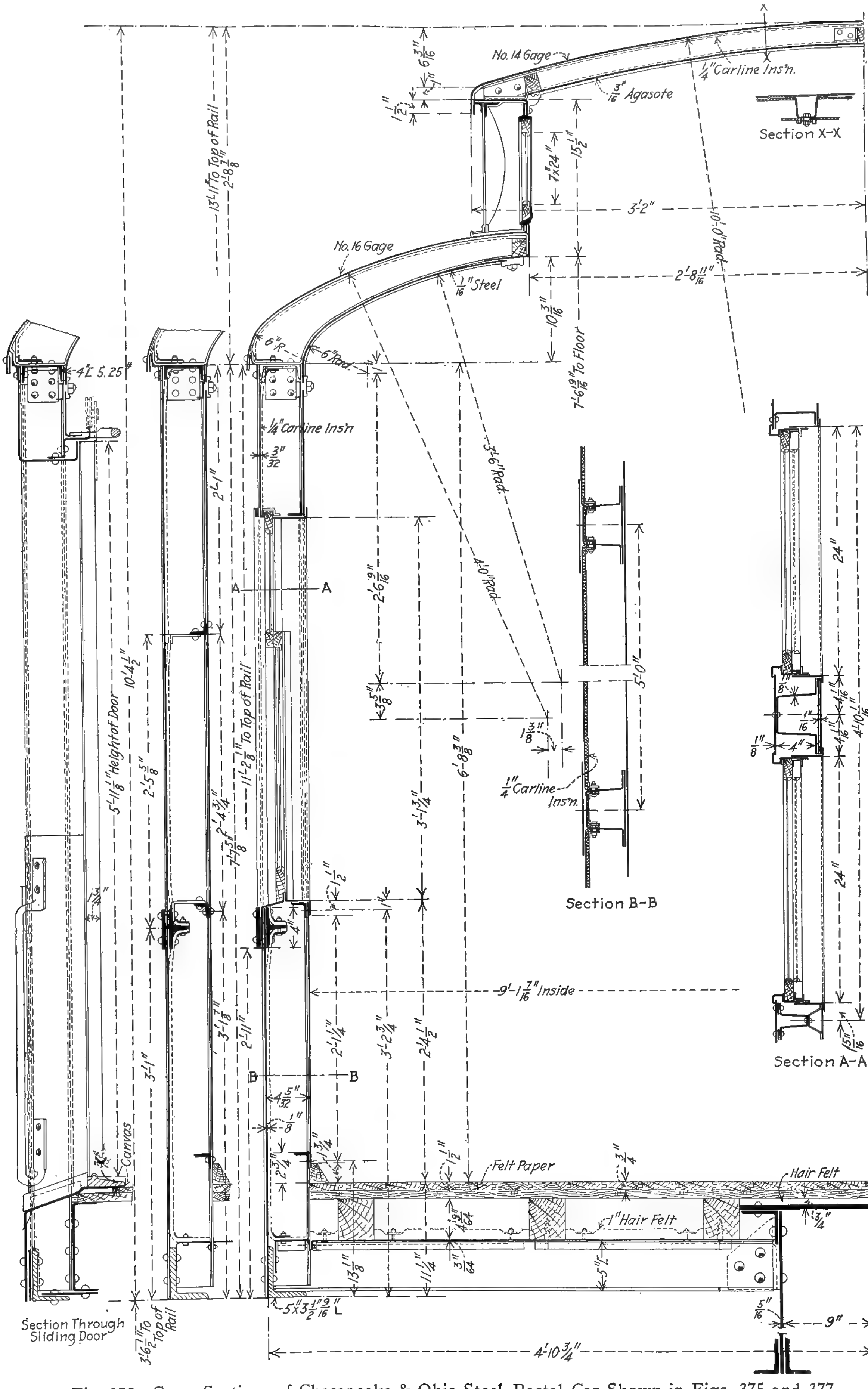


Fig. 376—Cross Sections of Chesapeake & Ohio Steel Postal Car Shown in Figs. 375 and 377.

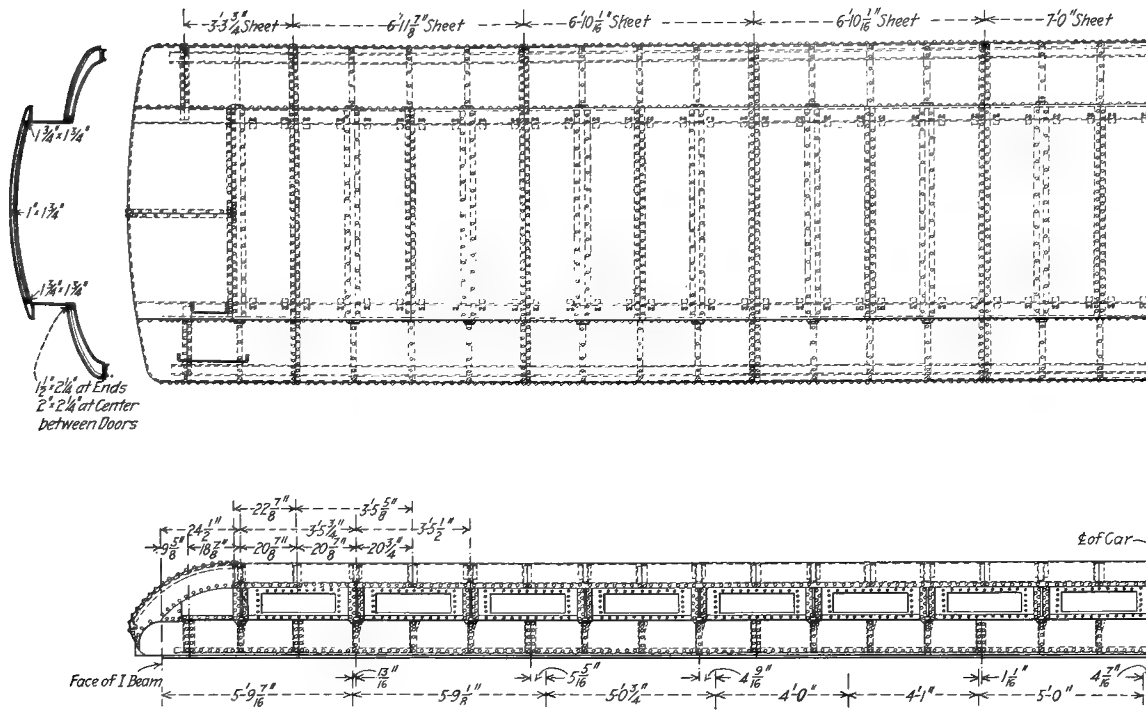


Fig. 377—Roof Construction of Chesapeake & Ohio Steel Postal Car Shown in Figs. 375 and 376.

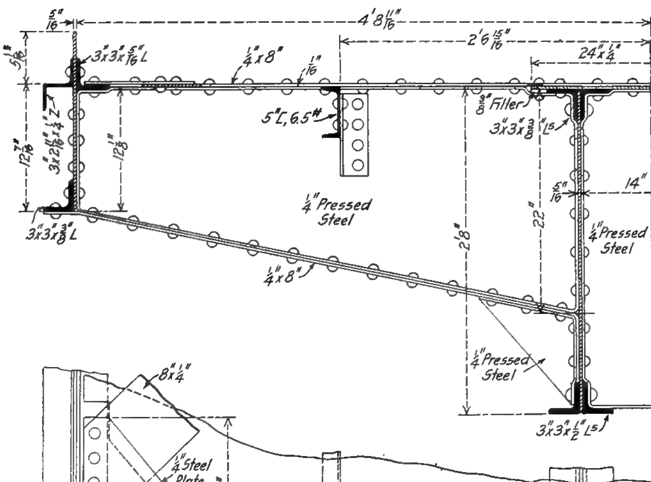


Fig. 378—Center Crosstie of Atchison, Topeka & Santa Fe Steel Day Coach Shown in Figs. 379 and 380.

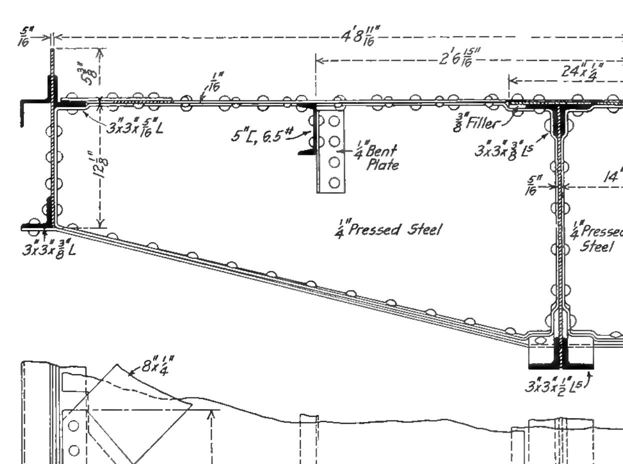


Fig. 379—Intermediate Crosstie of Atchison, Topeka & Santa Fe Steel Day Coach Shown in Figs. 378 and 380.

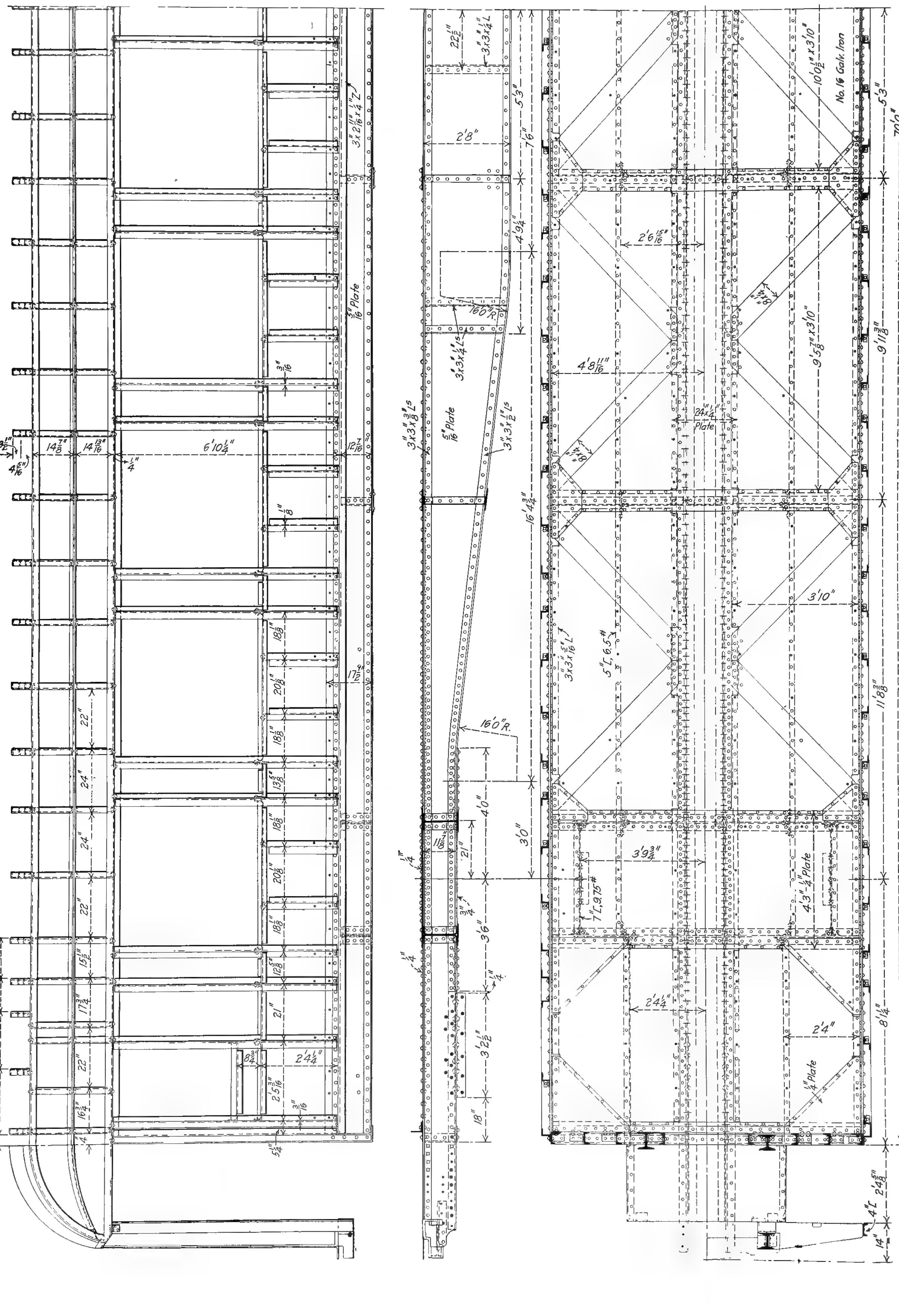


Fig. 380—Atchison, Topeka & Santa Fe Steel Day Coach. See also Figs. 378 and 379. Builder, The Pullman Company.

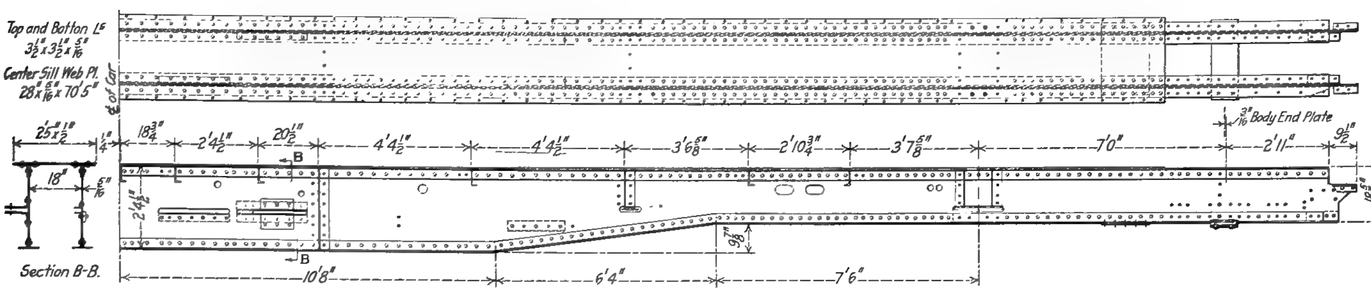


Fig. 381—Center Sill Construction of Central Railroad of New Jersey Steel Combination Car and Day Coach Shown in Figs. 144, 382 and 383.

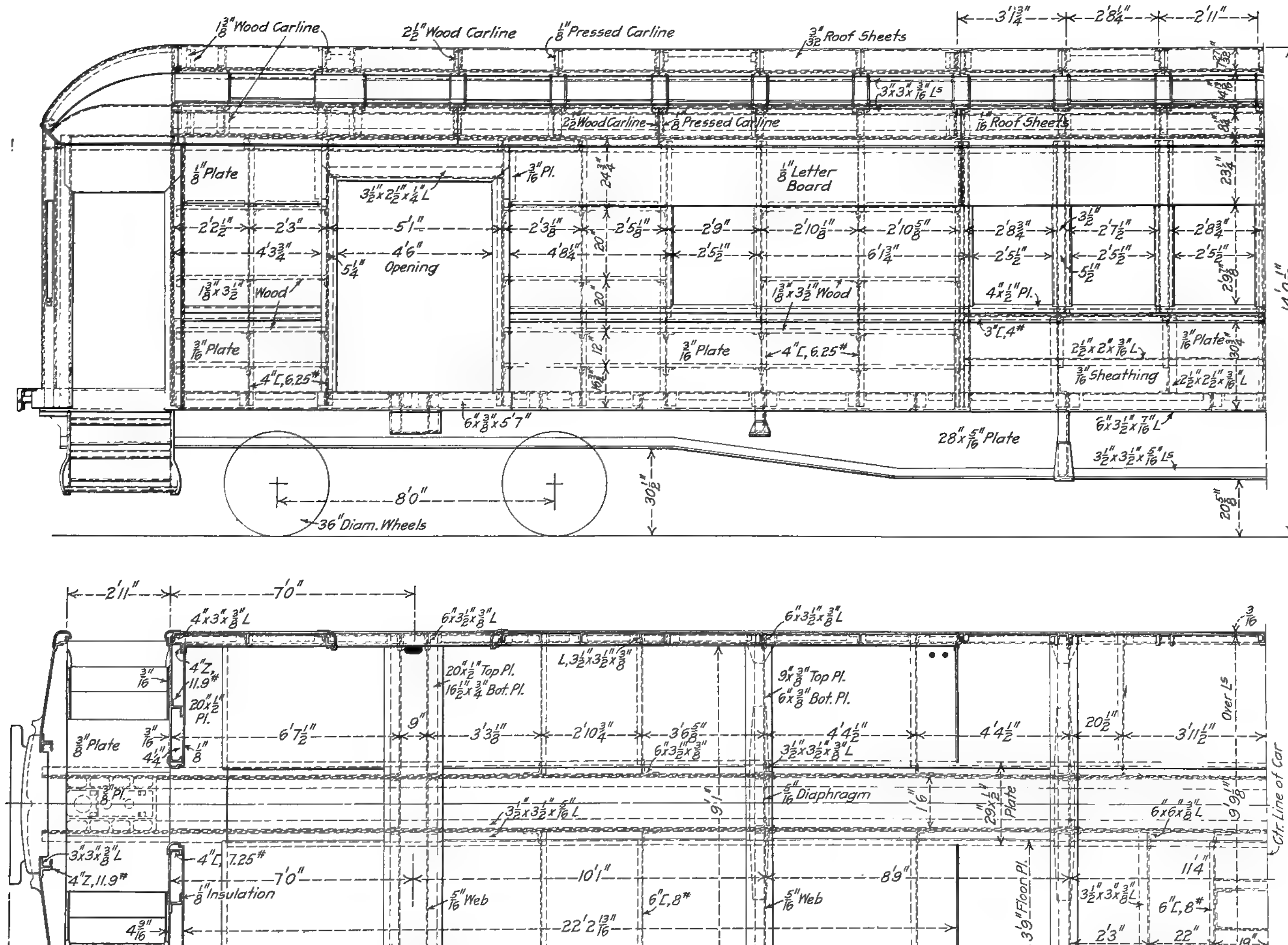


Fig. 382—Framing of Central Railroad of New Jersey Steel Combination Car and Day Coach Shown in Figs. 144, 381 and 383. Builder, The Harlan & Hollingsworth Corporation.

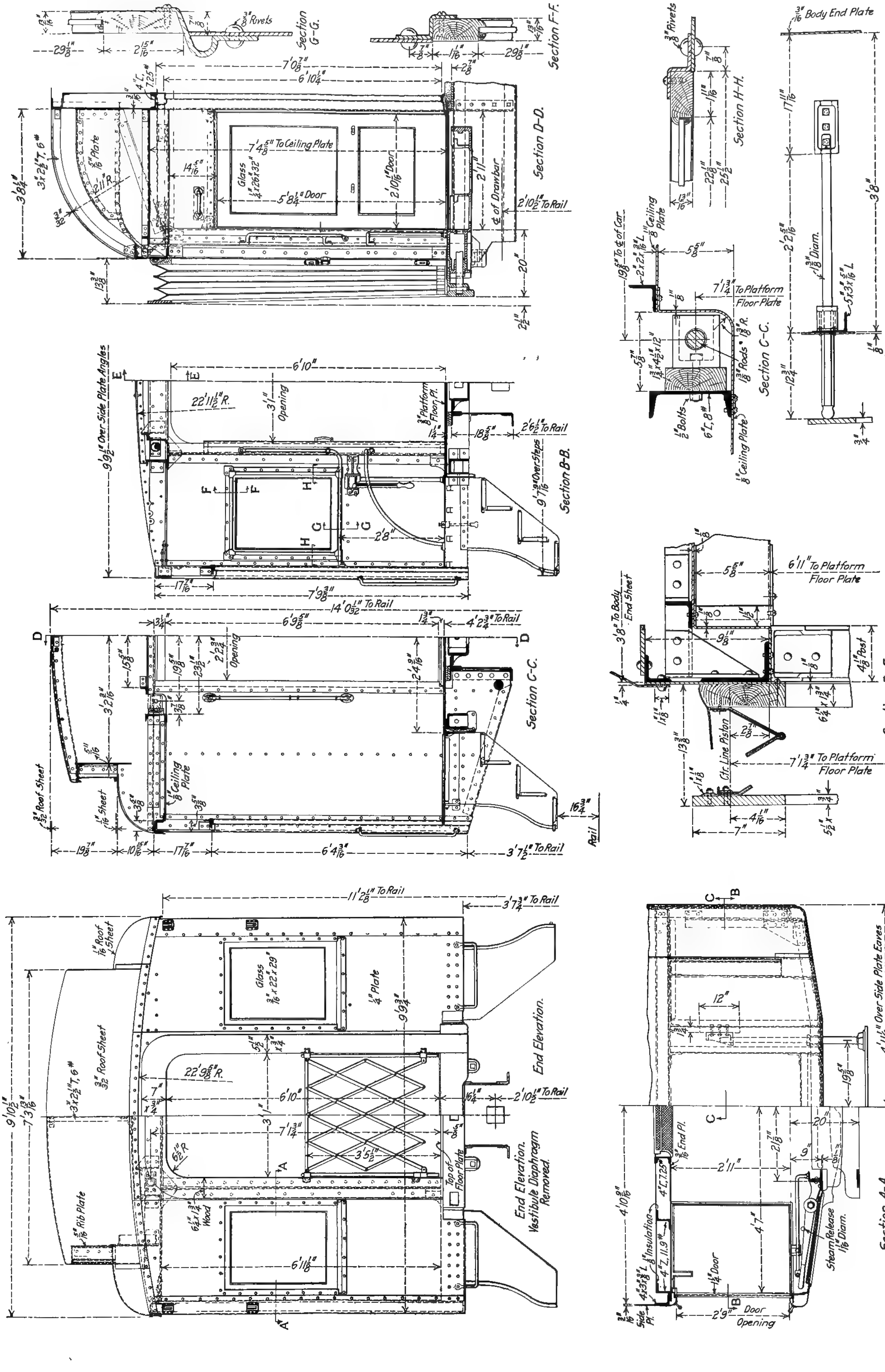


Fig. 383—End Arrangement of Central Railroad of New Jersey Steel Day Coach Shown in Figs. 144, 381 and 382.

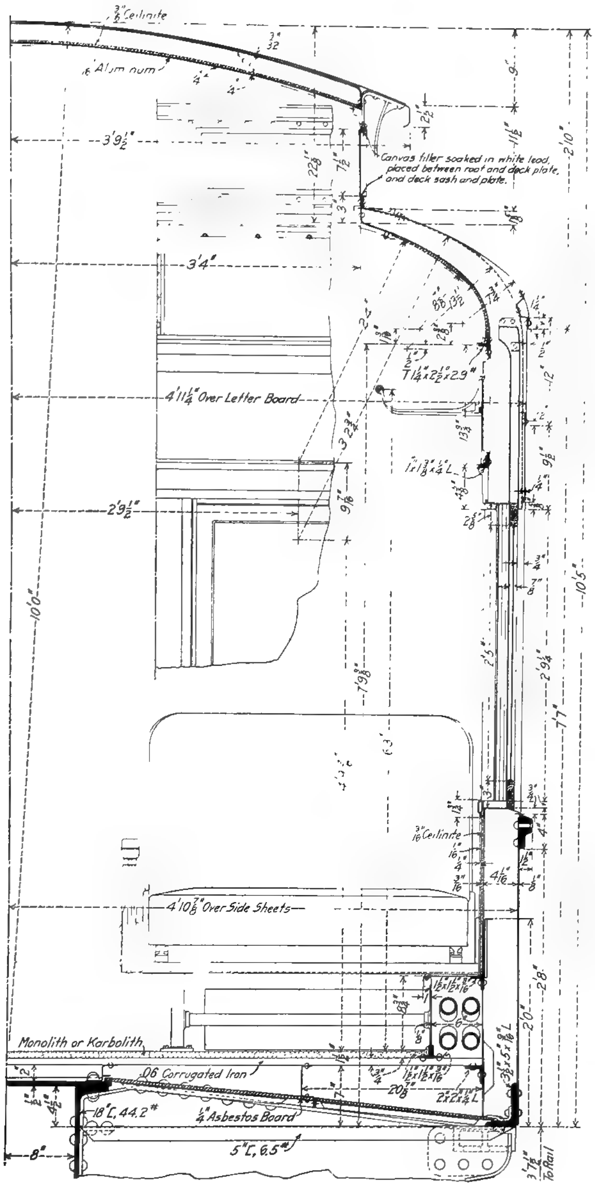


Fig. 384—Cross Section of Pennsylvania Railroad Steel Day Coach and Combination Cars, Classes P70 and PB70. Section Through Windows Shown in Fig. 387.

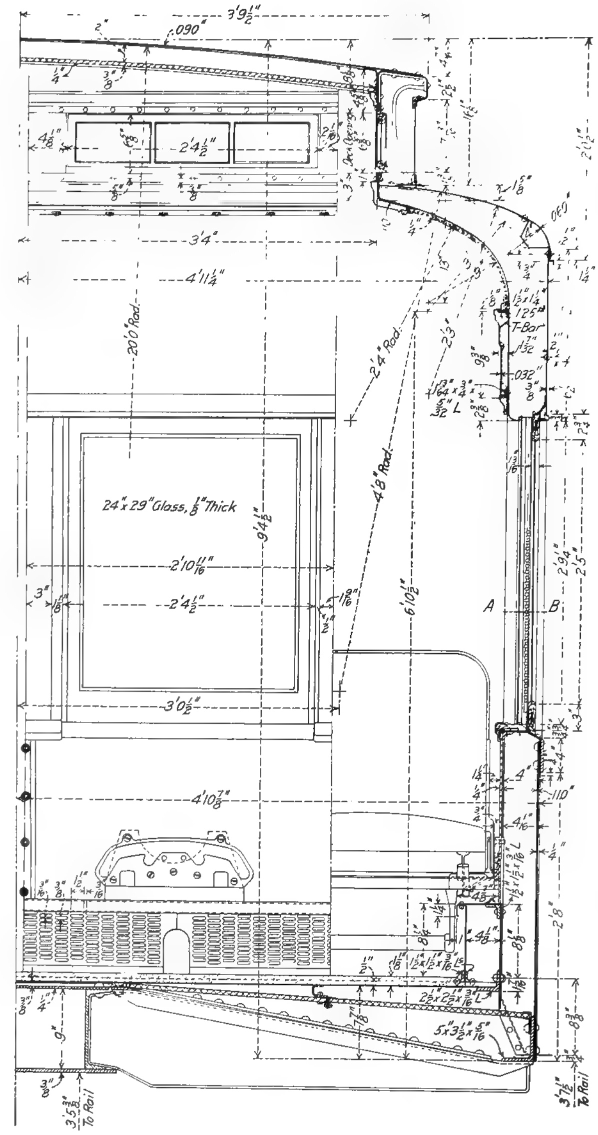


Fig. 385—Cross Section of Pennsylvania Railroad Steel Combination Cars, Classes MP54 and MPB54. See Fig. 386 for Section AB.

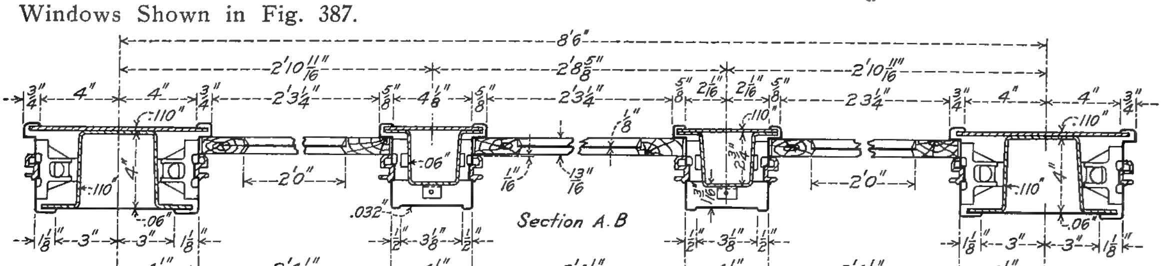


Fig. 386—Section Through Windows at AB in Fig. 385.

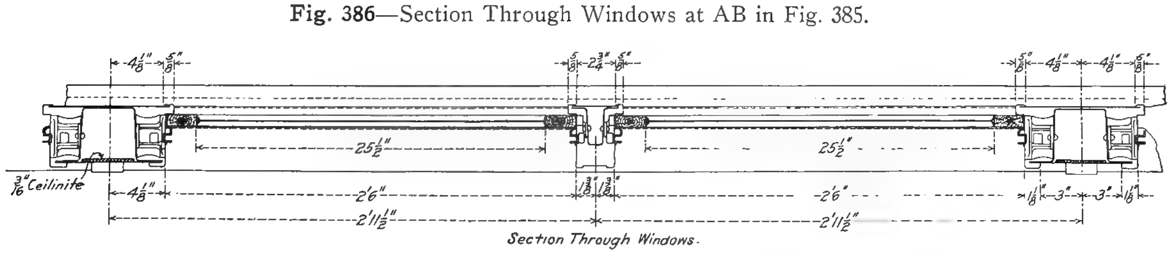


Fig. 387—Section Through Windows in Fig. 384.

See Note at Bottom of Page 368.

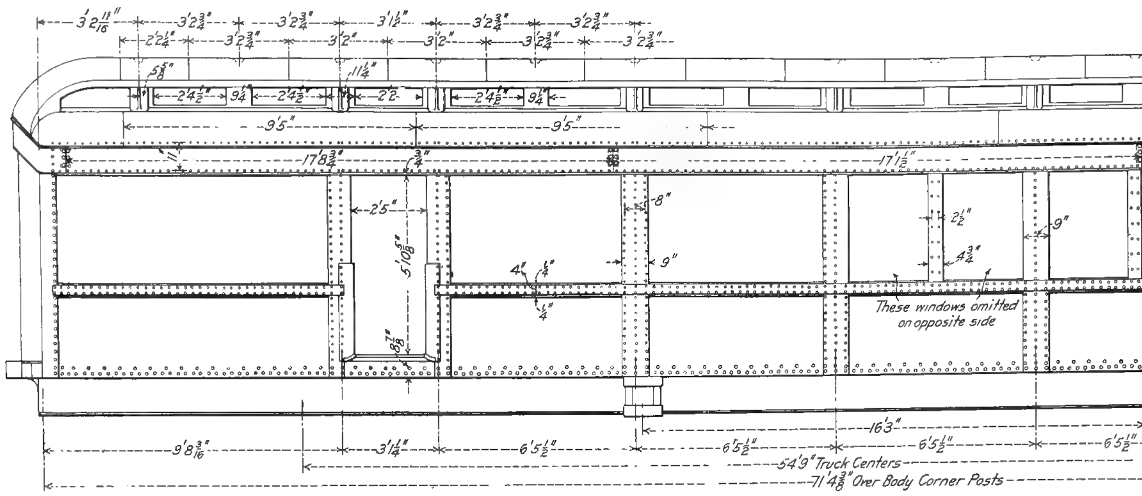


Fig. 388—Side Construction of Pennsylvania Railroad Steel Passenger Train Cars, Class M70.

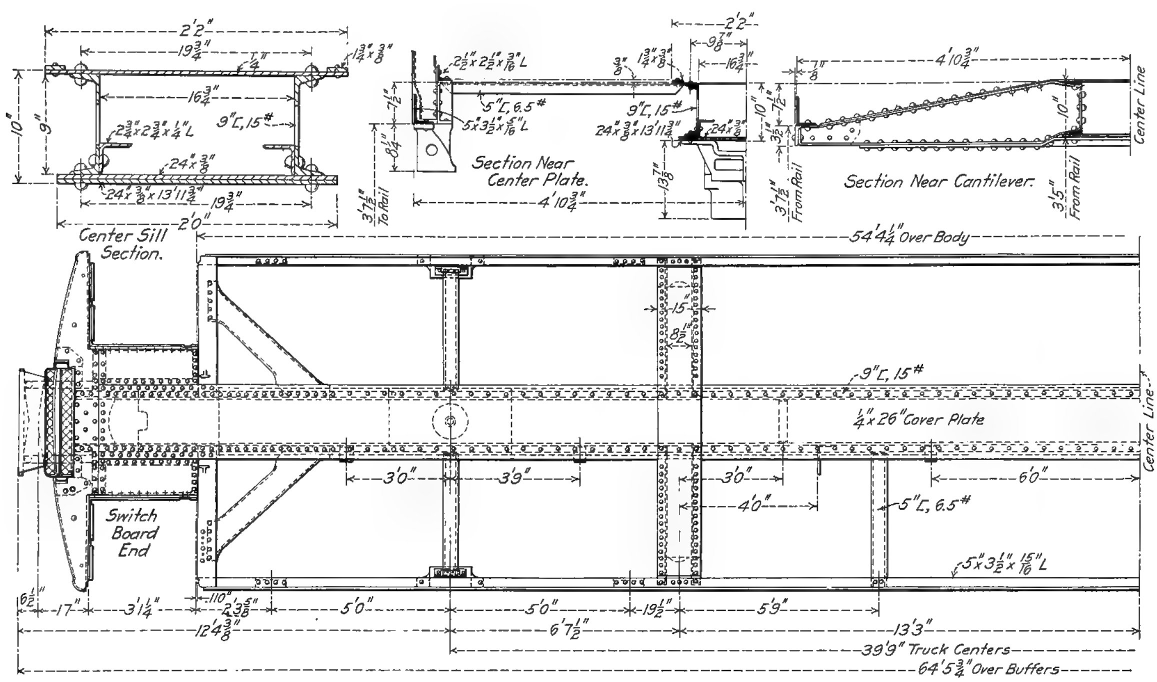


Fig. 389—Underframe of Pennsylvania Railroad Steel Passenger Train Cars, Classes MP54 and MPB54.

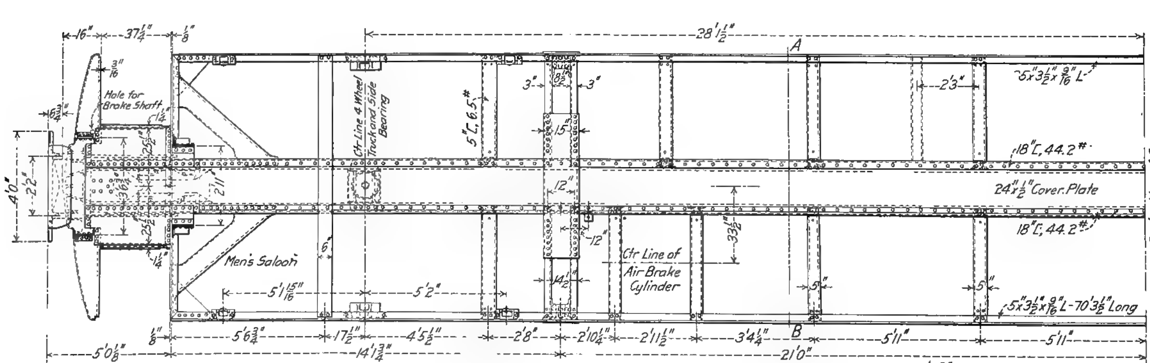


Fig. 390—Underframe of Pennsylvania Railroad Steel Passenger Train Cars, Class P70. See Fig. 384 for Cross Section.

Note:—Figs. 384-390 Cover General Design of Pennsylvania Railroad Steel Passenger Train Cars. See also Fig. 140 for Day Coach and Fig. 152 for Dining Car.

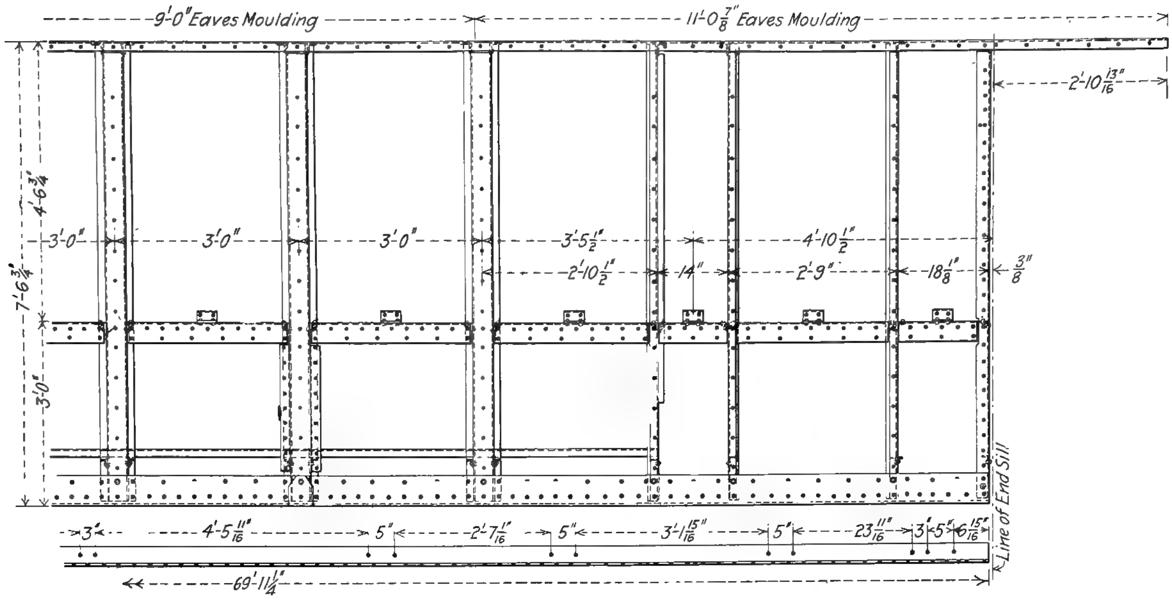


Fig. 391—Side Framing of New York Central Steel Day Coach Shown in Figs. 392 and 393.

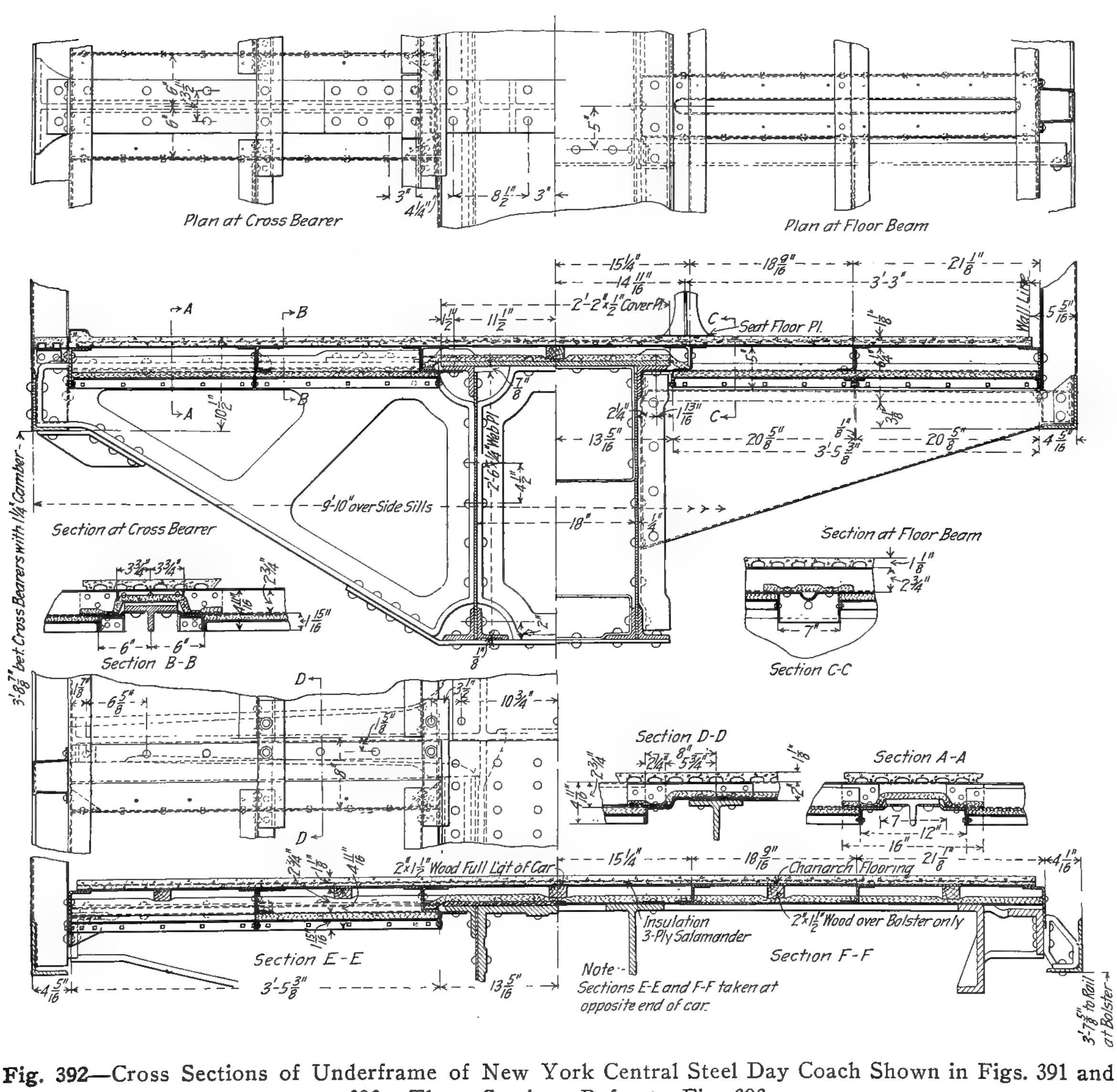


Fig. 392—Cross Sections of Underframe of New York Central Steel Day Coach Shown in Figs. 391 and 393. These Sections Refer to Fig. 393.

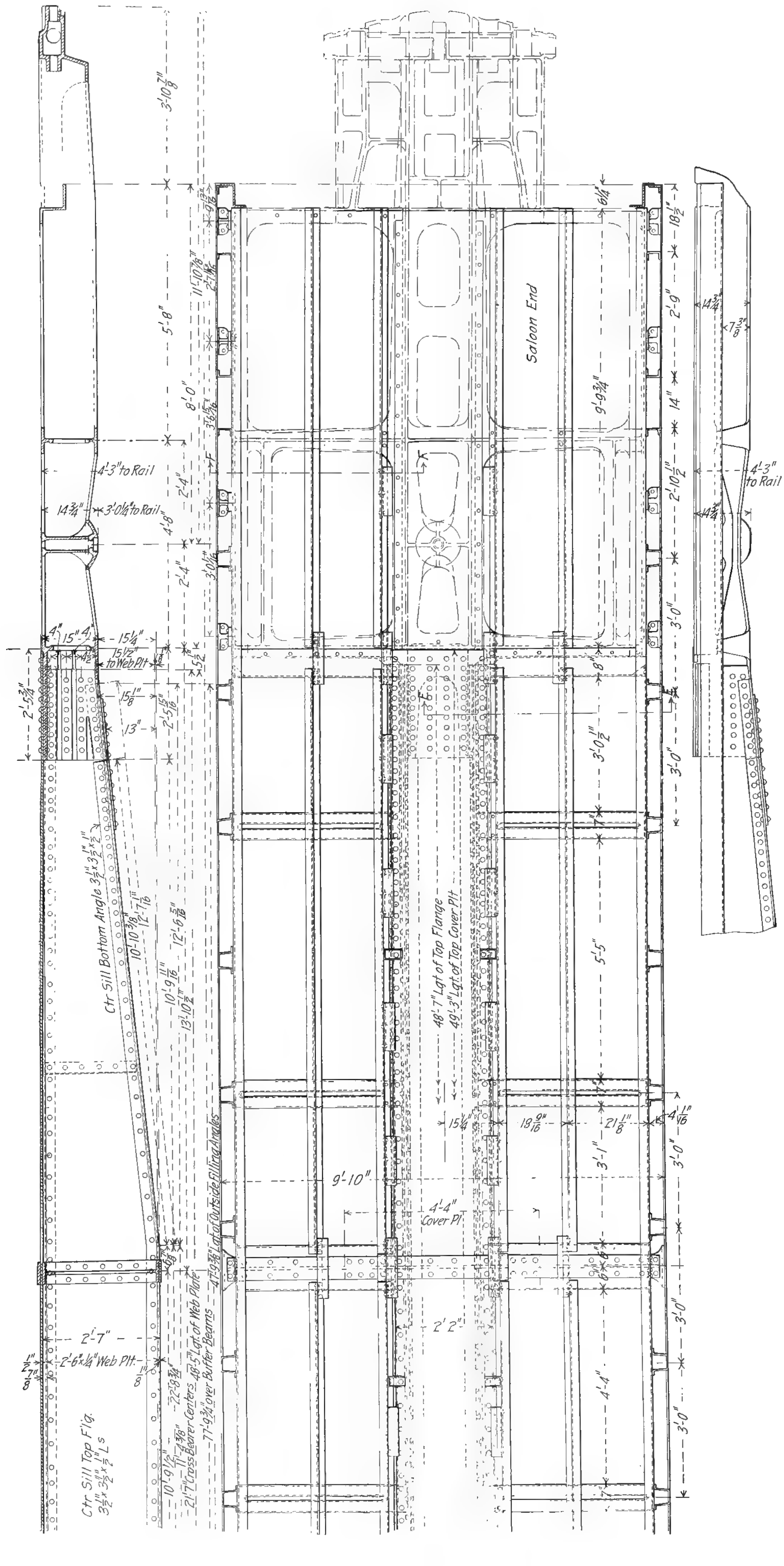


Fig. 393—Underframe of New York Central Steel Day Coach Shown in Figs. 391 and 392. Builder, American Car & Foundry Company.

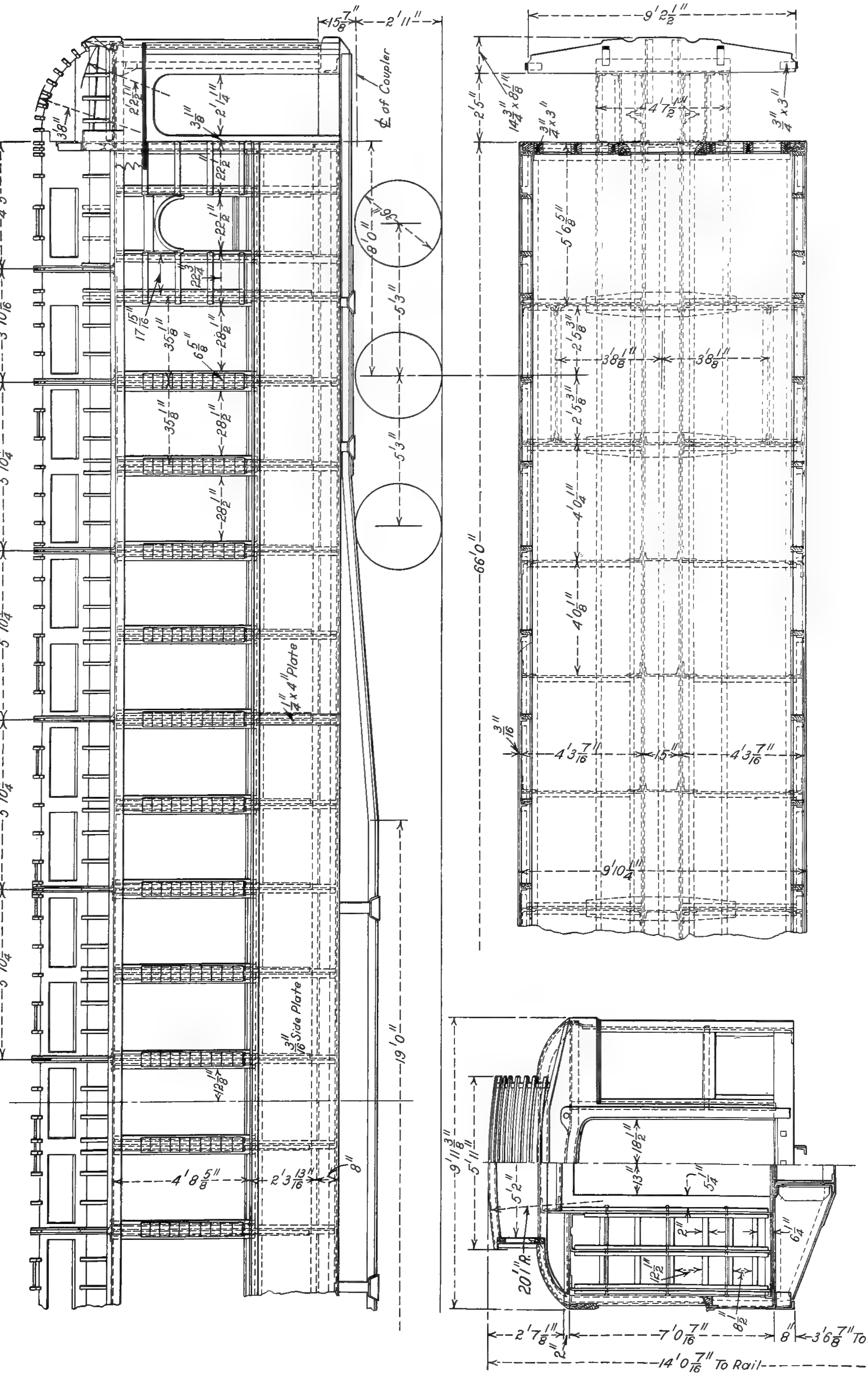


Fig. 394—Southern Railway **Steel Frame** Day Coach. Builder, The Harlan & Hollingsworth Corporation.

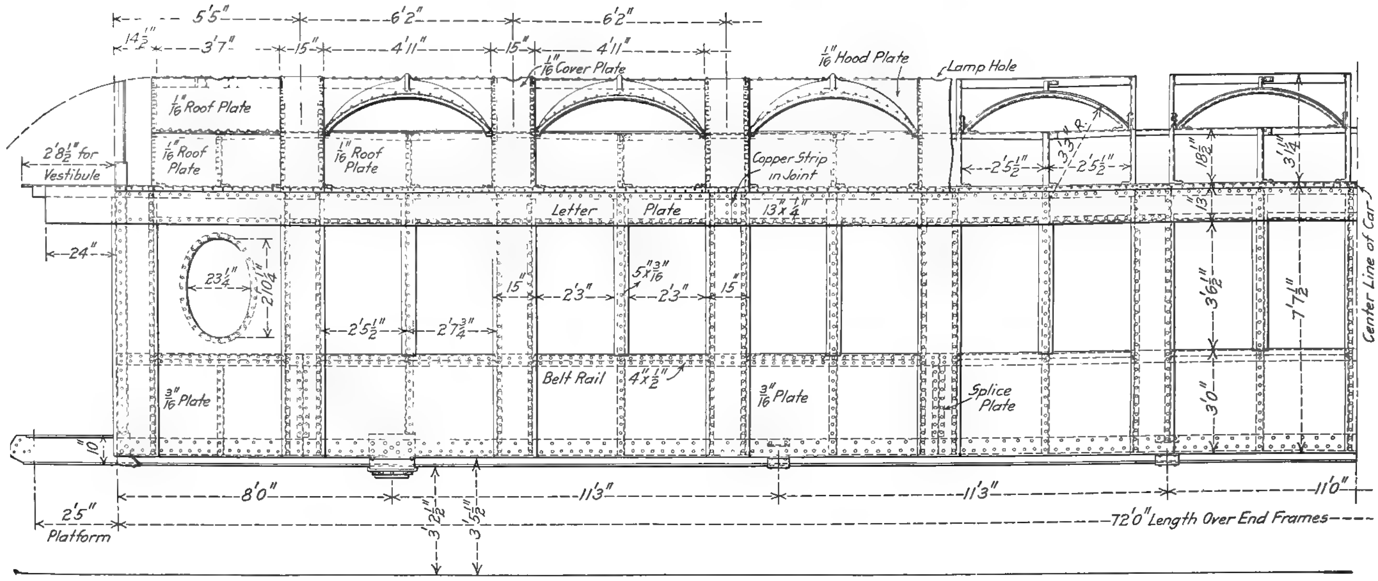


Fig. 394A—Side Framing of Canadian Pacific Steel Day Coach Shown in Figs. 395 and 396.

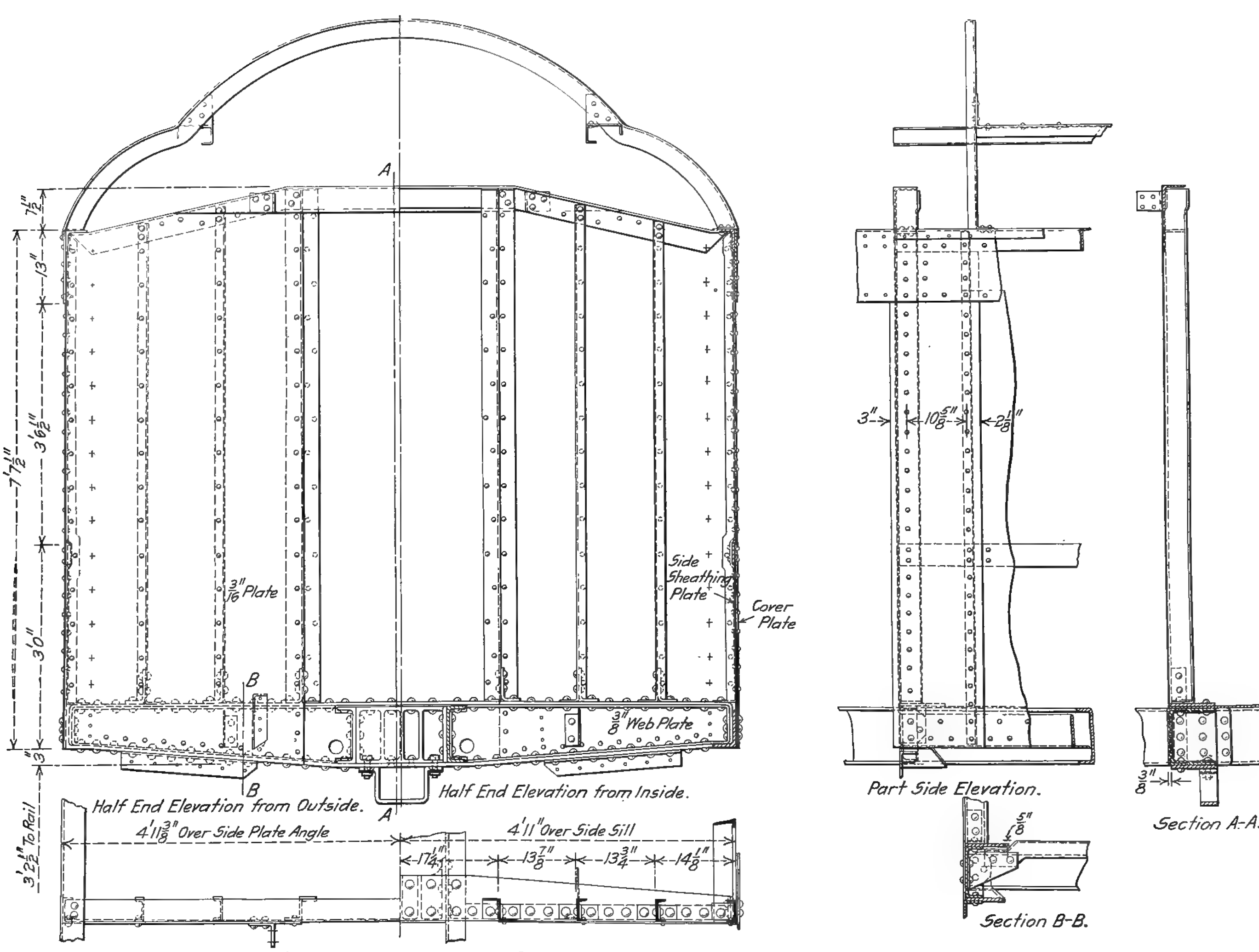


Fig. 395—End Construction of Canadian Pacific Steel Day Coach Shown in Figs. 394A and 396.

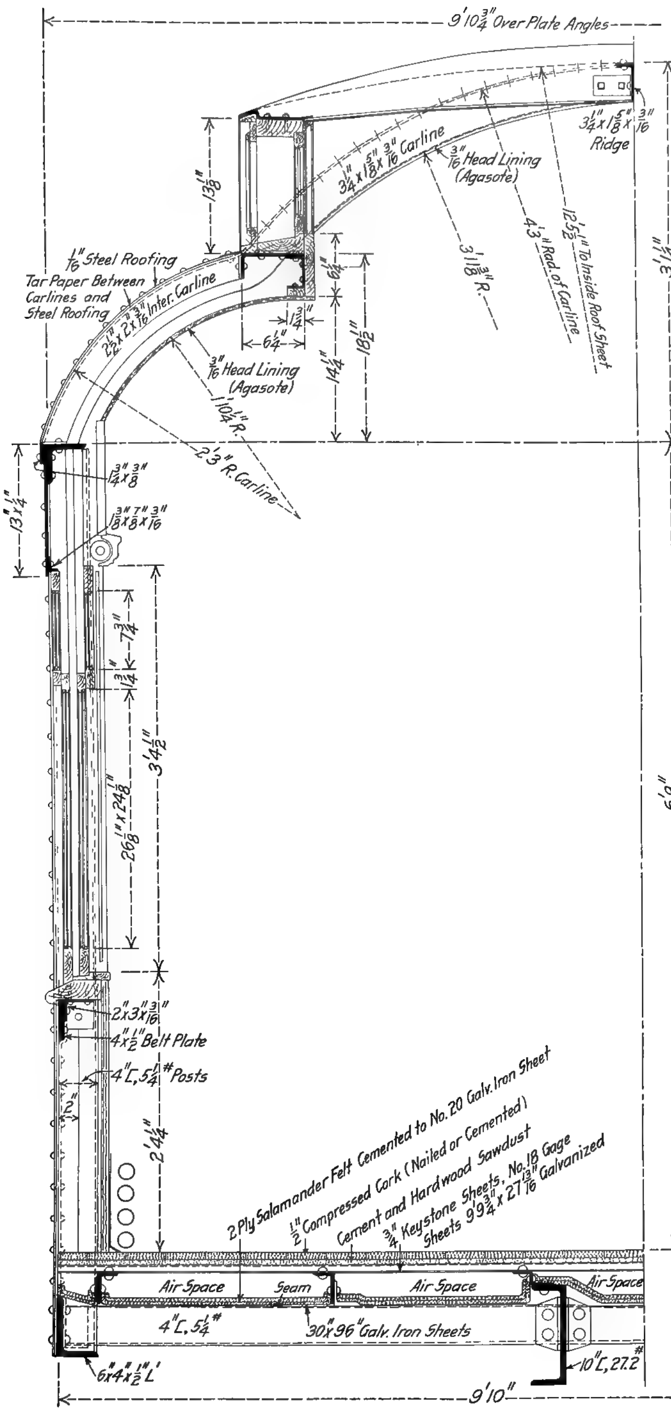


Fig. 396—Cross Section Through Canadian Pacific Steel Day Coach Shown in Figs. 394A and 395.

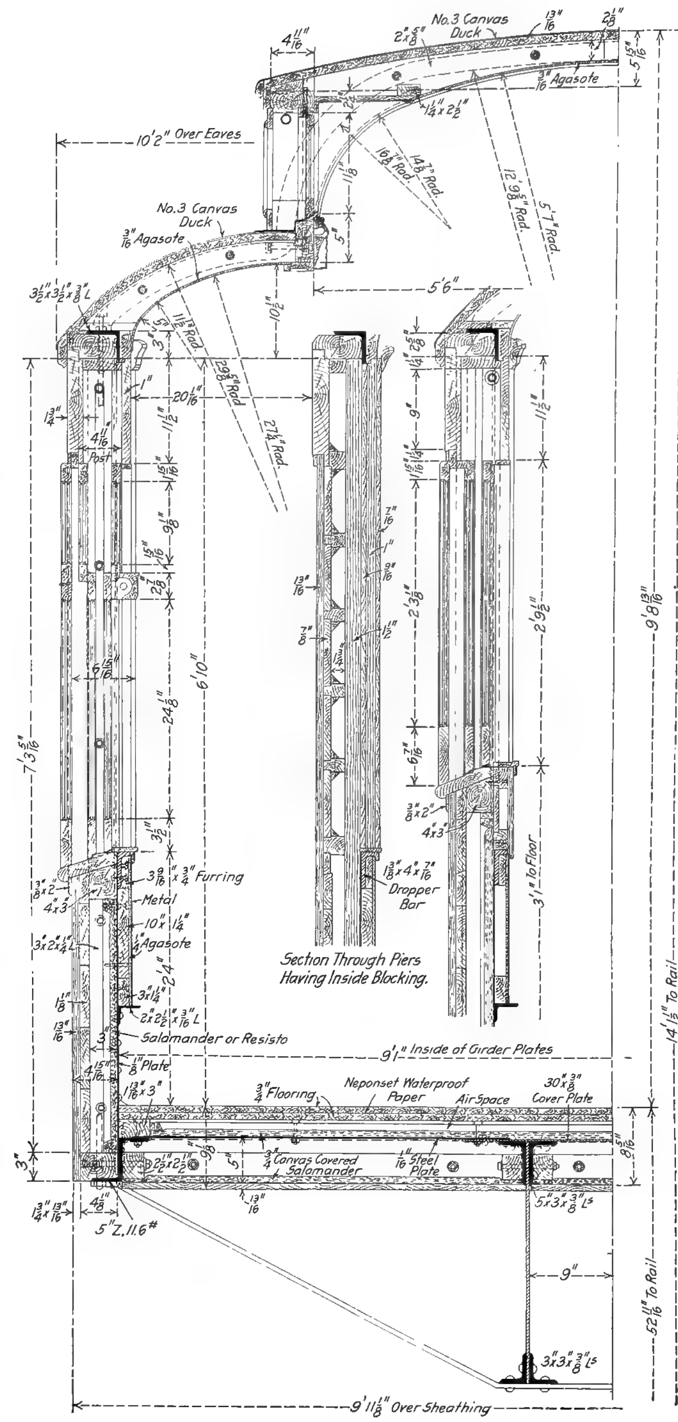


Fig. 397—Cross Sections Through Grand Trunk Suburban Coach Shown in Figs. 398 and 399.

Parts of Steel Passenger Train Cars. See Fig. 404.

1 *Center Sill Web Plate*
2 *Center Sill Bottom Angle*
3 *Center Sill Top Angle*
4 *Center Sill Cover Plate*
5 *Side Sill Angle*
6 *Crossbearer Bottom Tie Plate*
7 *Body Bolster Tie Plate*
8 *Body Side Bearing*
9 *Floor Nailing Strip*
10 *Floor Nailing Strip*
11 *Floor Nailing Strip*
12 *Underfloor Course*
13 *Top Floor Course*
14 *Floor Support*
15 *Crossbearer Center Filler*
16 *Bolster Center Filler*
17 *Floor Nailing Strip Stiffener*
18 *Floor Nailing Strip Stiffener*
19 *Angle Side Post*
20 *Tee Side Post*
21 *Buffer Beam*
22 *Buffer Beam Extension*
23 *Corner Post*
24 *End Door Post*
25 *Intermediate End Post*
26 *Platform Cover Plate*
27 *Steel Underfloor Plate*
28 *Drawbar Carry Iron*
30 *Side Girder Top Member or Belt Rail*
31 *Vestibule Corner Post*
32 *Vestibule Diaphragm Post*
33 *Window Header Angle*
34 *Side Sheathing Plate*
35 *Roof or Lower Deck Carline*
36 *Roof or Upper Deck Carline*
37 *Metal End Plate*
38 *Side and End Sill Corner Gusset*
39 *Window Sill Angle*
40 *Side Post Gusset*
41 *"Z" Bar Side Plate*
42 *End Sill Top Tie Plate*
43 *End Sill Bottom Tie Plate*
44 *Draft Lug Angle*
45 *End Sill Channel*

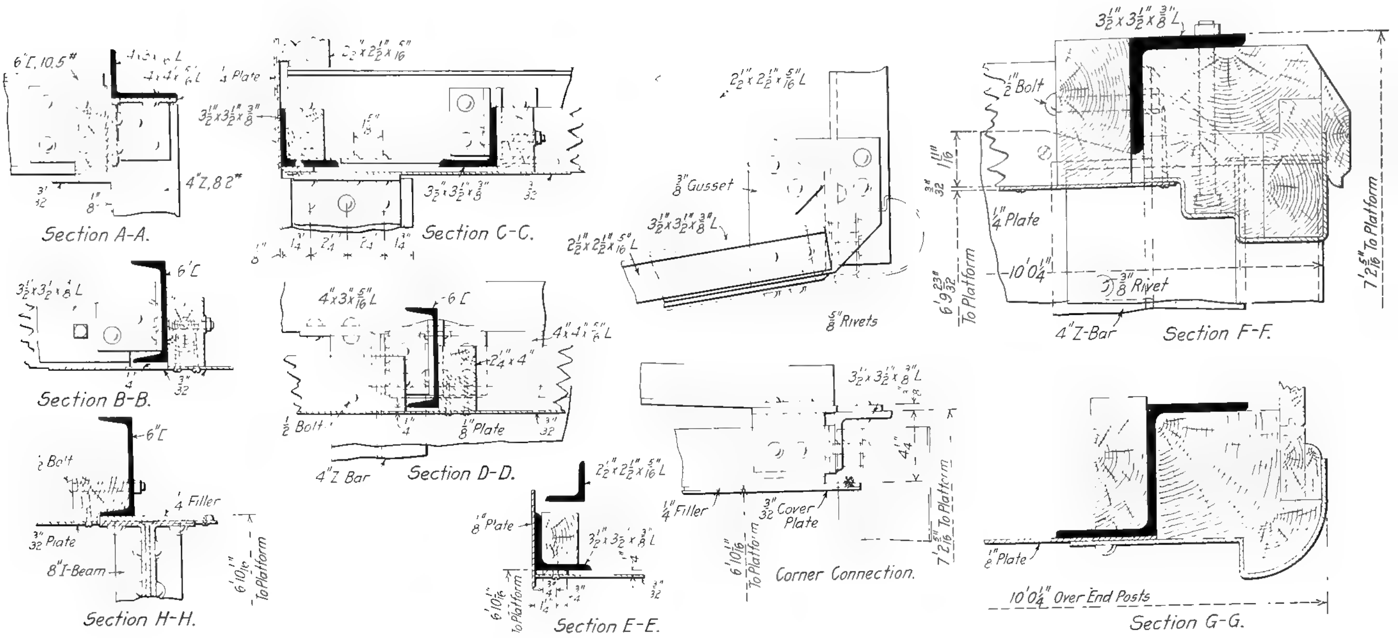
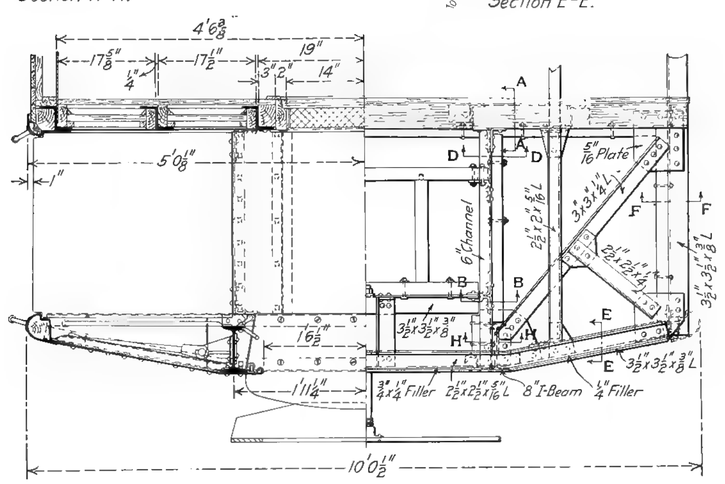


Fig. 398—Details of End Framing of Grand Trunk Suburban Cars Shown in Figs. 397 and 399. The Section Letters Refer to Fig. 399.



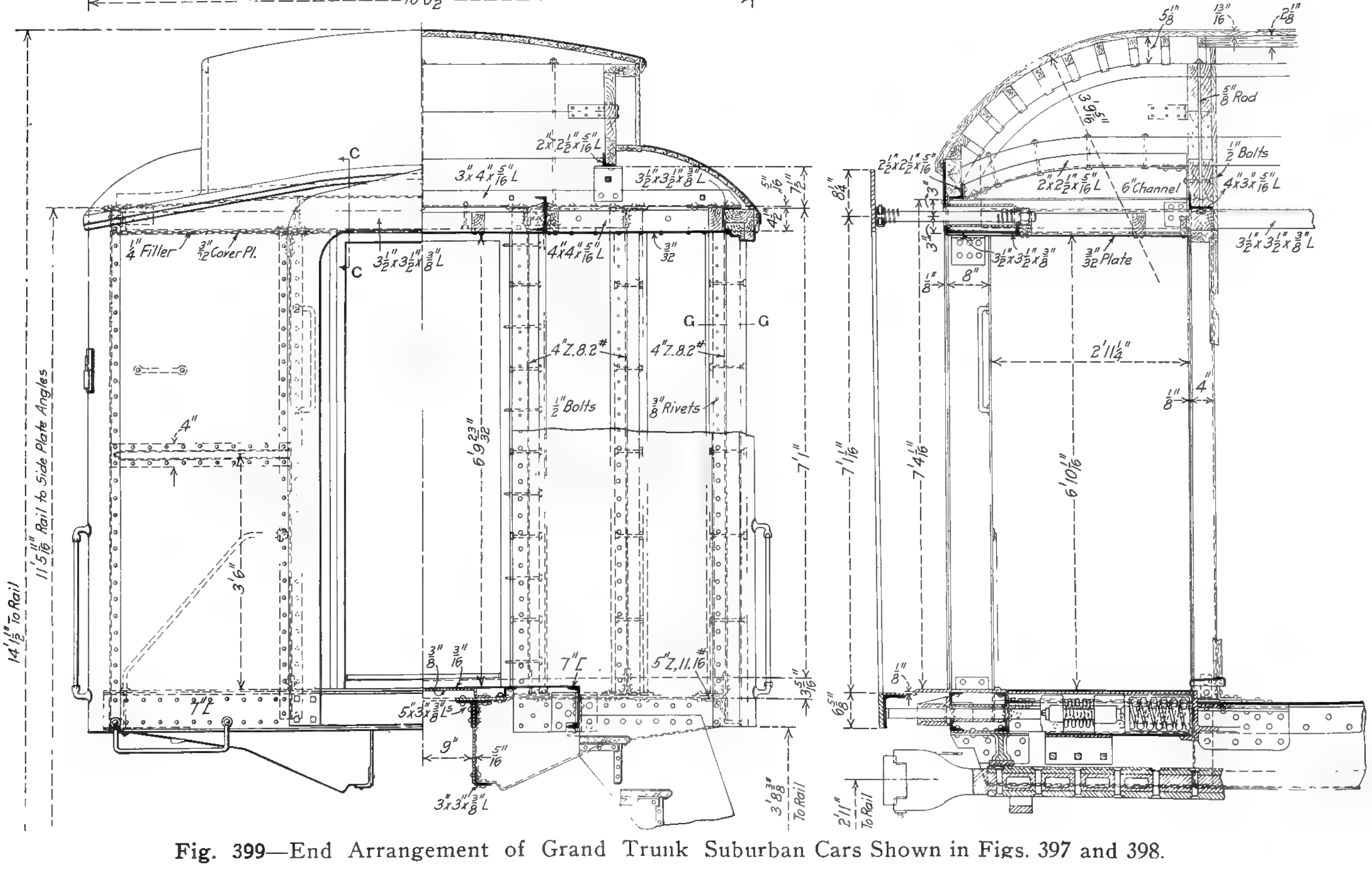


Fig. 399—End Arrangement of Grand Trunk Suburban Cars Shown in Figs. 397 and 398.

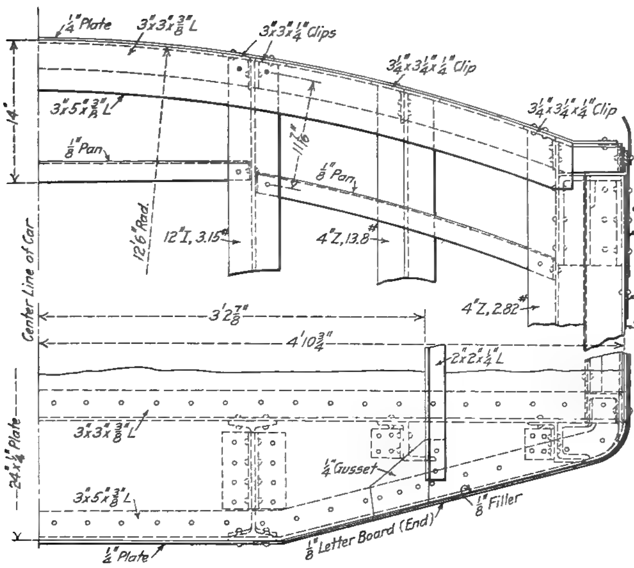


Fig. 400—Roof Details at End of Burlington Dining Car.

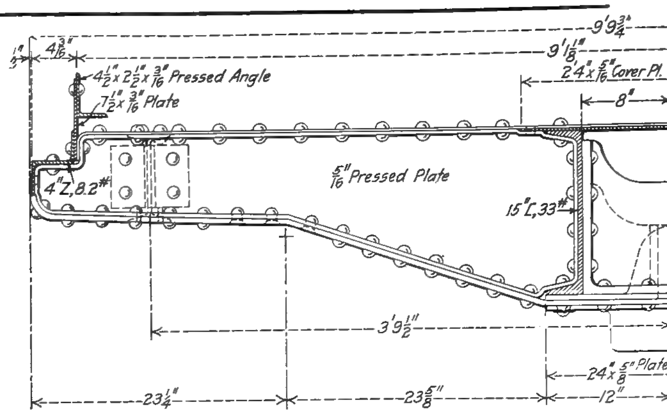


Fig. 401—Double Body Bolster of Burlington Diner.

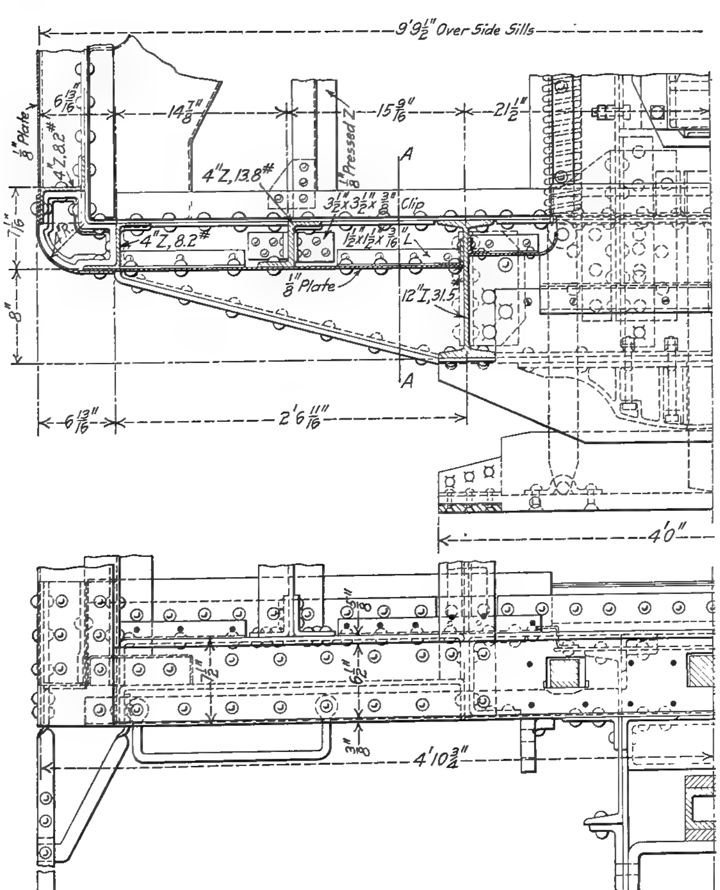


Fig. 402—End Sill of the Burlington Dining Car Shown in Figs. 400-403. Builder, The Pullman Company.

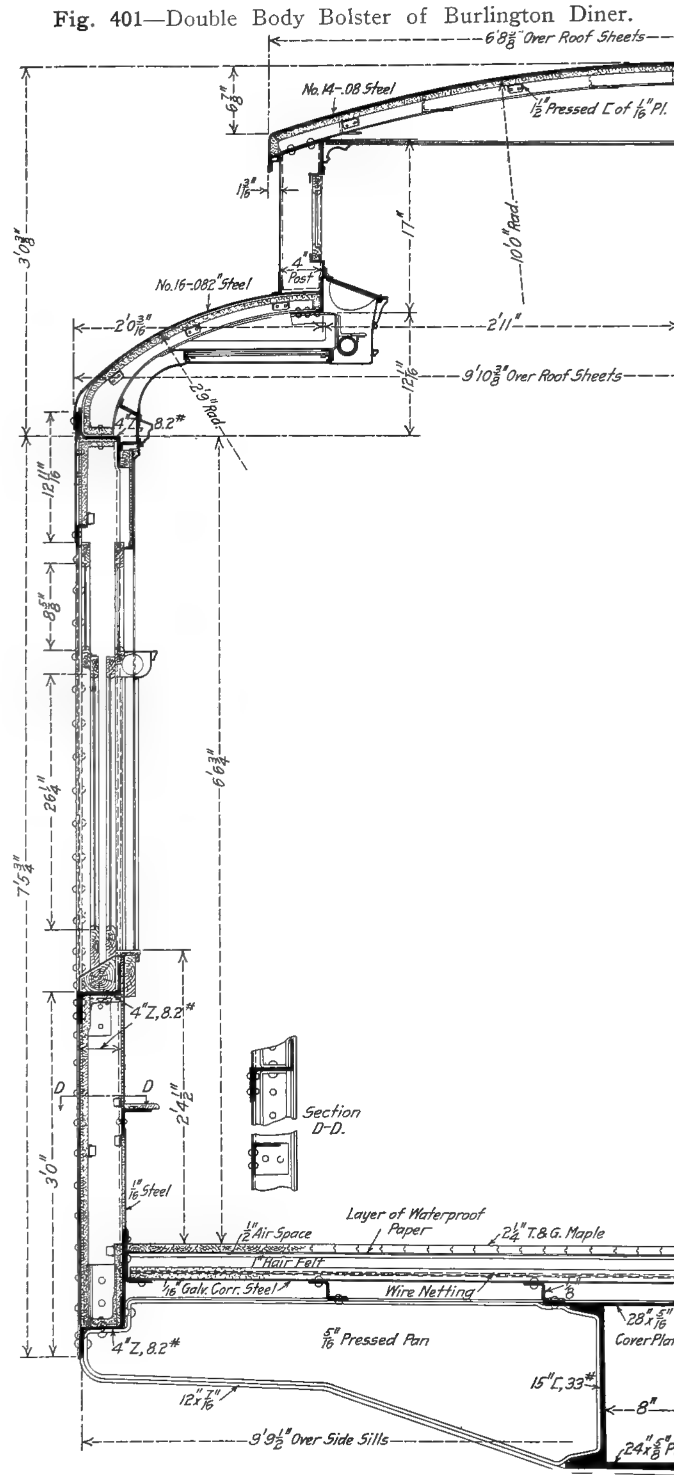


Fig. 403—Cross Section Through Chicago, Burlington & Quincy Dining Car Shown in Figs. 400-402. Builder, the Pullman Company.

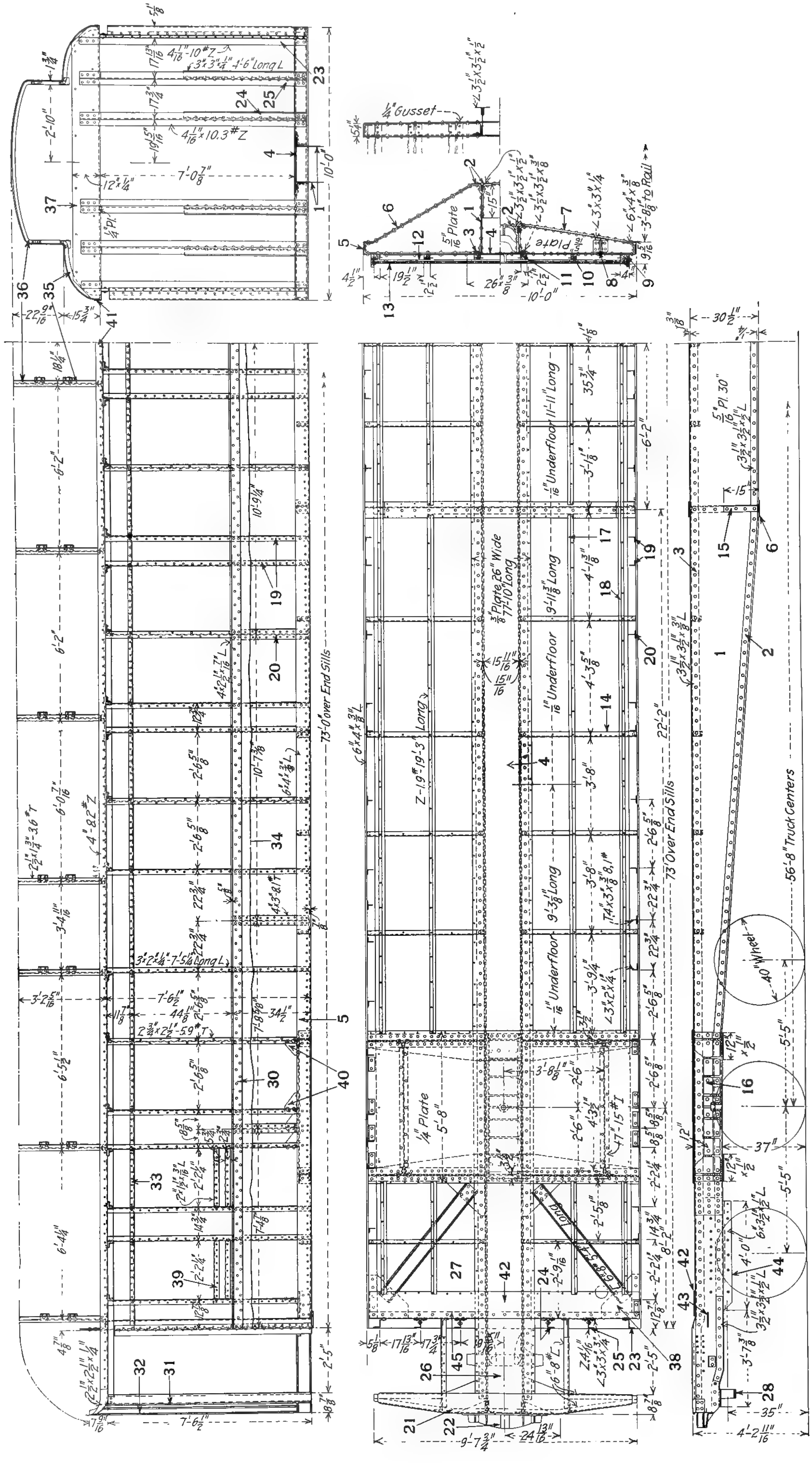


Fig. 404—Minneapolis, St. Paul & Sault Sainte Marie Steel Sleeping Car. Builder, The Barney & Smith Car Company.

See Page 373 for Names of Numbered Parts.

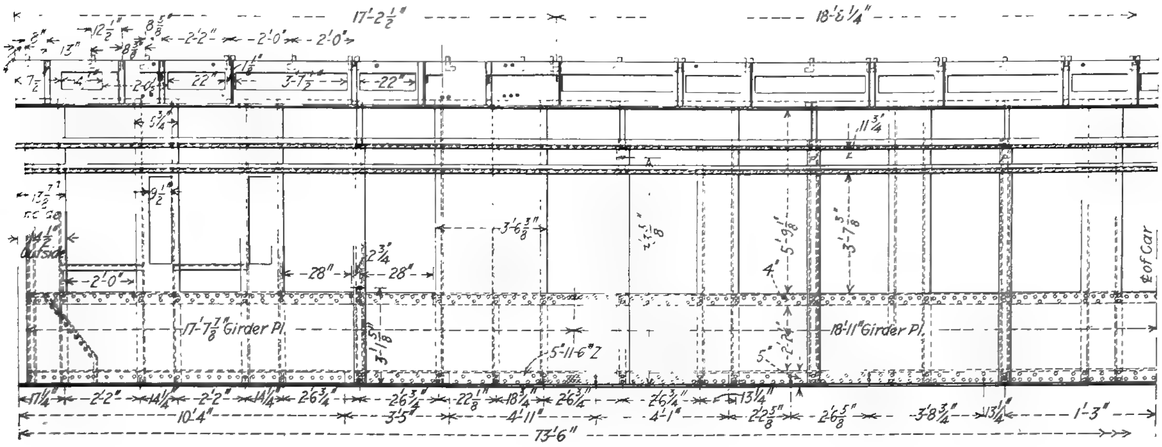


Fig. 405—Side Framing of Pullman Steel Sleeping Car Similar to That Shown in Fig. 170. See also Figs. 406, 407, 409-411 and 413.

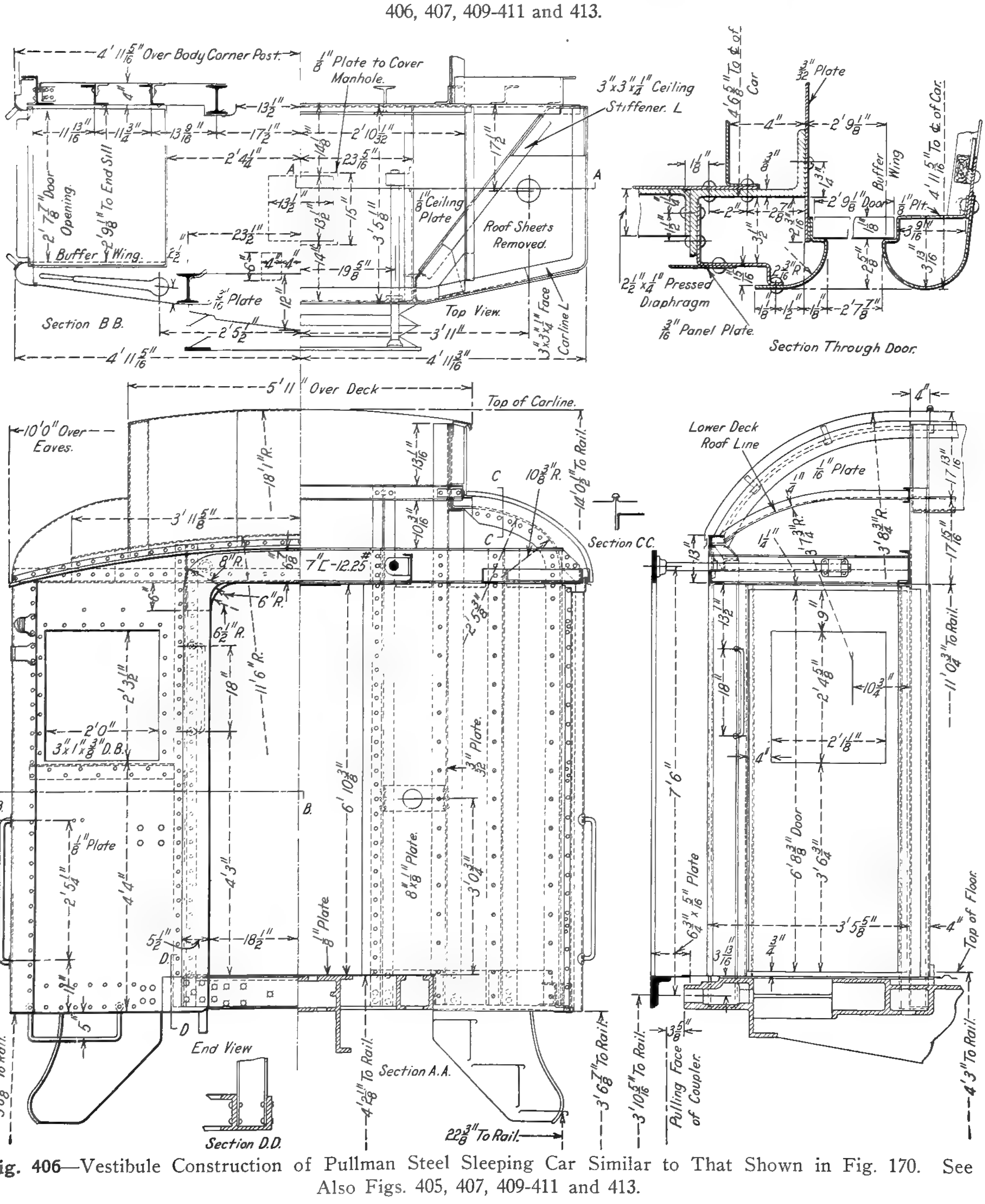


Fig. 406—Vestibule Construction of Pullman Steel Sleeping Car Similar to That Shown in Fig. 170. See Also Figs. 405, 407, 409-411 and 413.

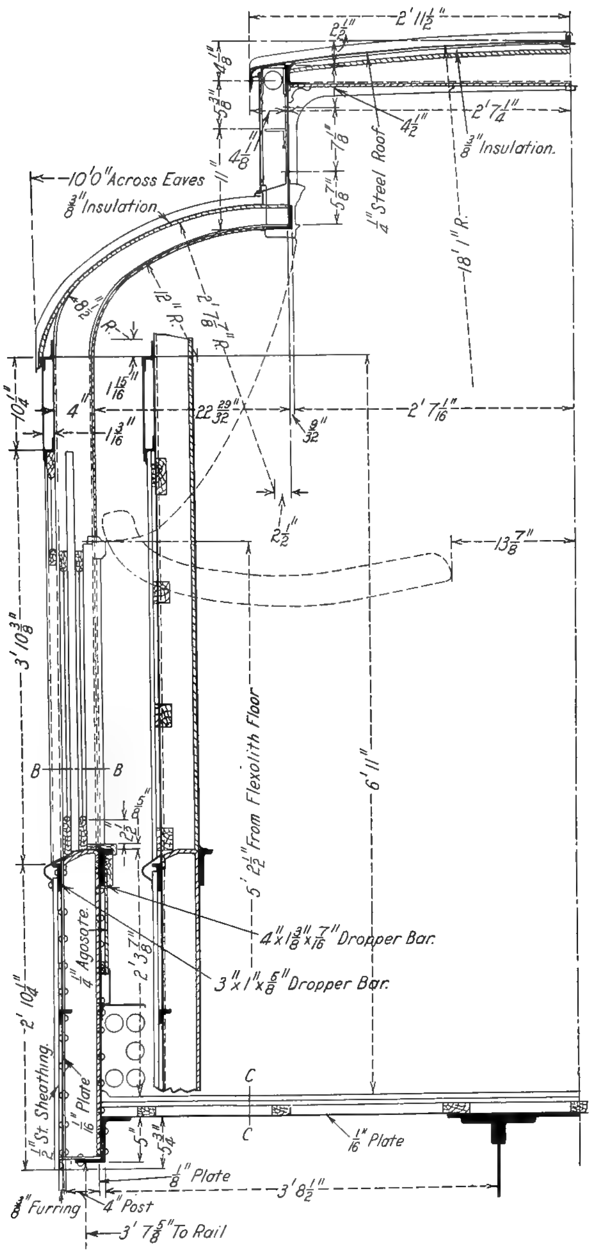


Fig. 407—Cross Sections of Pullman Steel Sleeping Car Similar to That Shown in Fig. 170. See also Figs. 405, 406, 409-411 and 413.

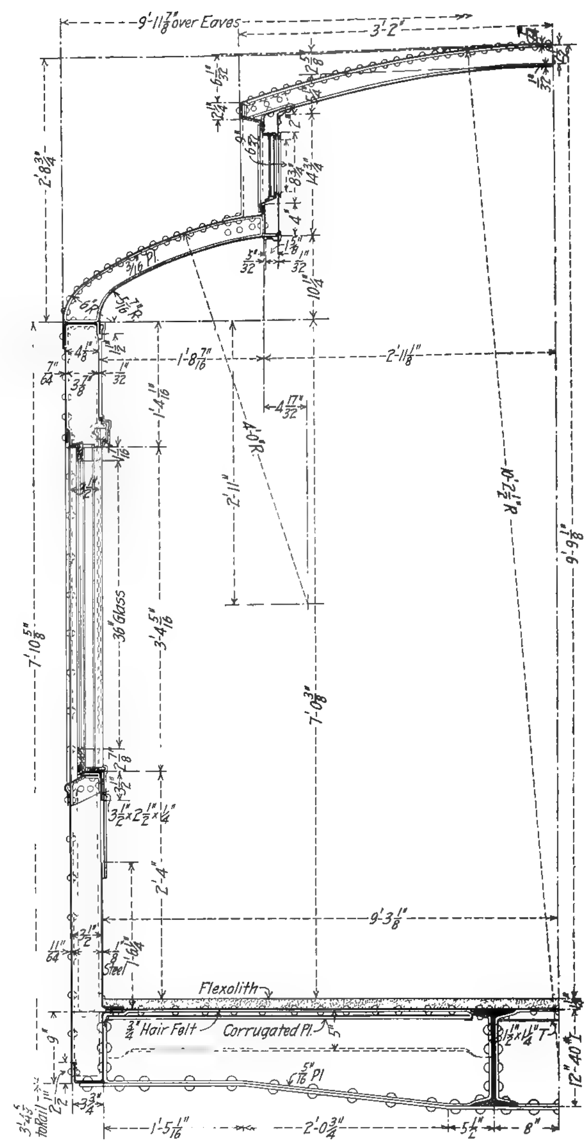


Fig. 408—Cross Section of 67-ft. Steel Day Coach. Builder, Standard Steel Car Company.

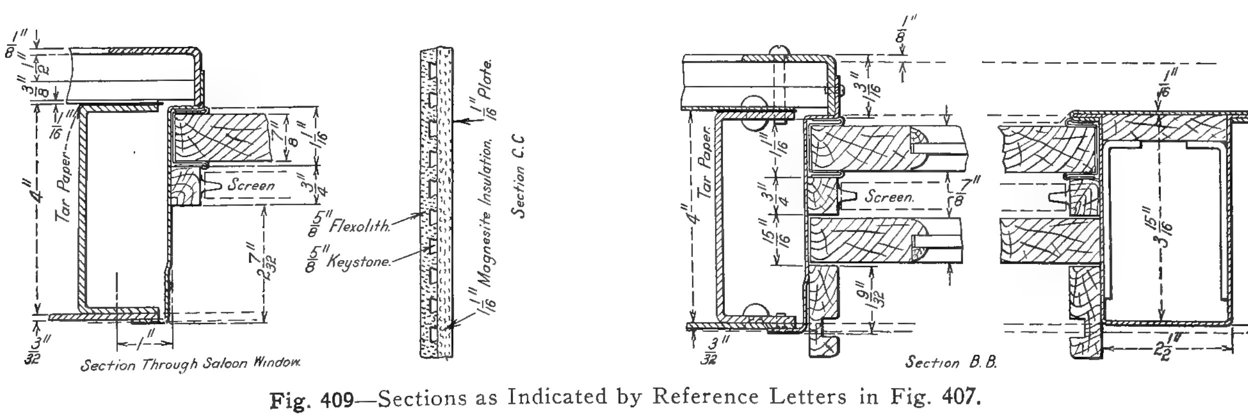


Fig. 409—Sections as Indicated by Reference Letters in Fig. 407.

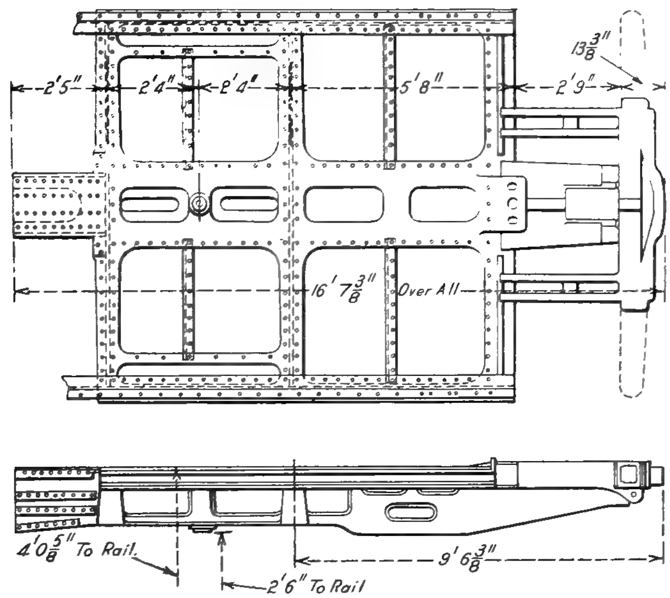


Fig. 410—Body Bolster and Platform of Pullman Steel Sleeping Car. See Fig. 413.

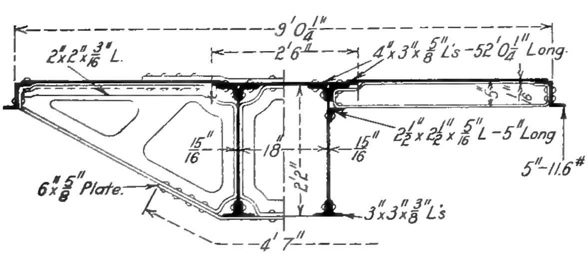


Fig. 411—Cross Sections Through Underframe of Pullman Steel Sleeping Car. See Fig. 413.

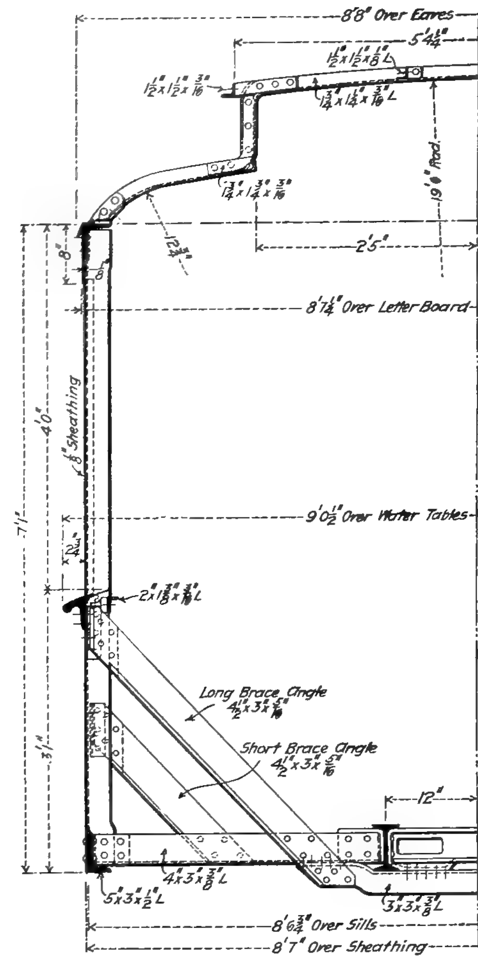


Fig. 412—Cross Section Through Interborough Subway Motor Car.

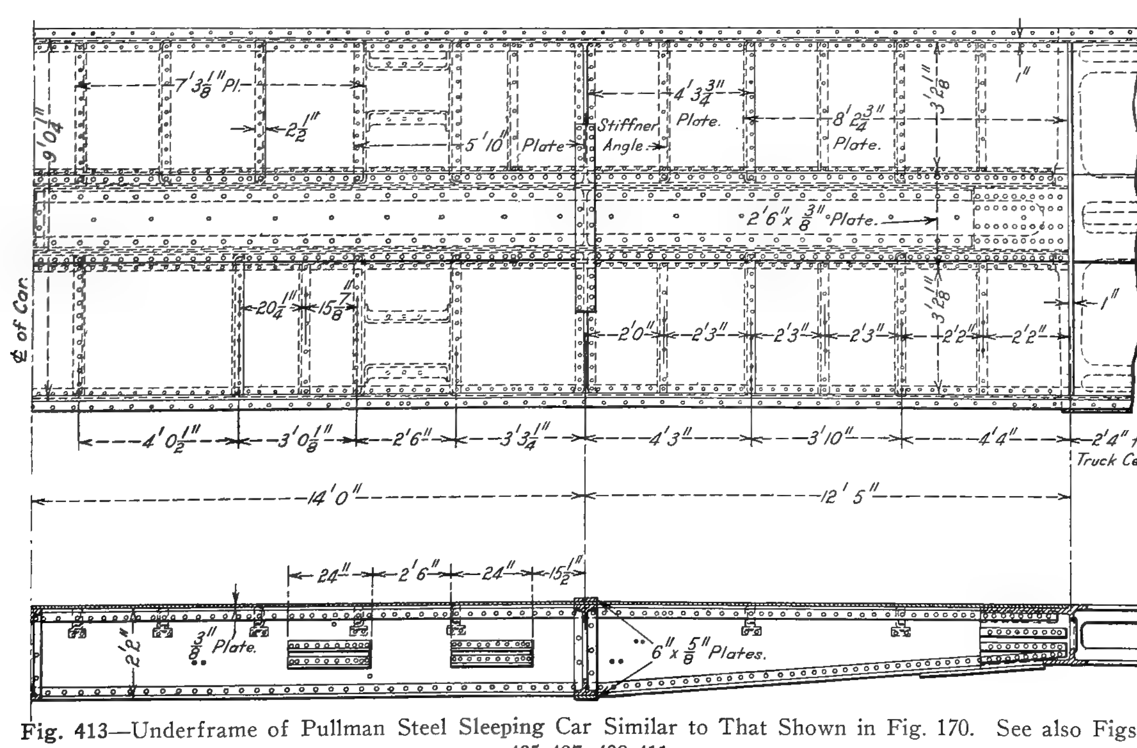


Fig. 413—Underframe of Pullman Steel Sleeping Car Similar to That Shown in Fig. 170. See also Figs. 405-407, 409-411.

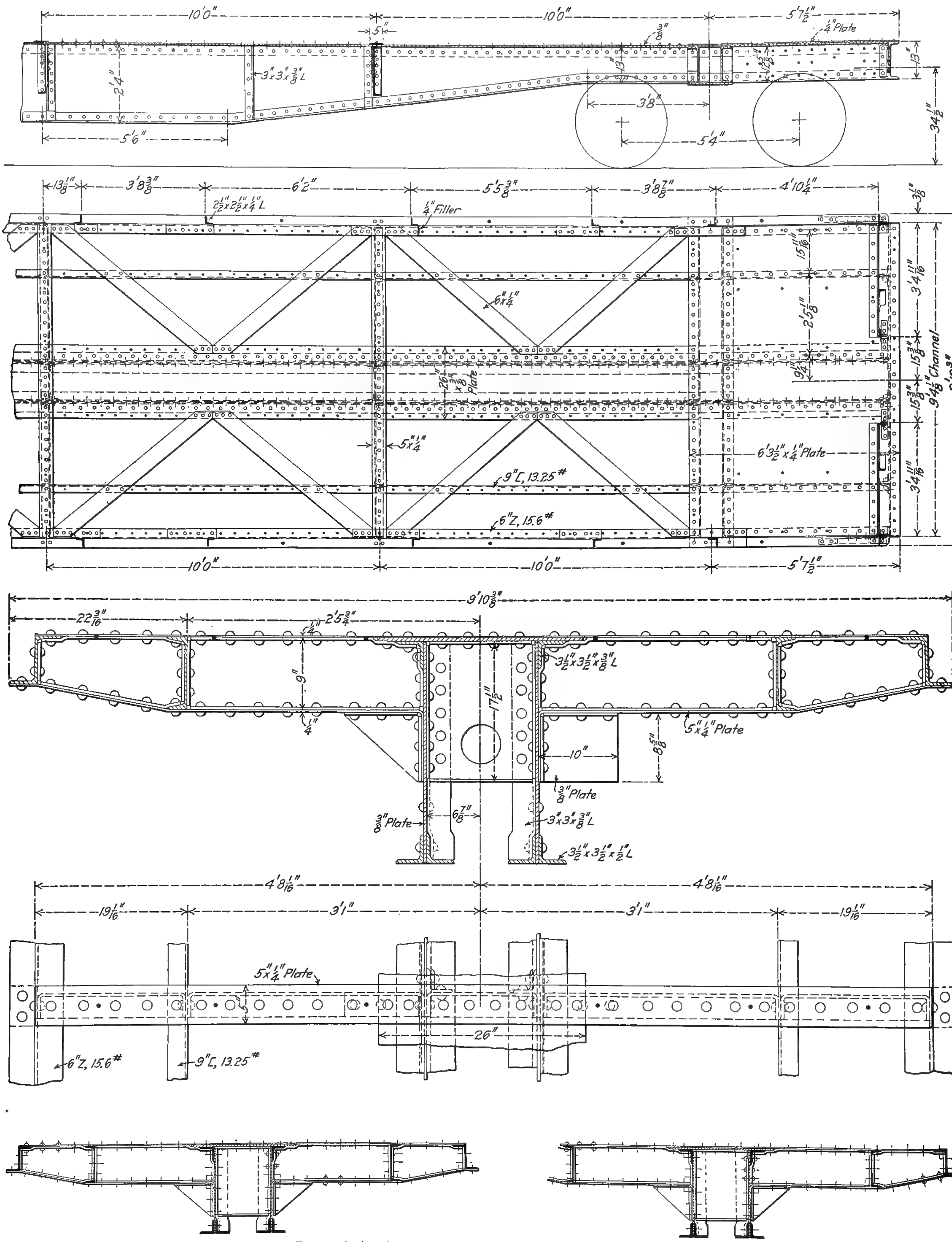


Fig. 414—Underframe of Atchison, Topeka & Santa Fe Steel Frame Dynamometer Car Shown in Figs. 199 and 415-417.

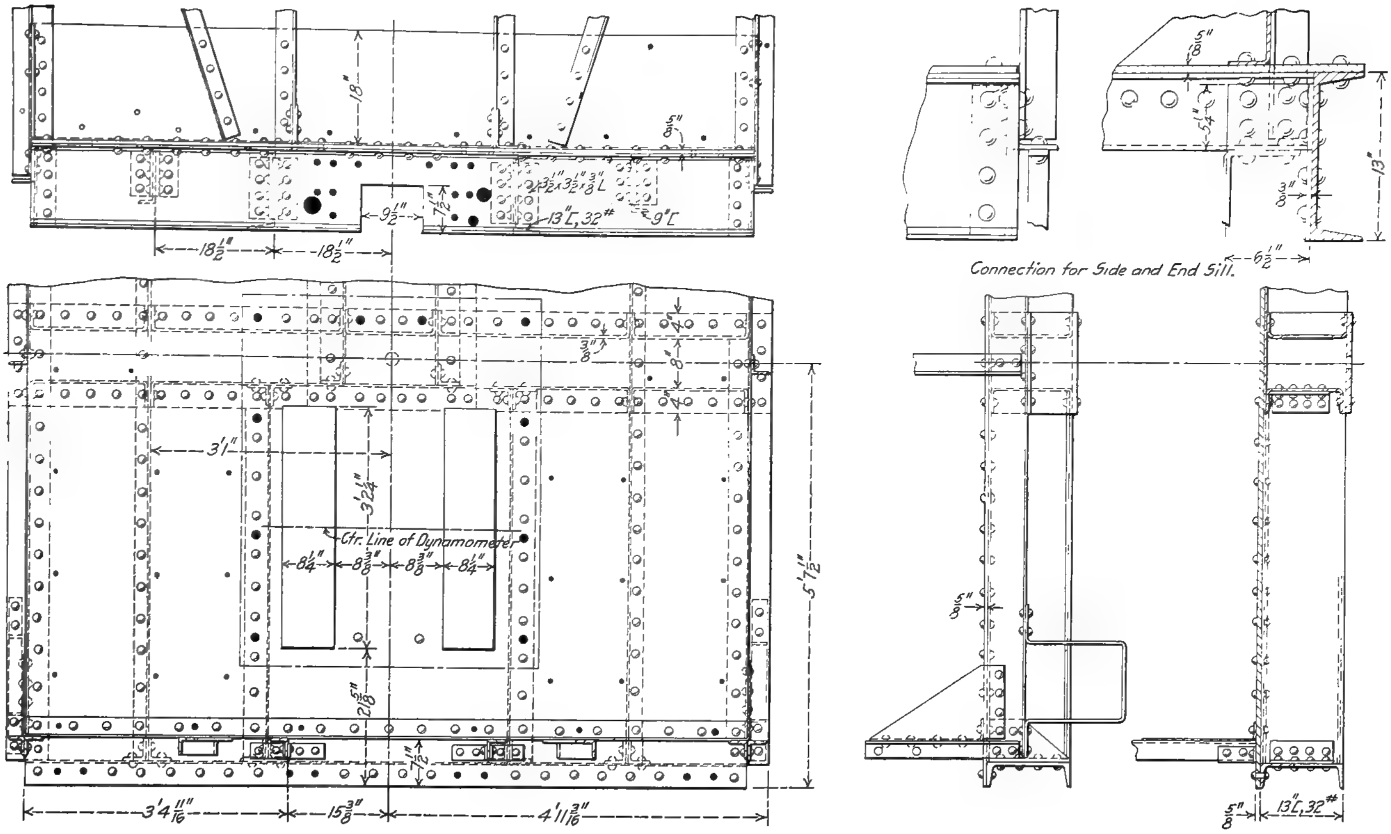


Fig. 415—Underframe Construction at Dynamometer End of Santa Fe Dynamometer Car Shown in Figs. 199, 414, 416 and 417.

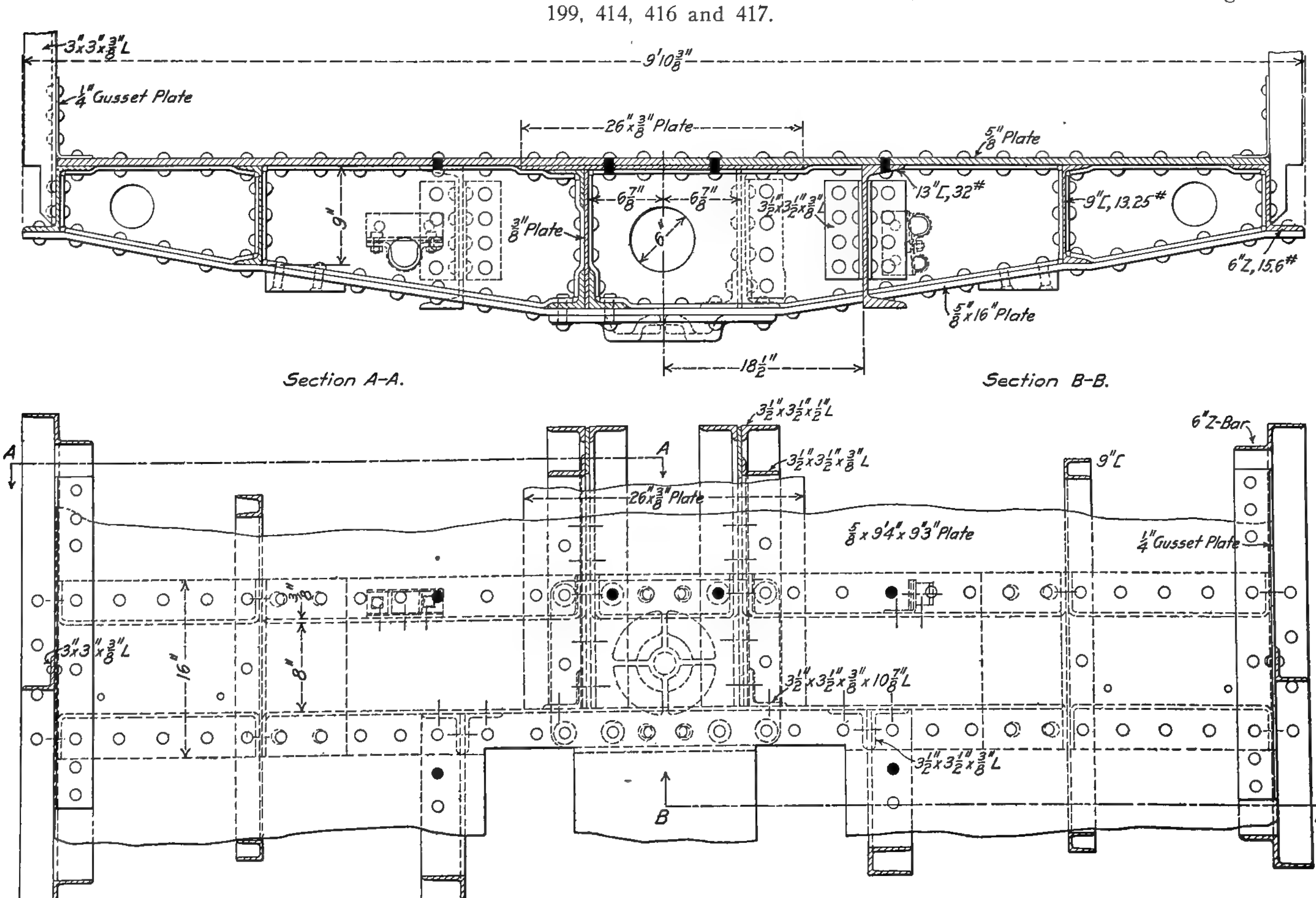


Fig. 416—Body Bolster at Dynamometer End of Santa Fe Dynamometer Car Shown in Figs. 199, 414, 415 and 417.

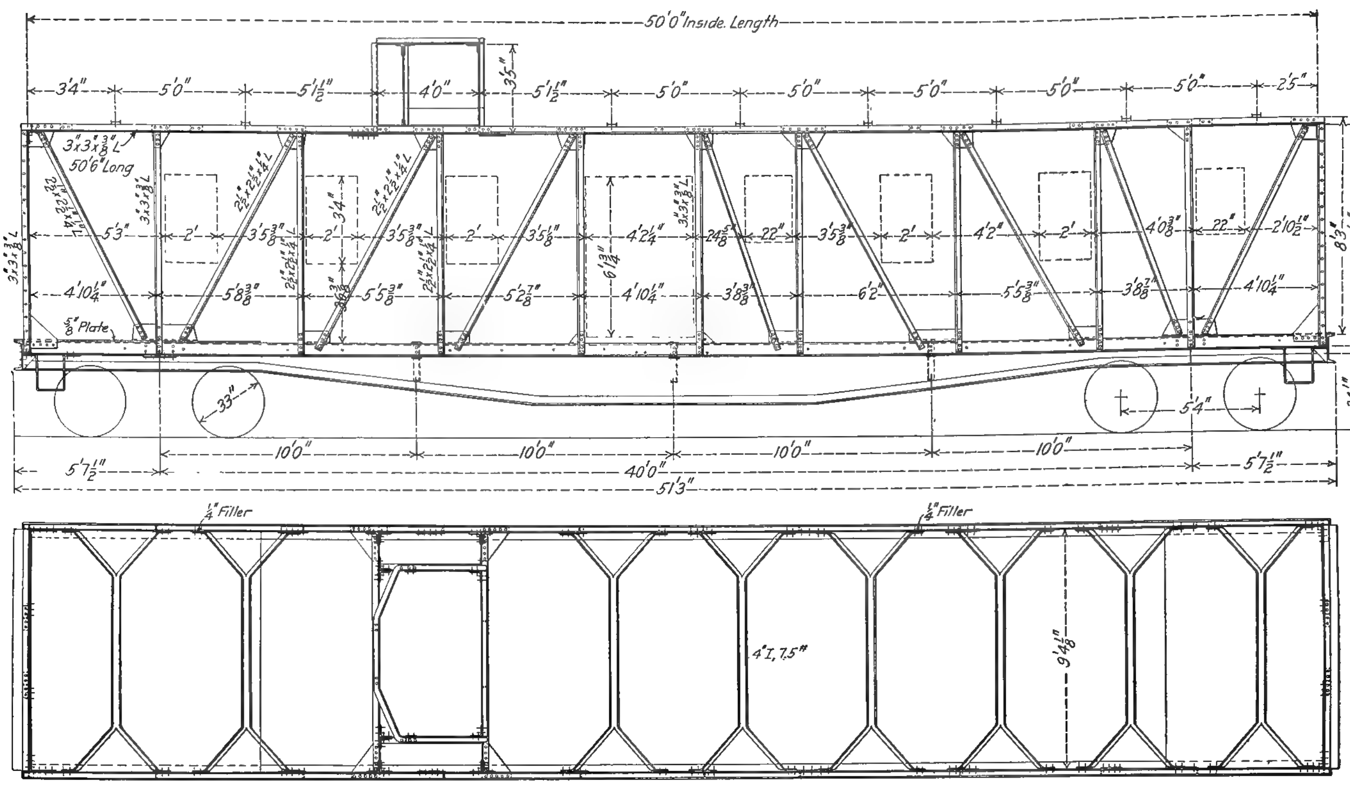


Fig. 417—Side and Roof Framing of Atchison, Topeka & Santa Fe Steel Frame Dynamometer Car Shown in Figs. 199 and 414-416.

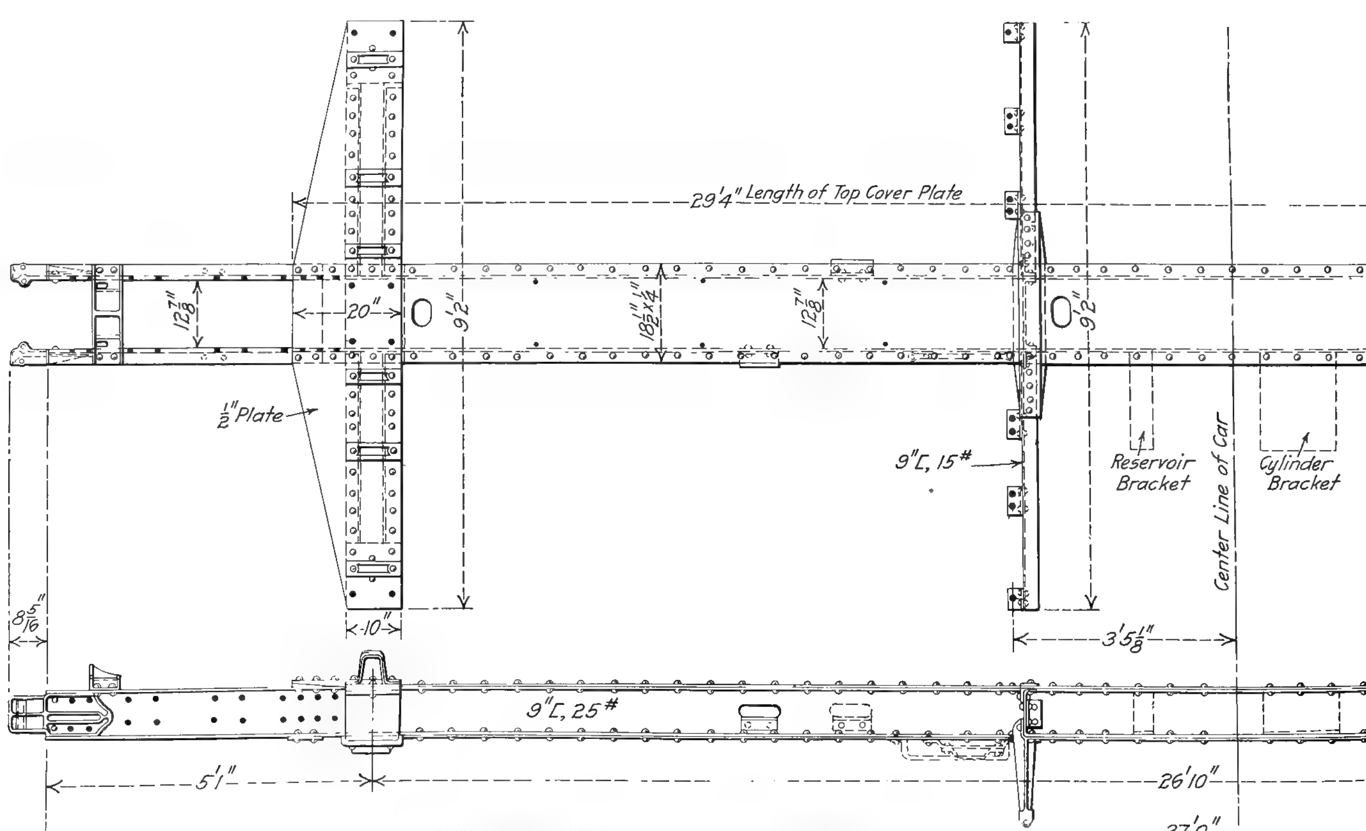


Fig. 418—Steel Underframe Used on the New York Central in Strengthening Wooden Box Cars.

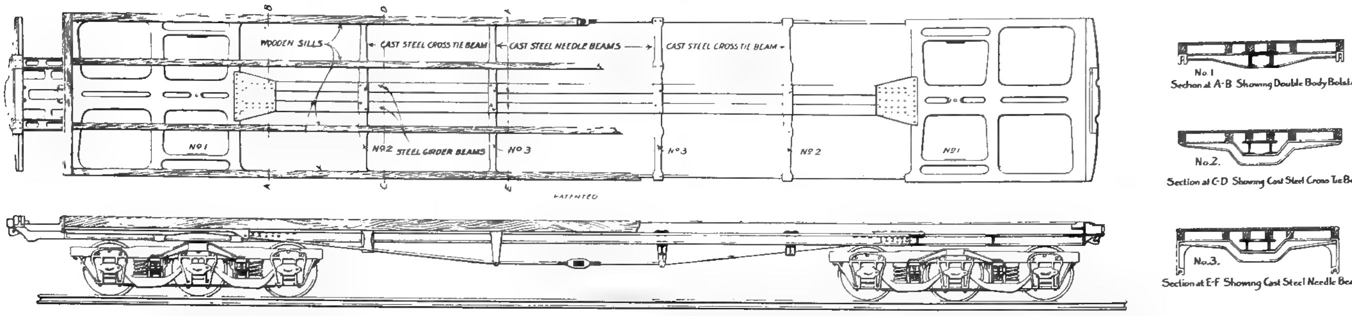


Fig. 419—Combined Wood and Steel Underframe for Passenger Train Cars with One Vestibule and One Non-Vestibule End, Using Commonwealth Steel Company's Cast Steel Combined Platform and Double Body Bolsters.

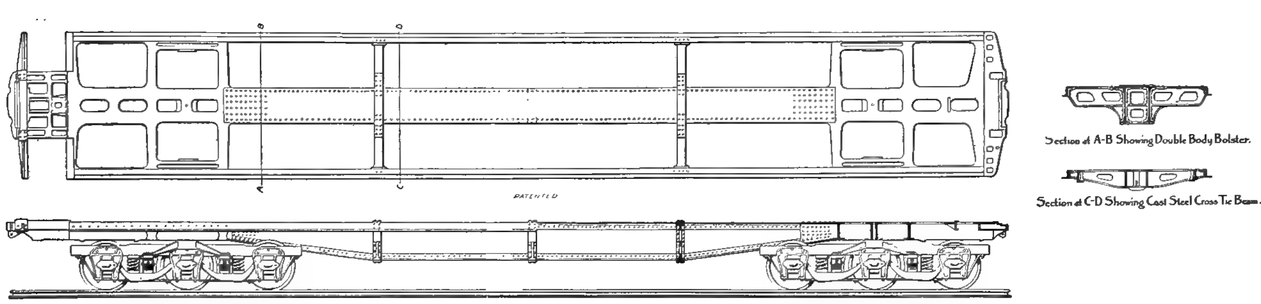


Fig. 420—Steel Underframe for Passenger Train Cars with One Vestibule and One Non-Vestibule End, Using Commonwealth Steel Company's Combined Cast Steel Platform and Double Body Bolsters.

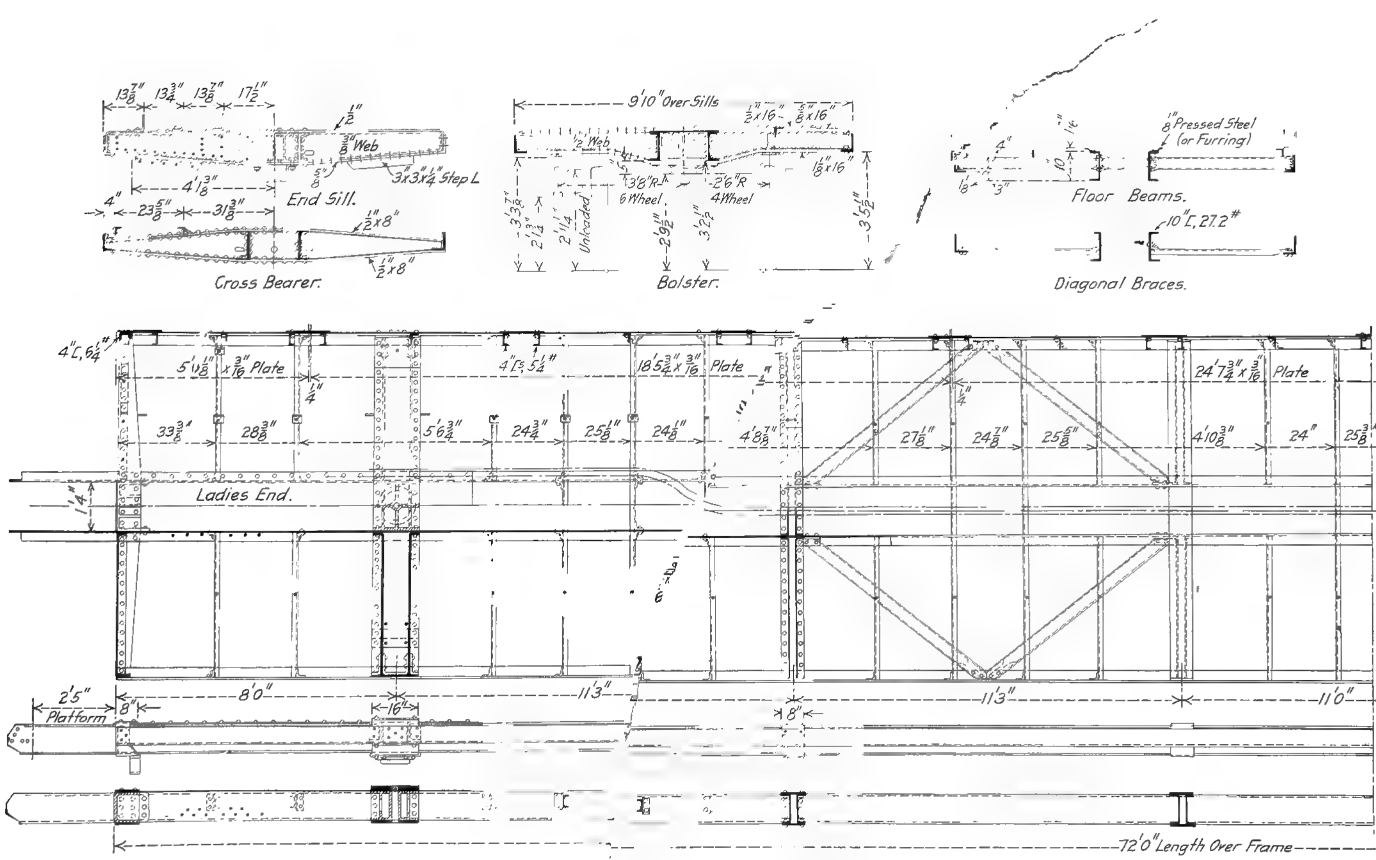


Fig. 421—Underframe of Canadian Pacific Steel Day Coach Shown in Figs. 394-396.

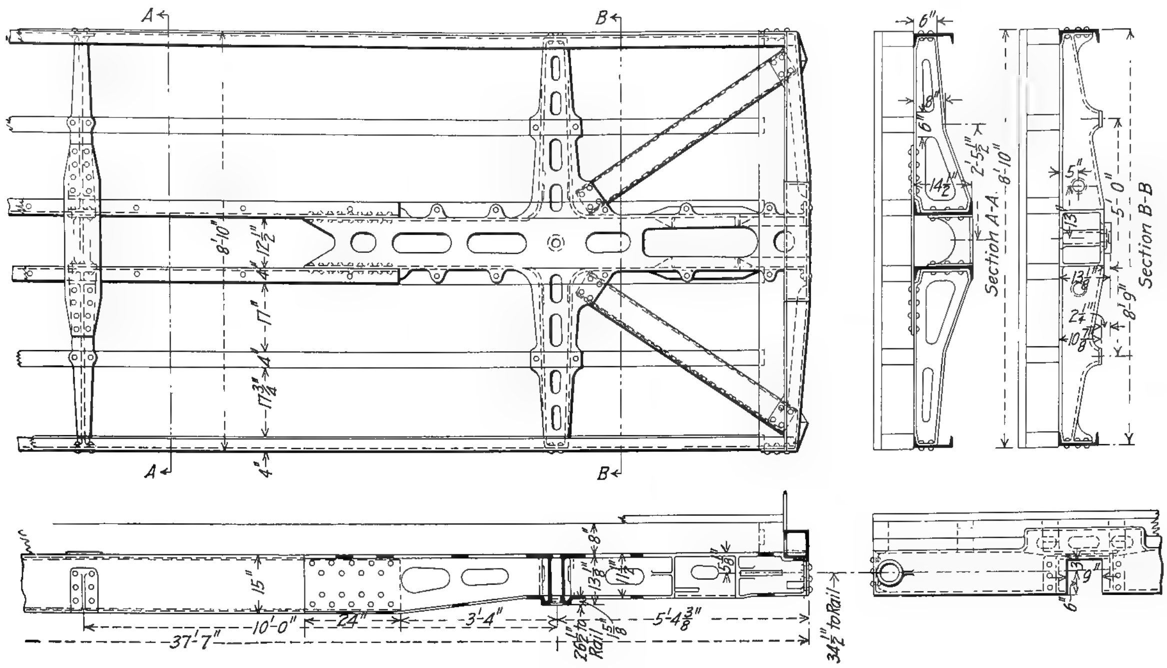


Fig. 422—Steel Underframe for 40-Ton Capacity Box Car. Builder, Pittsburgh Steel Foundry Company.

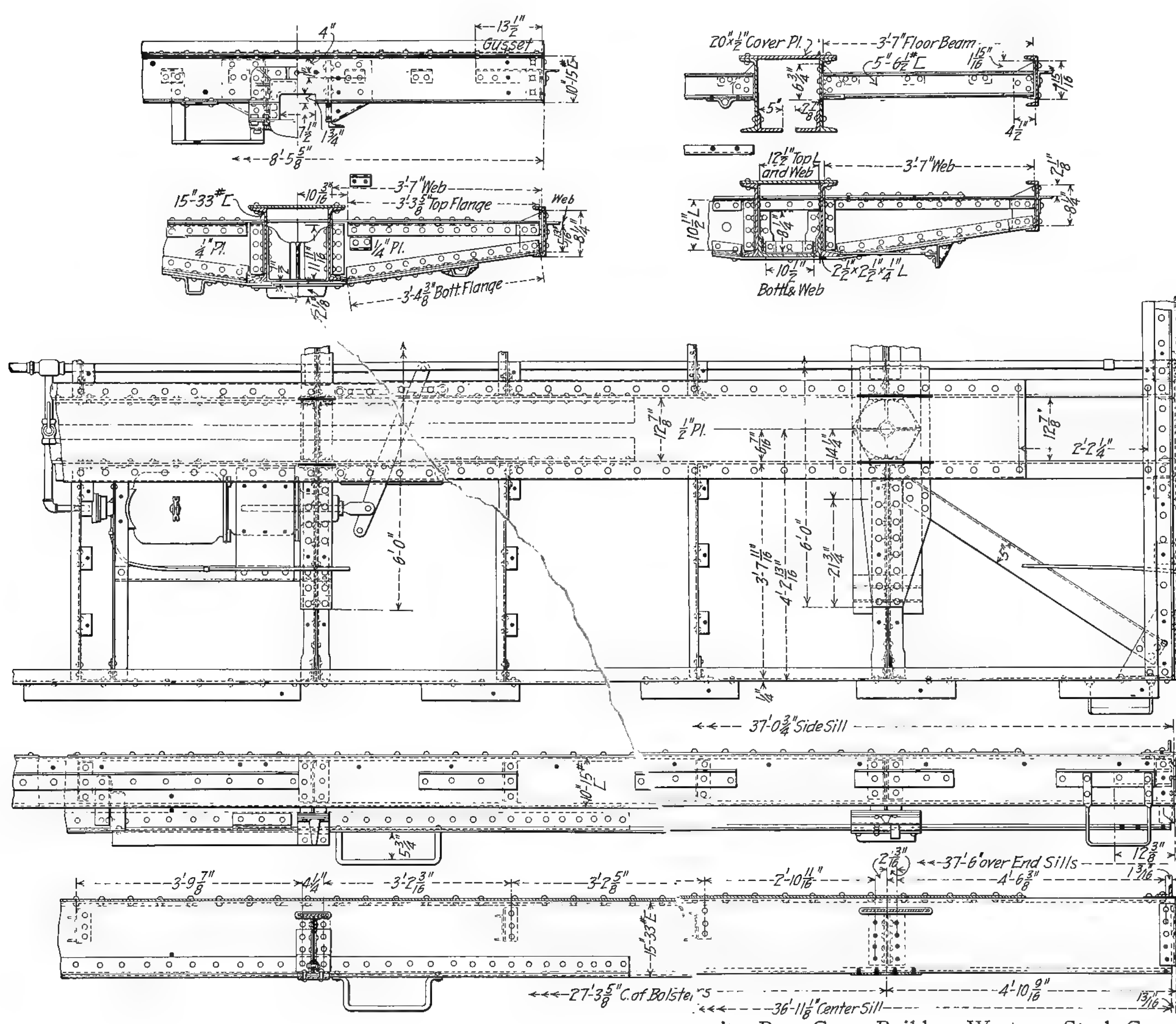


Fig. 423—Steel Underframe for Boston & Maine 40-Ton Capacity Box Car. Builder, Western Steel Car & Foundry Company.

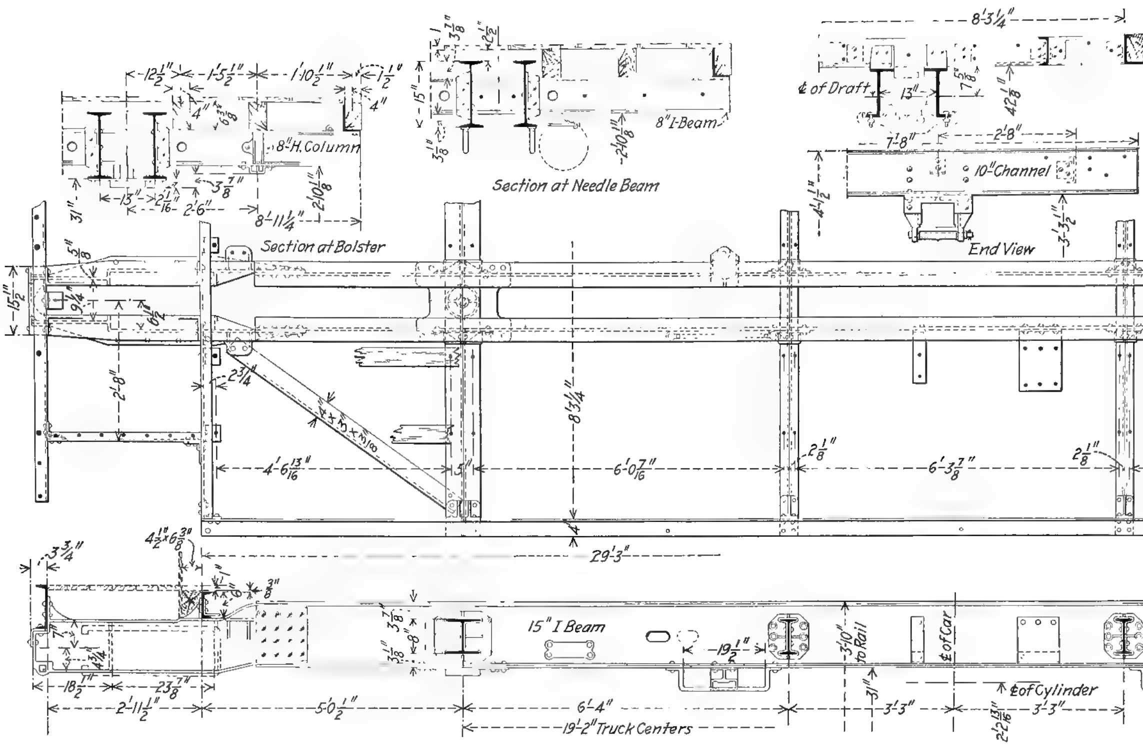


Fig. 424—Steel Underframe for Caboose. Builder, The Bettendorf Company.

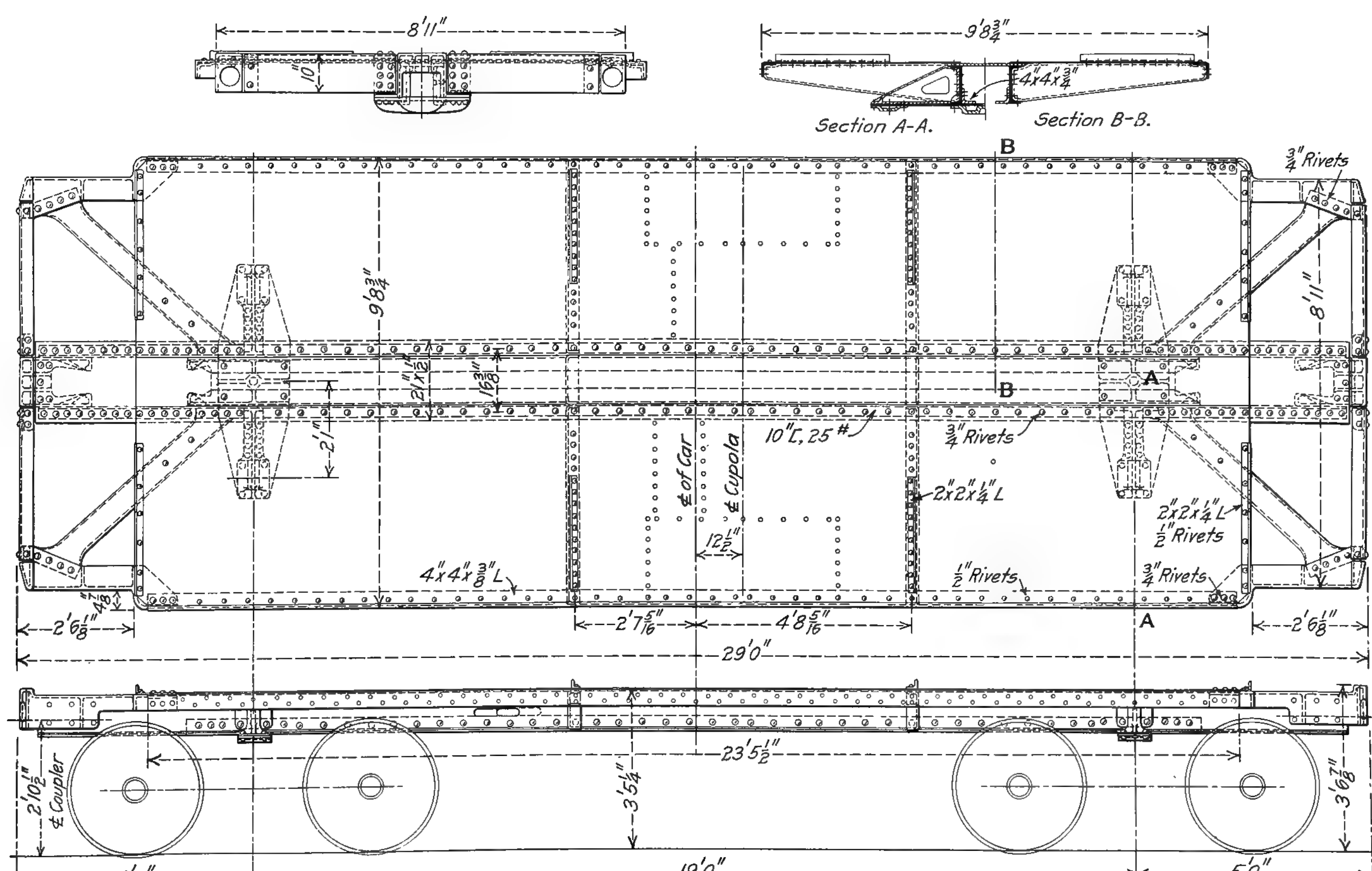


Fig. 425—Arrangement of the Underframe of the Pennsylvania Railroad Steel Caboose Shown in Figs. 367-370.

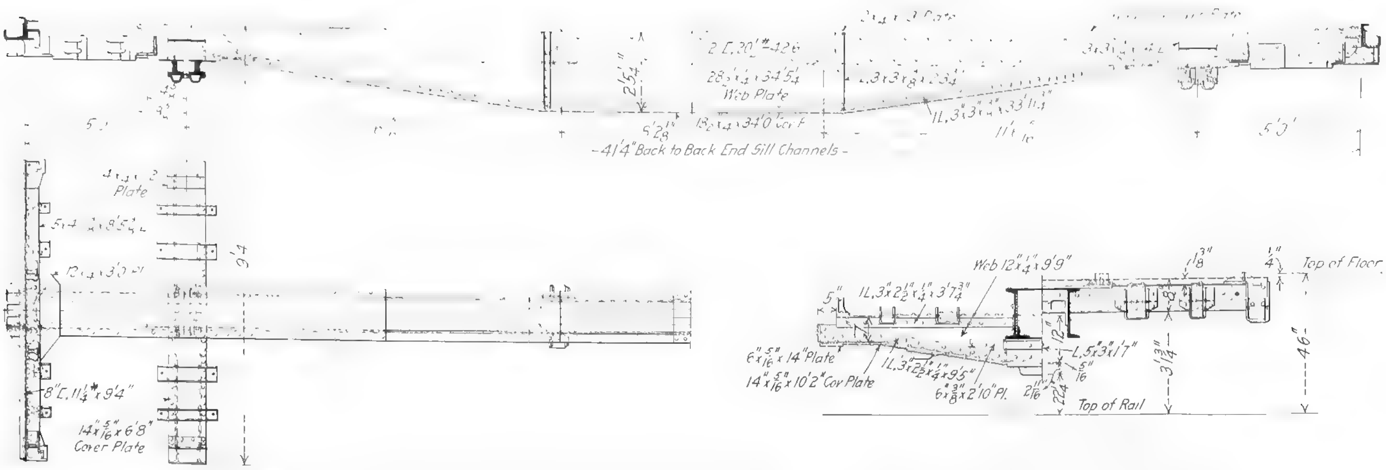


Fig. 426 Steel Underframe for Northern Pacific Stock Car. Builder, Whipple Car Company.

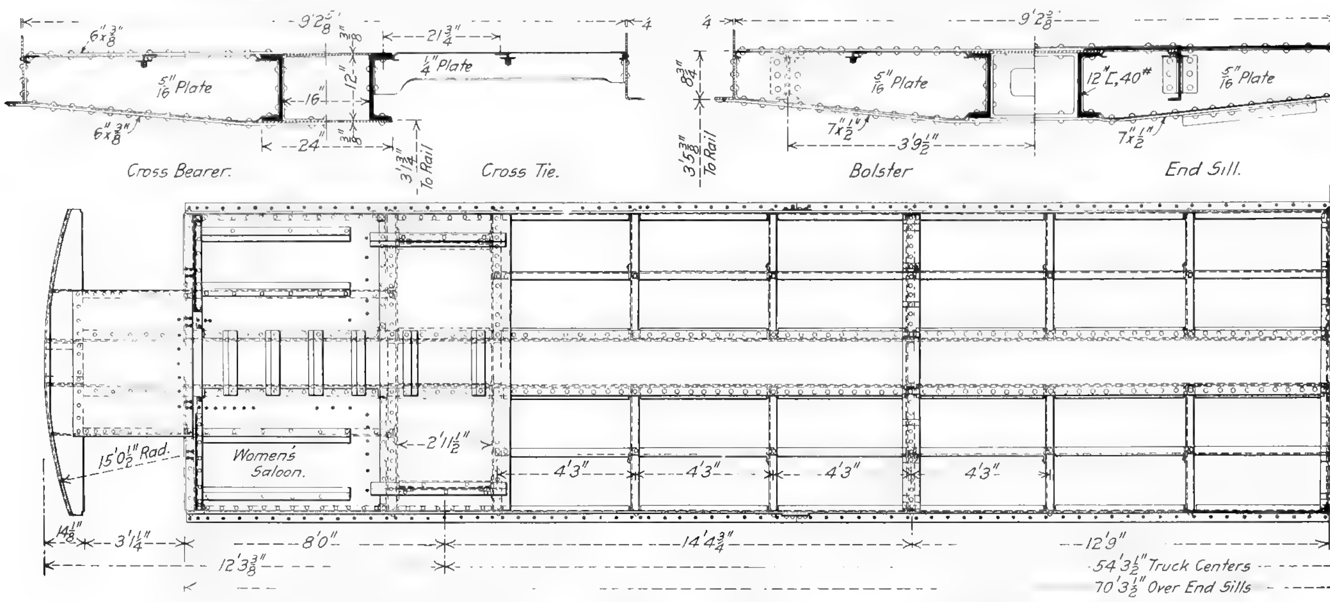


Fig. 427 —Steel Underframe for New York, New Haven & Hartford Steel Day Coach.

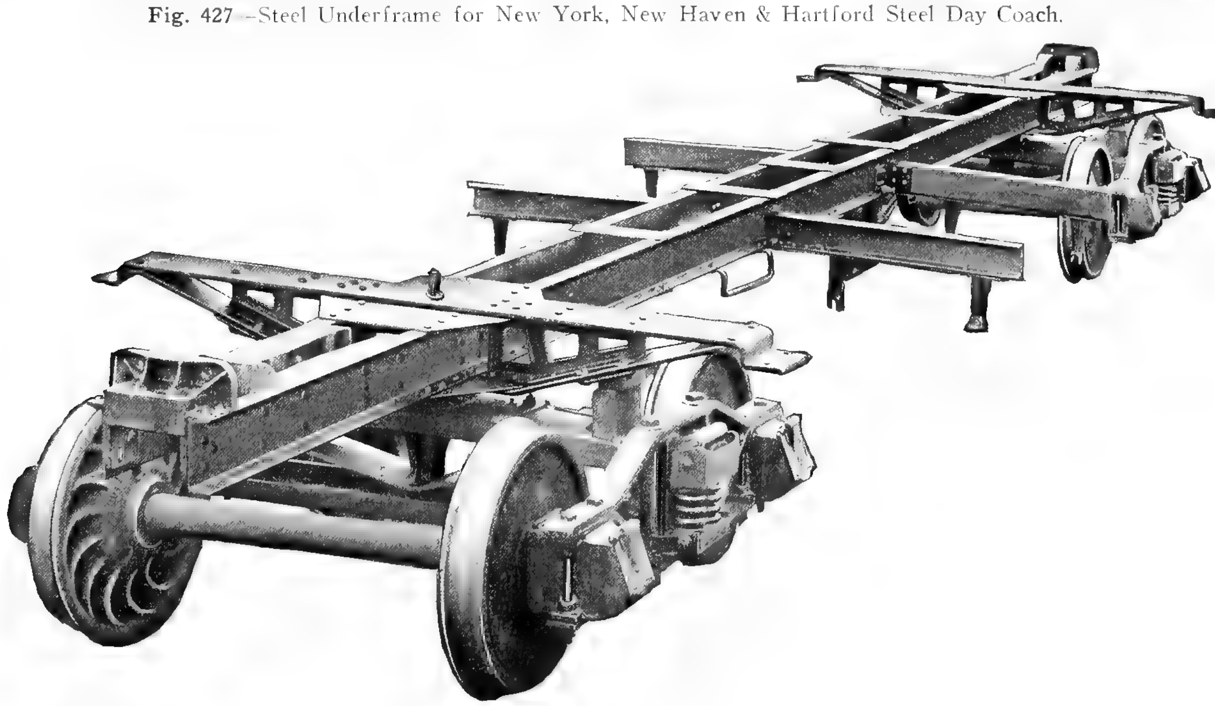


Fig. 428—Steel Underframe for Reinforcing 30 to 40-Ton Capacity Box Cars. Builder, Central Locomotive & Car Works.

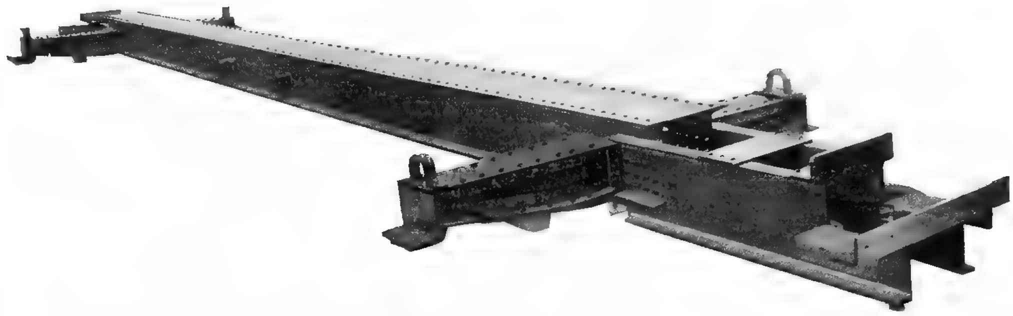


Fig. 429—Ralston Steel Underframe for 35-Ton Capacity Hopper Car.

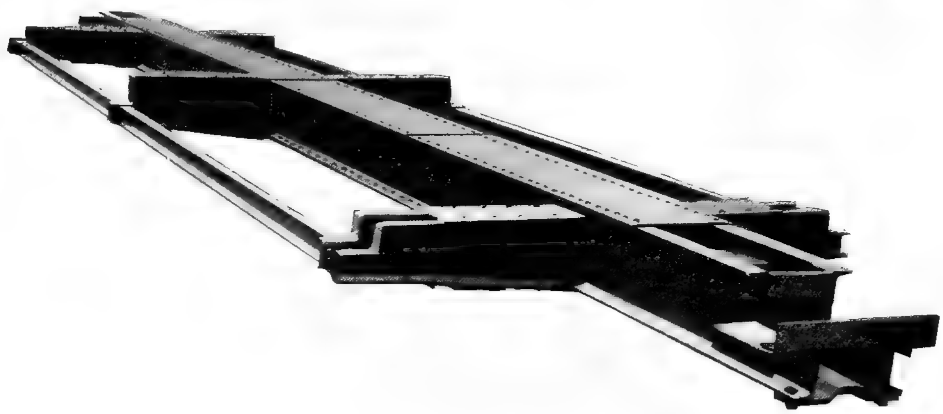


Fig. 430—Ralston Steel Underframe for 40-Ton Capacity Hopper Gondola Car.

Fig. 431—Ralston Steel Underframe for 40-Ton Capacity Gondola Car.

Fig. 432—Commonwealth Steel Company's Steel Underframe for Strengthening Old Postal Cars.

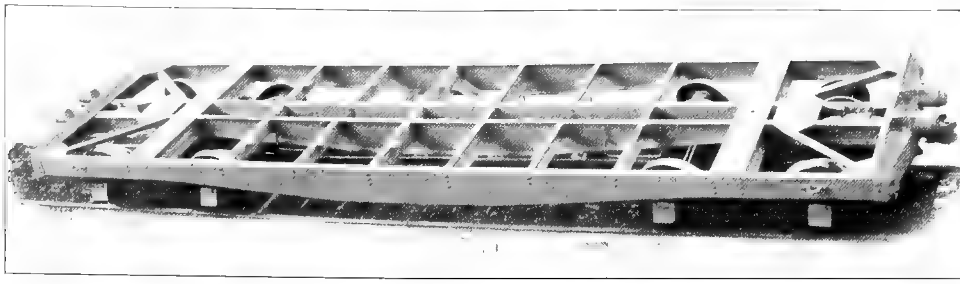


Fig. 433—Pressed Steel Underframe for 50-Ton Capacity Box Car. Builder, Pressed Steel Car Company.

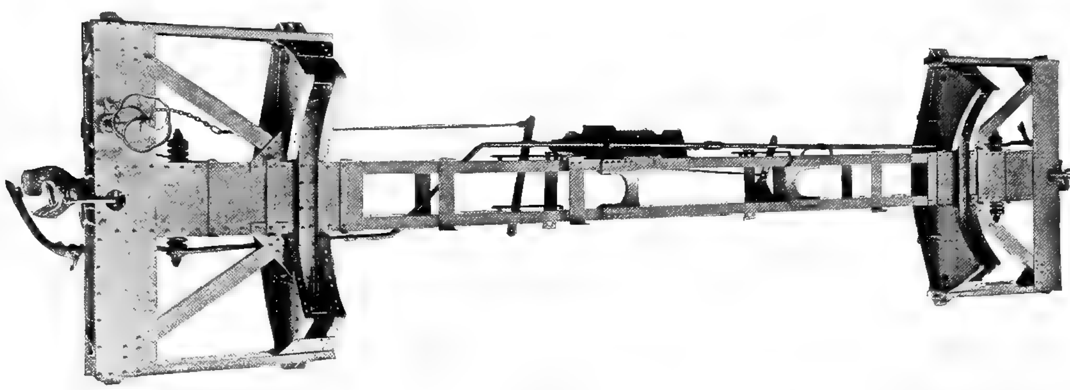


Fig. 434—Steel Underframe for Tank Car, Capacity 12,000 U. S. Gallons. Builder, American Car & Foundry Company.

Fig. 434a—Underframe for Tank Car, Capacity 8,000 U. S. Gallons. Builder, Chicago Steel Car Company.

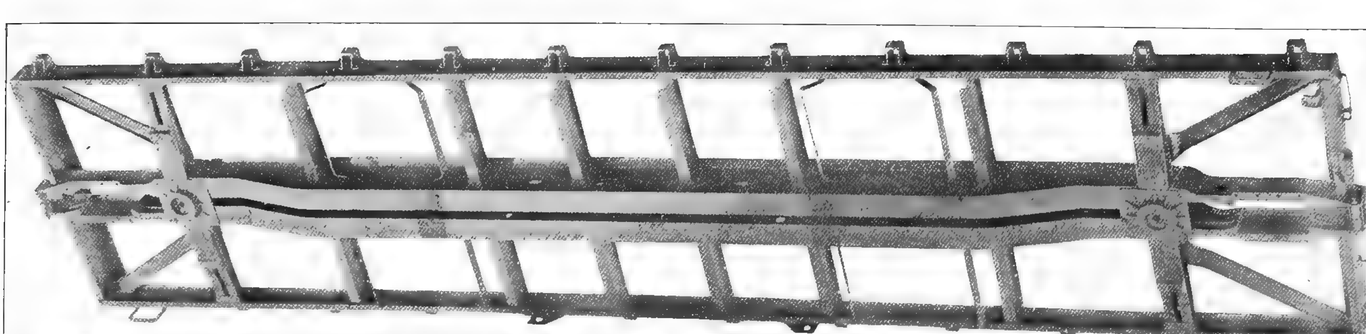


Fig. 435—Steel Underframe for 50-Ton Capacity Gondola Car. Builder, The Bettendorf Company.

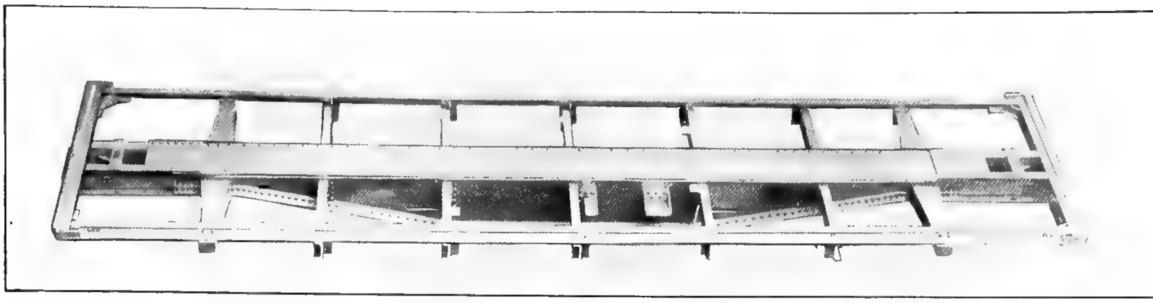


Fig. 436—American Car & Foundry Company Steel Underframe.

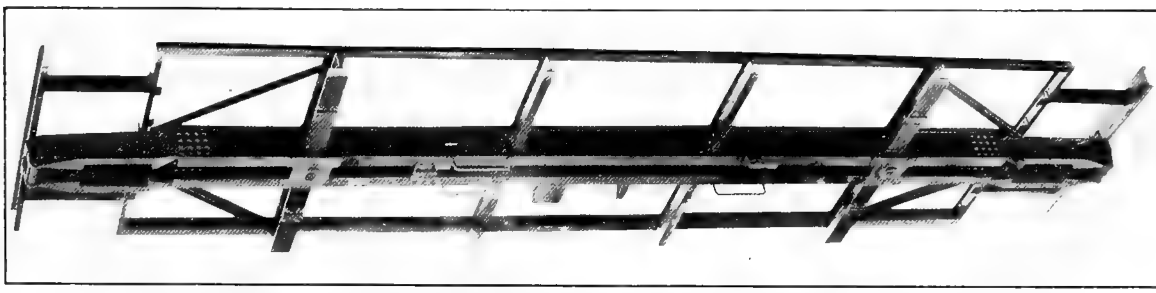


Fig. 437—Bottom View of Steel Underframe for Caboose. Builder, The Bettendorf Company.

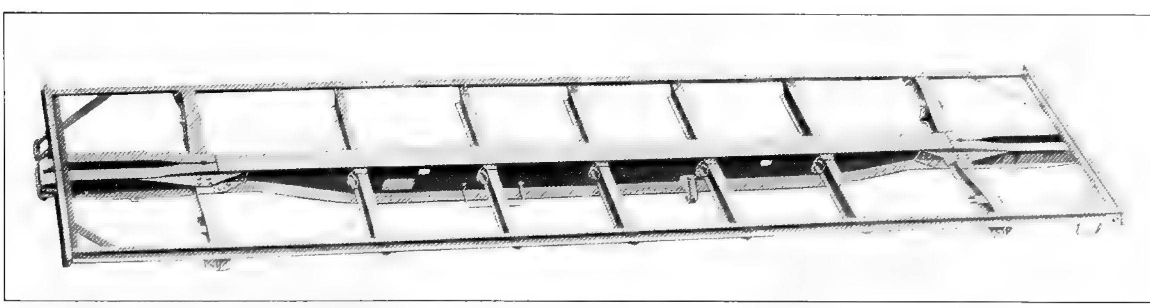


Fig. 438—Underframe for Union Pacific 50-Ton Capacity Box Car with Wooden Superstructure. Builder, The Bettendorf Company.

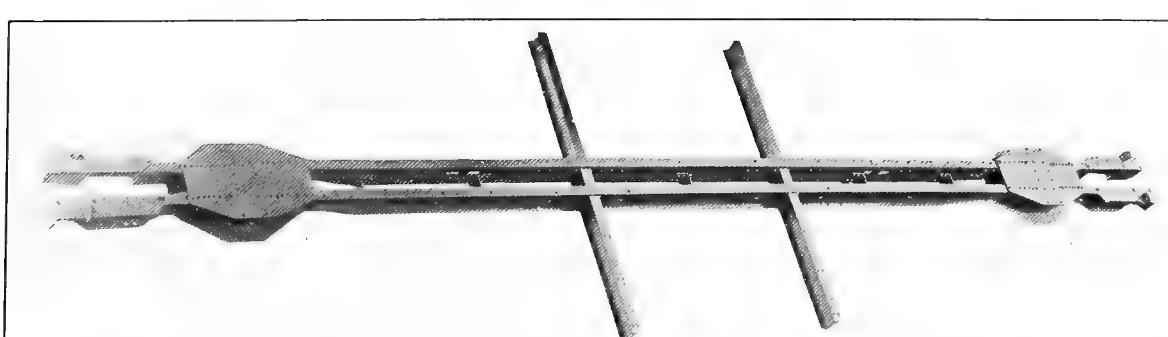


Fig. 439—Subsills for Strengthening Old Cars. Builder, The Bettendorf Company.

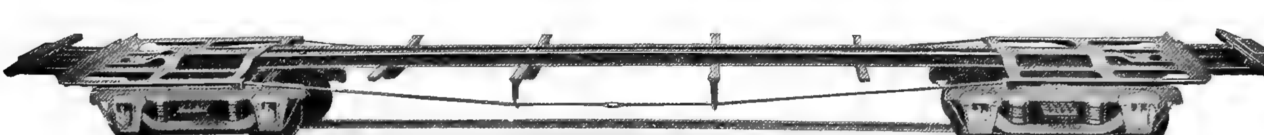


Fig. 440—Commonwealth Steel Company's Combined Steel and Wood Underframe for Passenger Train Cars, Using Cast Steel Combined Platform and Double Body Bolsters, Steel Crossties and Needle Beams.

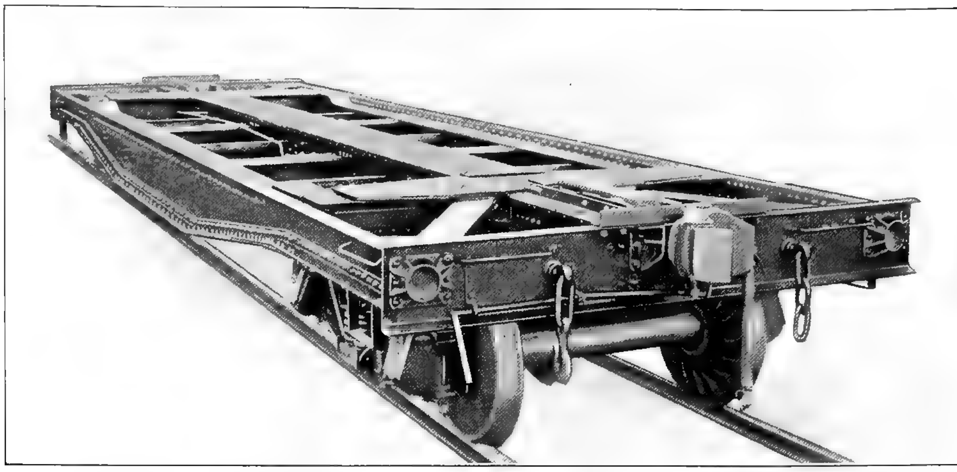


Fig. 441—Steel Frame for Erie Railroad 75-Ton Capacity Flat Car. Builder, American Car & Foundry Company.

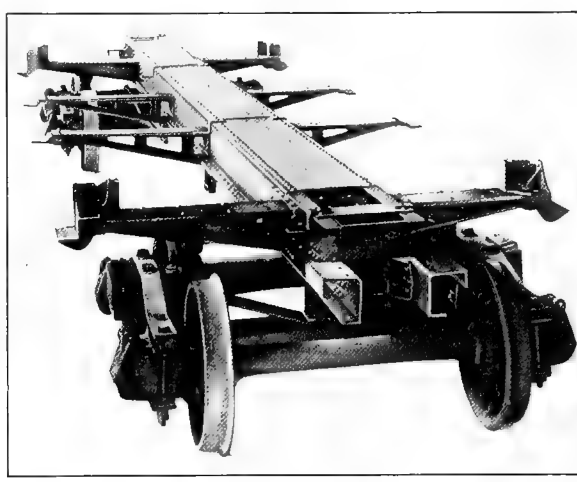


Fig. 442—Ralston Patent Steel Underframe for Freight Cars. Builder, Ralston Steel Car Company.

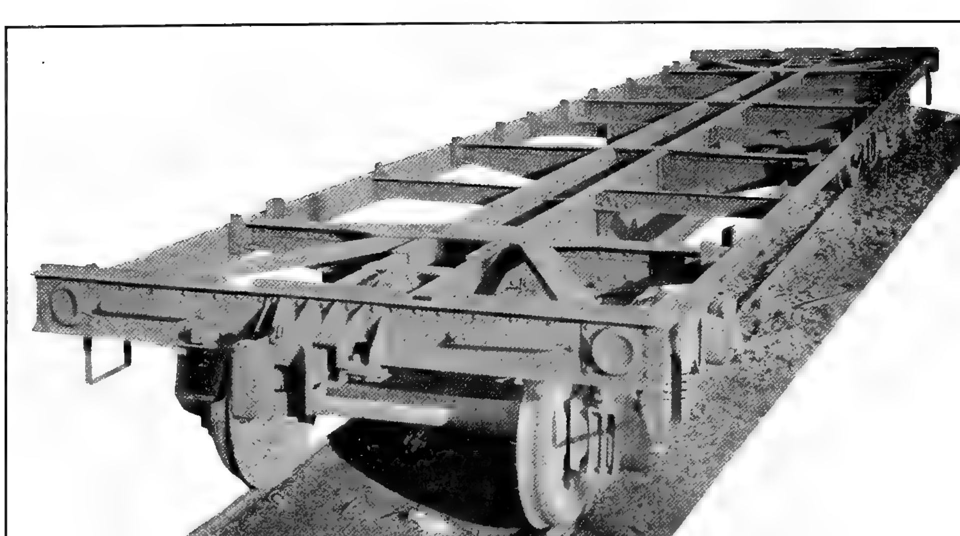


Fig. 443—Steel Underframe for Ann Arbor 40-Ton Capacity Box Car. Builder, Western Steel Car & Foundry Company.

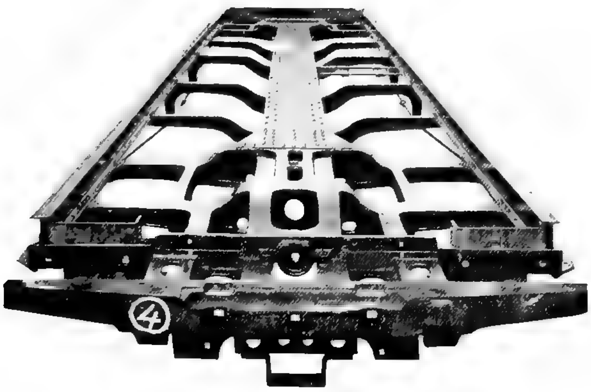


Fig. 444—Steel Underframe for Passenger Train Cars.

Fig. 445 -Steel Underframe for Passenger Train Cars.

Builder, The Harlan & Hollingsworth Corporation.

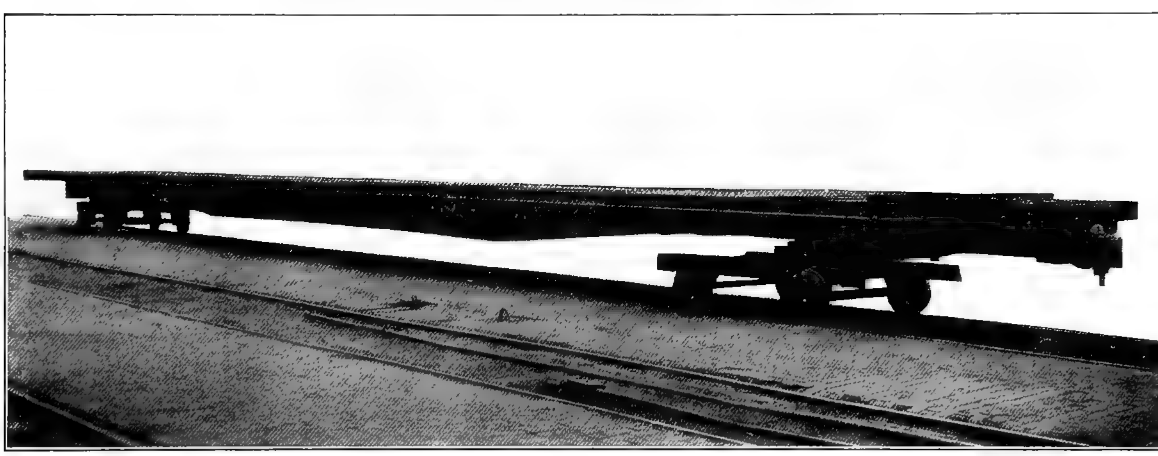


Fig. 446—Steel Underframe for Pullman Steel Sleeping Car Shown in Fig. 170.

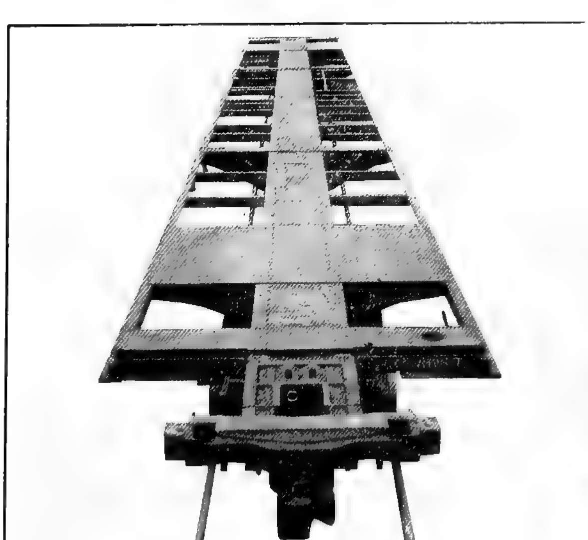


Fig. 447—Steel Underframe for Pullman Steel Sleeping Car Shown in Fig. 170.

Fig. 448—Steel Underframe for Atlantic Coast Line Day Coach. Builder, Central Locomotive & Car Works.

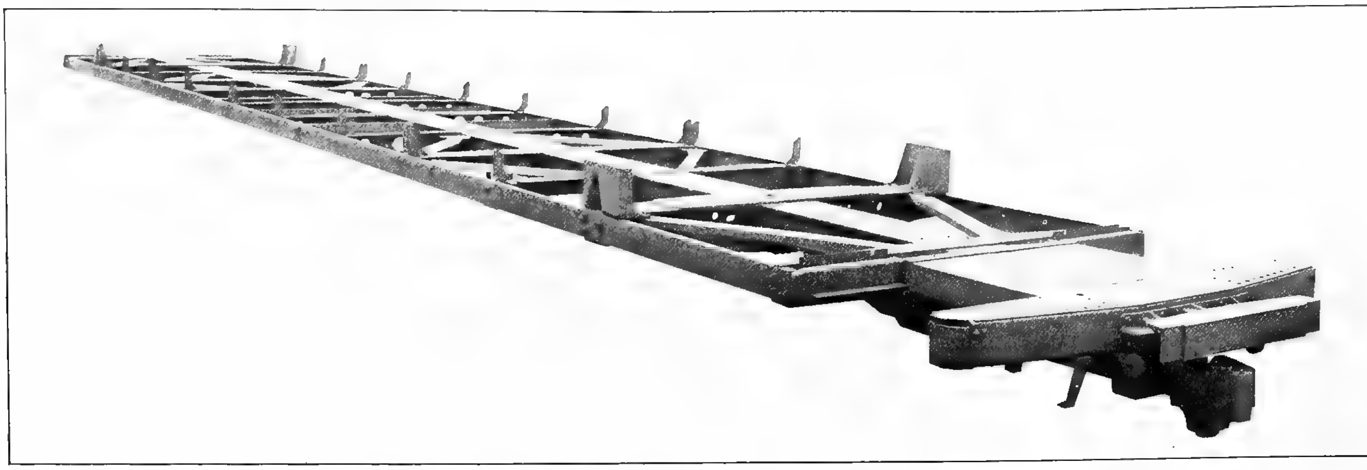


Fig. 449—Underframe for Erie Railroad Steel Suburban Coach Shown in Fig. 147.

Fig. 450—Steel Frame for Pullman Sleeping Car Shown in Fig. 170.

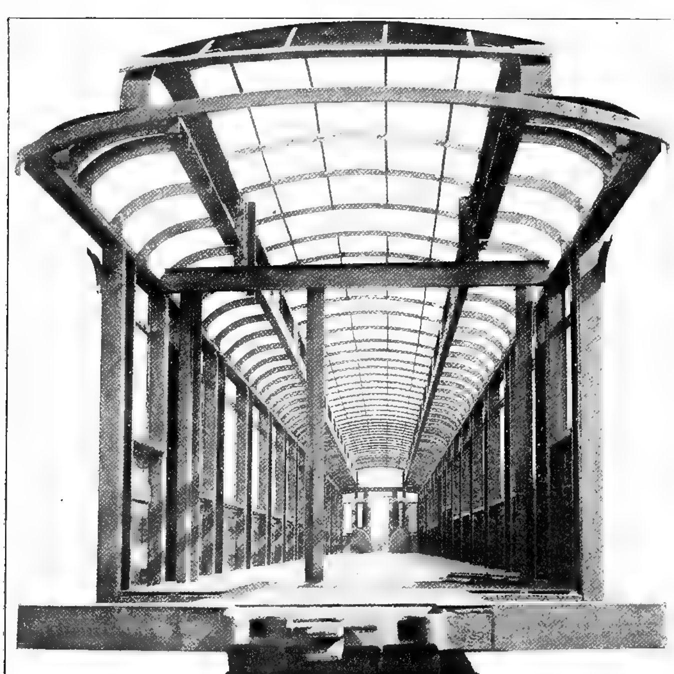
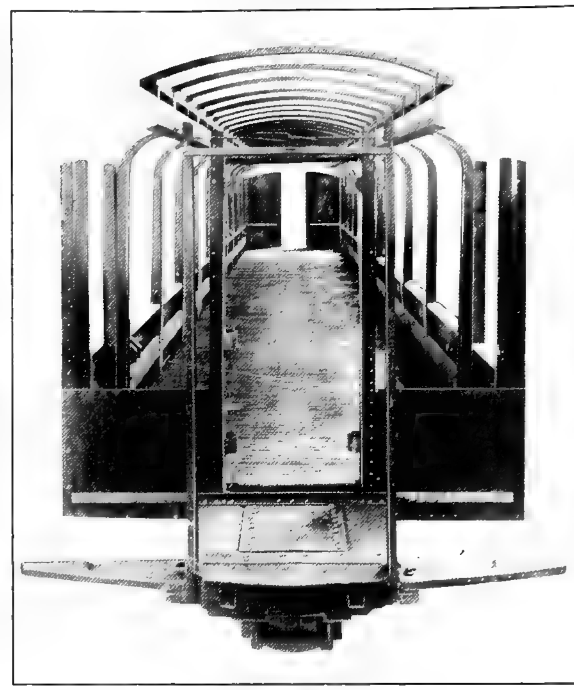


Fig. 451—Steel Frame for Observation Car. Builder, The Barney & Smith Car Company.

Fig. 452—Interior of Steel Frame for Pullman Sleeping Car Shown in Fig. 450.



Figs. 453 and 454—Steel Frame for Pennsylvania Railroad Day Coach.

Fig. 455—Steel Frame for 40-Ton Capacity Gondola Car. Builder, Middletown Car Company.

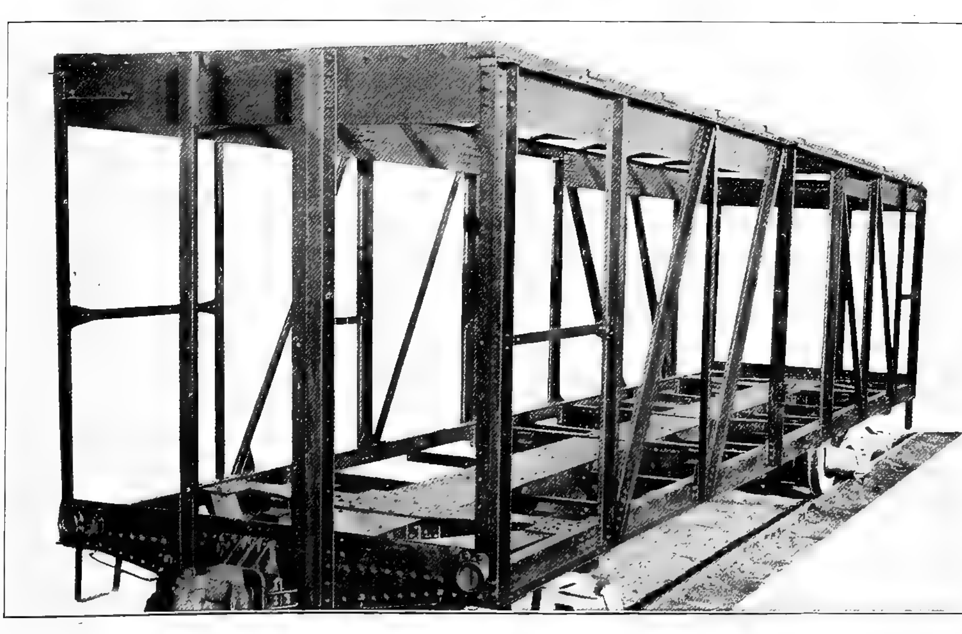


Fig. 456—Steel Frame for Chicago, Rock Island & Pacific Box Car. Builder, Western Steel Car & Foundry Company.

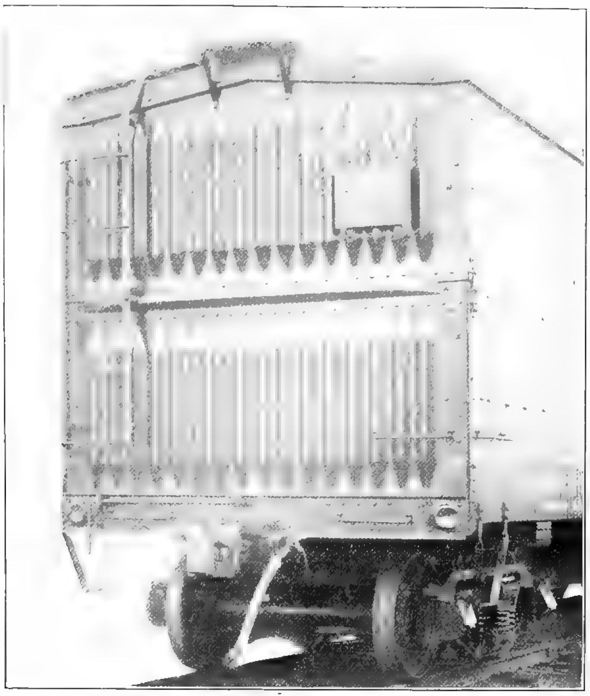


Fig. 457 American Car & Foundry Company Two-Piece Steel End of $\frac{1}{4}$ in. Plate.

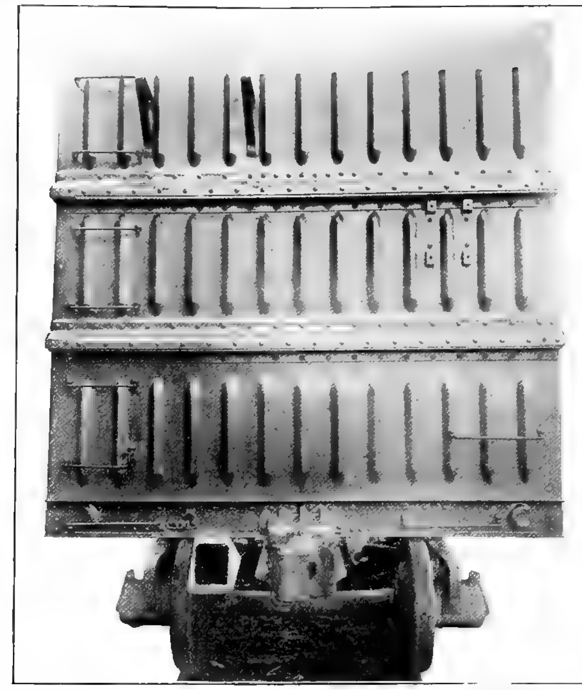


Fig. 458—American Car & Foundry Company Three-Piece Steel End.

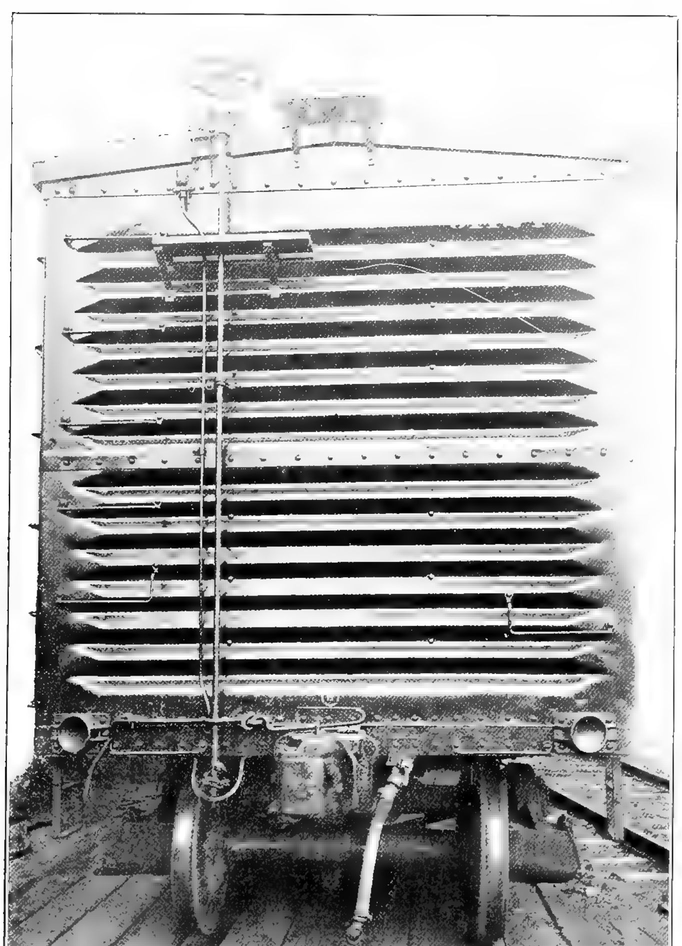
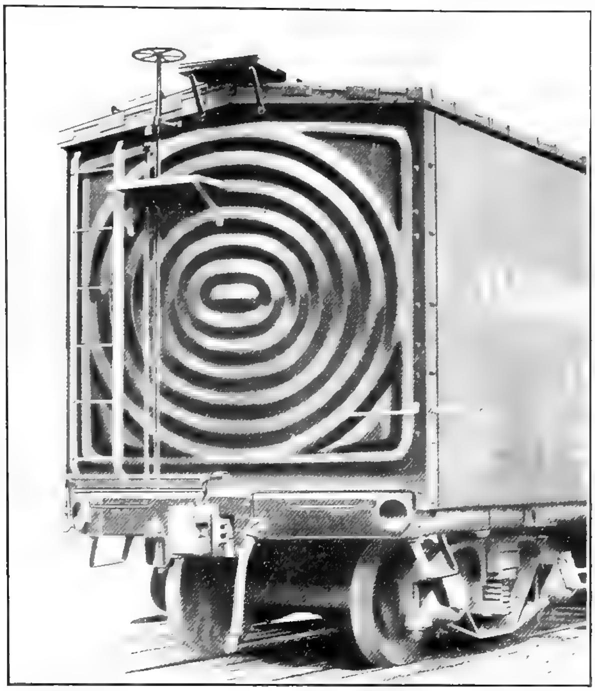
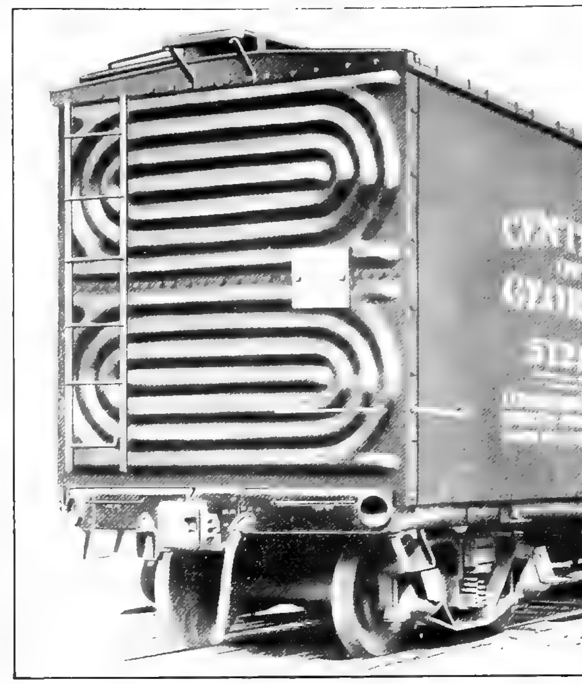


Fig. 459—Murphy Steel End—Pressed Steel Manufacturing Company.

Fig. 460—End Construction Used on Canadian Pacific Steel Frame Box Car.





Figs. 461 and 462—Van Dorn One-Piece and Two-Piece Steel Ends. Pyle-National Electric Headlight Company.

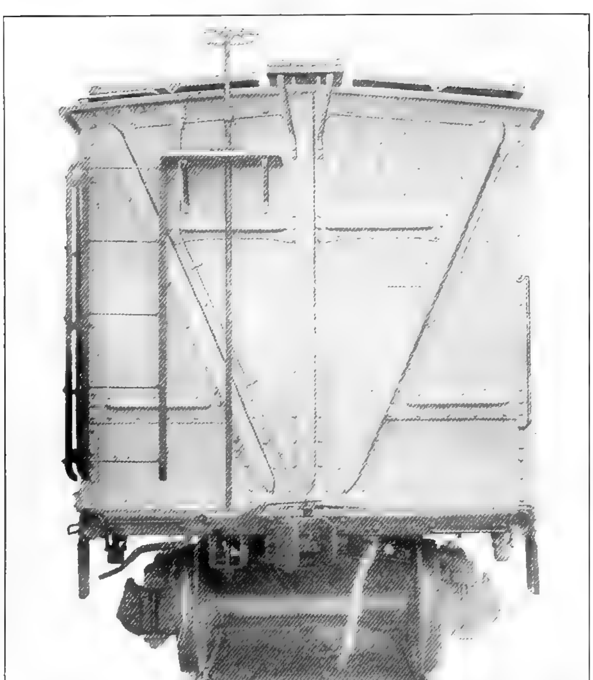


Fig. 463—End Construction of Pennsylvania Railroad Steel Frame Car. American Car & Foundry Co.

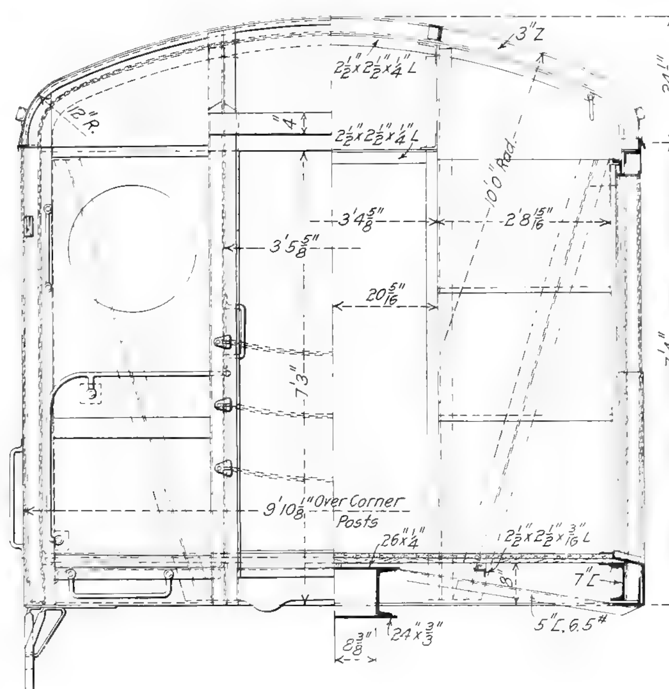


Fig. 464—End Construction of Long Island Steel Baggage Car. American Car & Foundry Co.

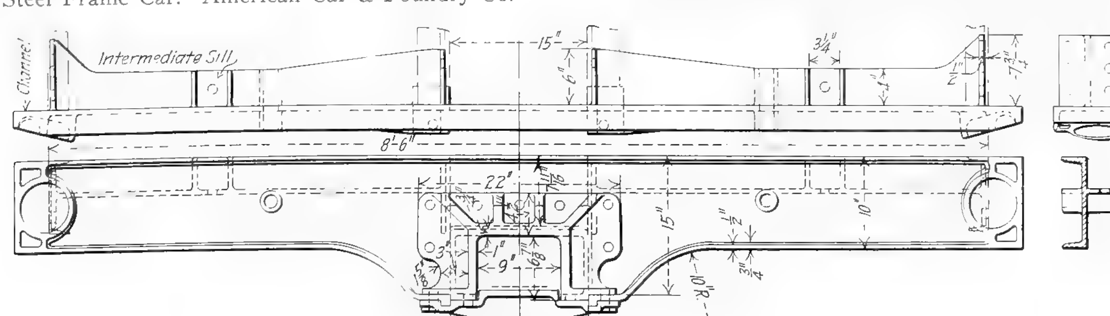


Fig. 465—Cast Steel End Sill for Freight Cars. Pittsburgh Steel Foundry Company.

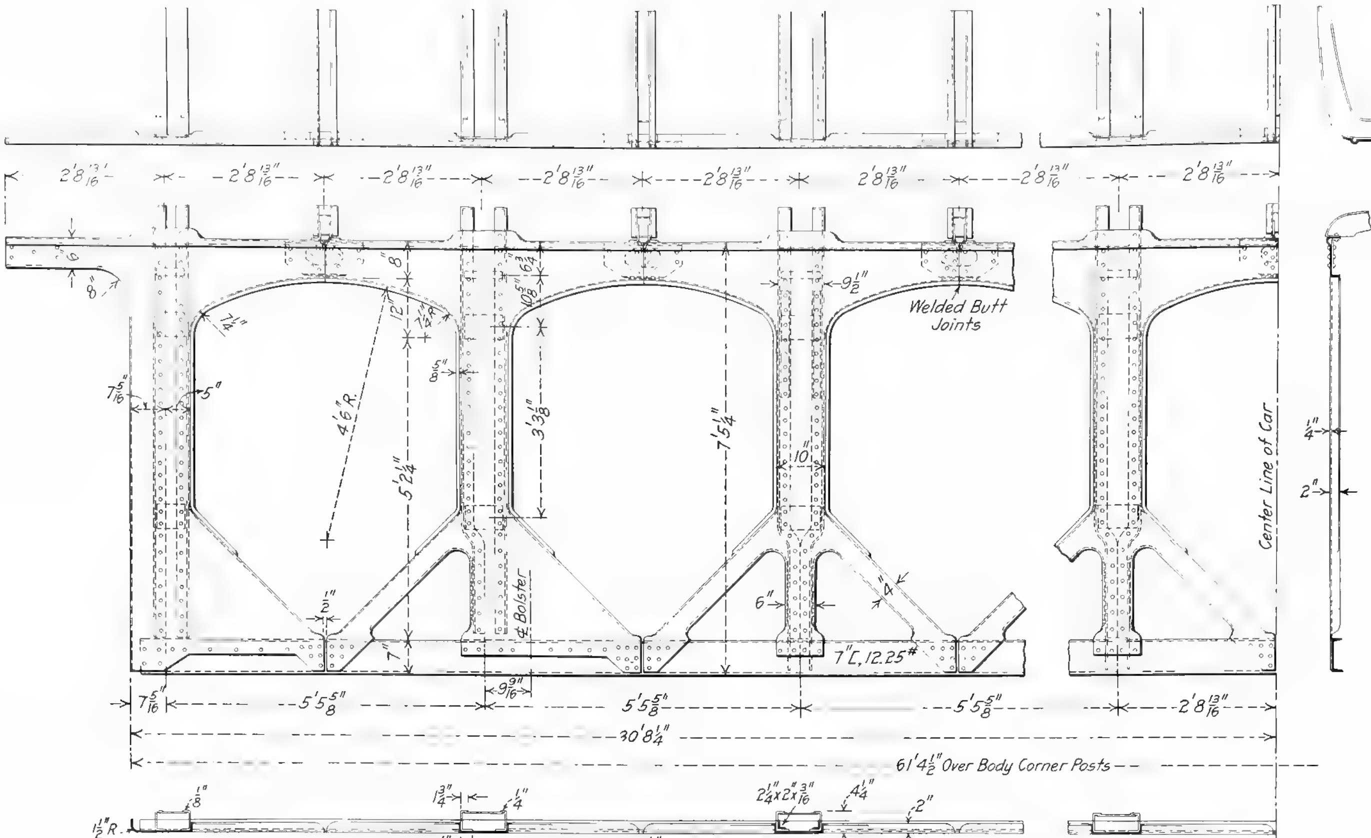


Fig. 466—Side Framing of Erie Railroad Steel Suburban Car. Builder, Pressed Steel Car Company.

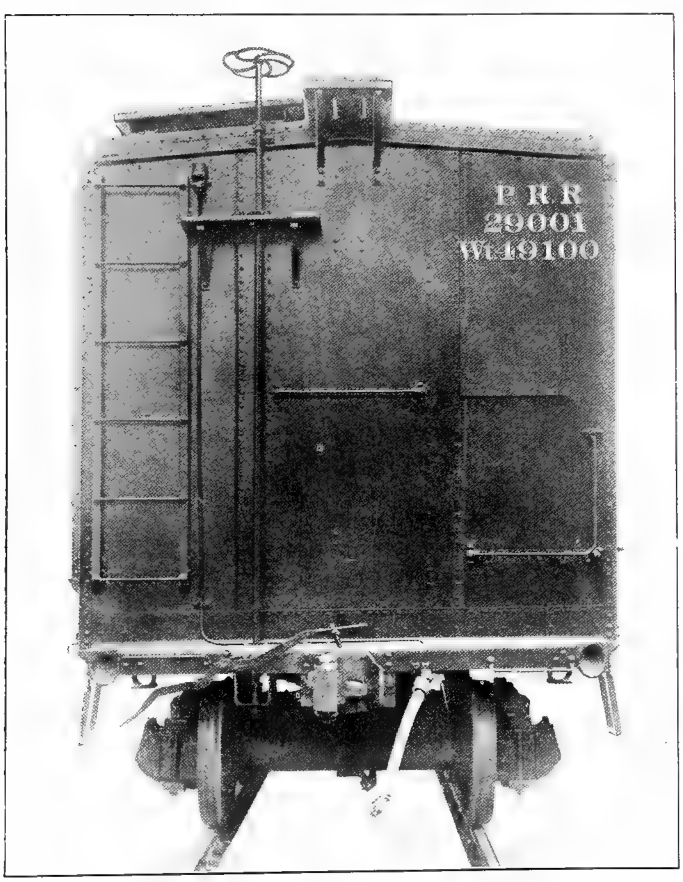


Fig. 467—End Construction of Pennsylvania Railroad Steel Box Car Shown in Fig. 7.

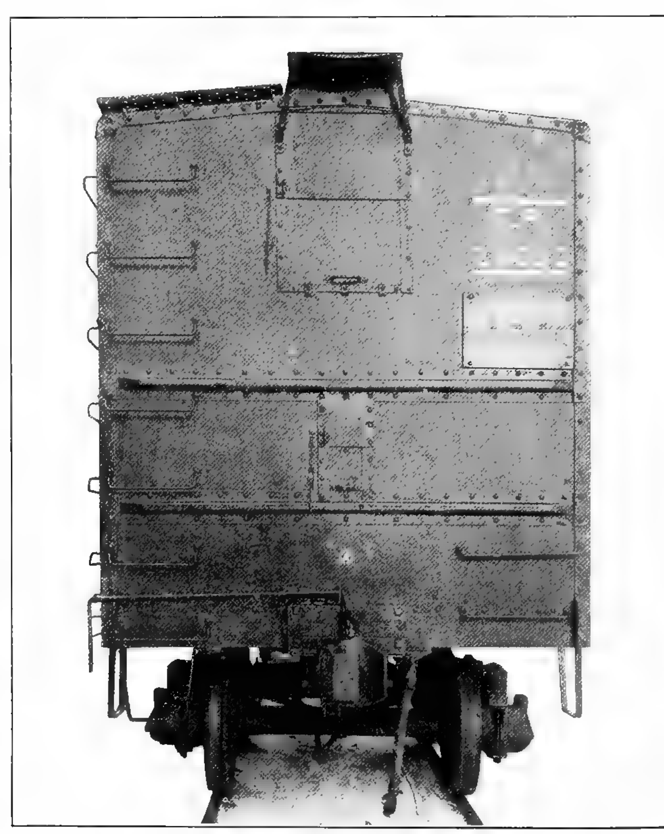


Fig. 468—End Construction of Canadian Pacific Steel Box Car Shown in Fig. 2. Builder, Canadian Car & Foundry Company.

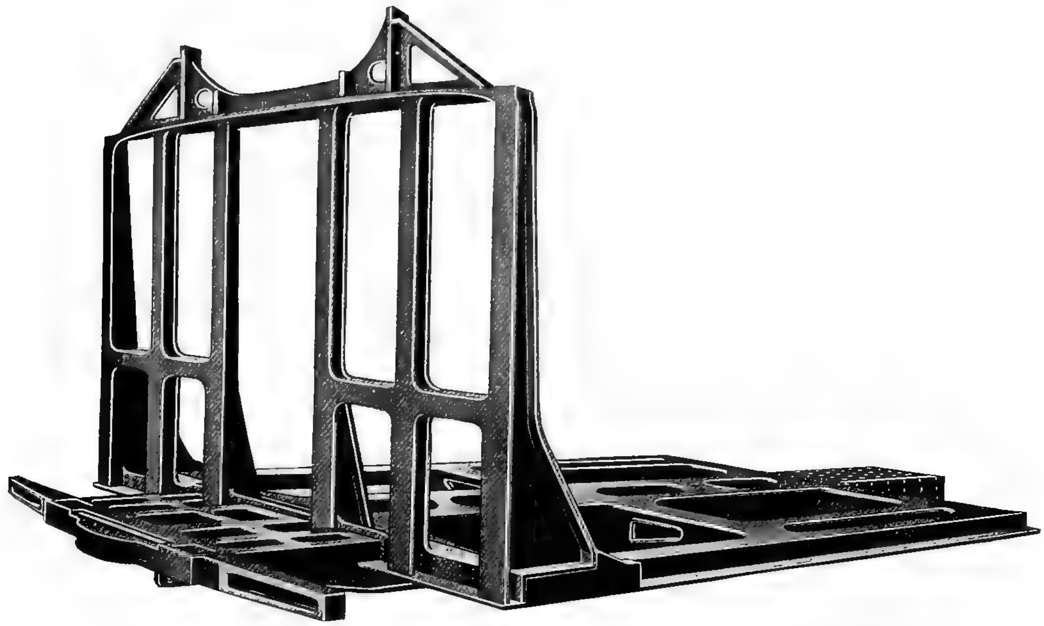


Fig. 469—Commonwealth Steel Company's Upright End Frame in One Piece, and Commonwealth Combined Platform and Double Body Bolster for Vestibuled Cars.

Fig. 470—Commonwealth Steel Company's Cast Steel End Sill for Freight Cars, with Flory Carry Iron.

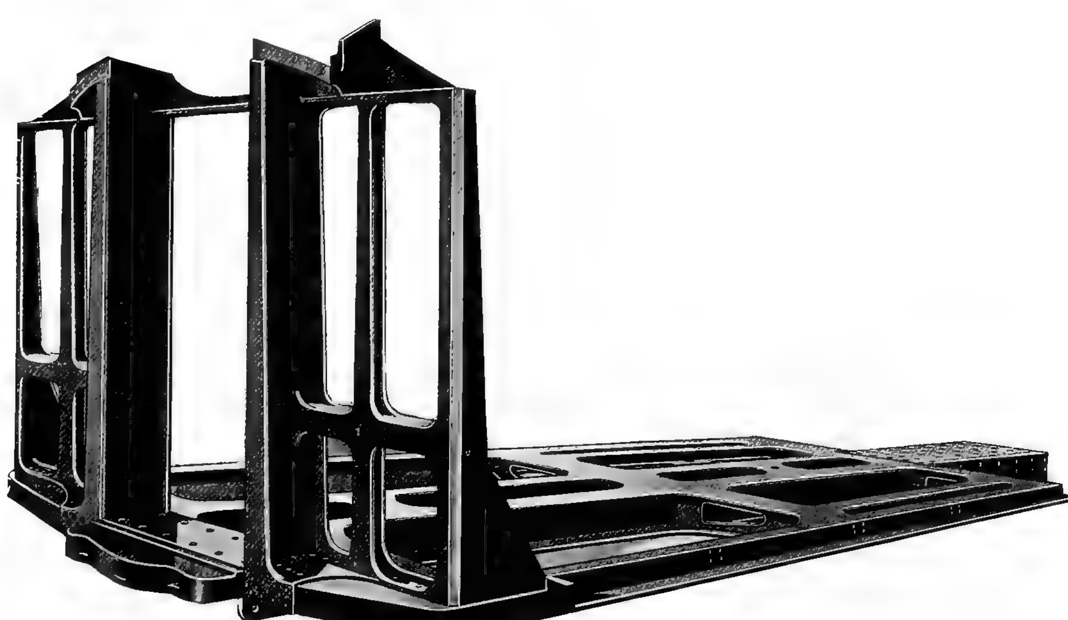


Fig. 471—Commonwealth Steel Company's Upright End Frame in One Piece, and Commonwealth Combined Platform and Double Body Bolster for Non-Vestibule Cars.

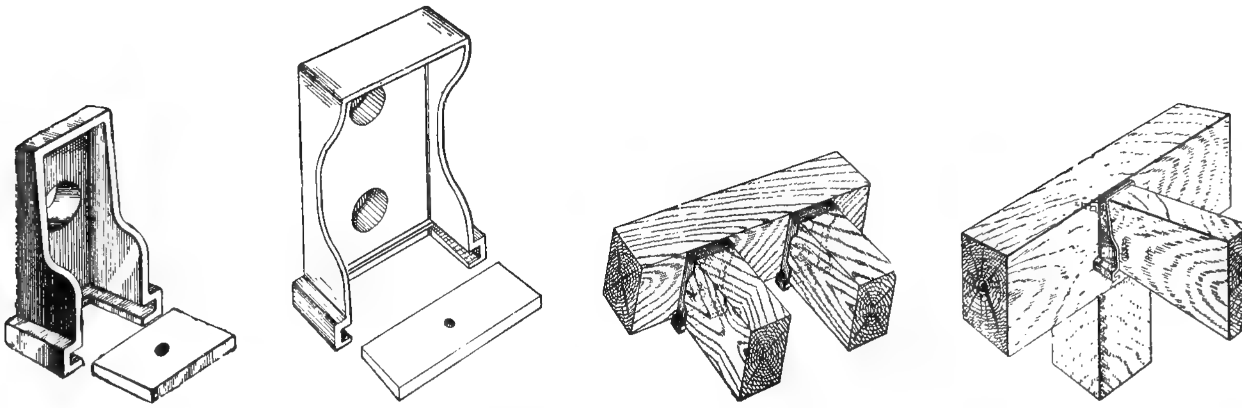


Fig. 472—Western Timber Pockets and Their Application. Western Railway Equipment Company.

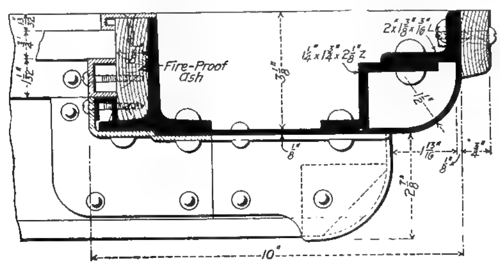


Fig. 473—End Door Post Construction for Interborough Subway Steel Motor Cars.

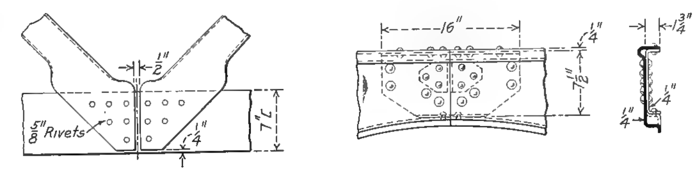


Fig. 474—Diagonal Brace Connection to Side Sill, and Side Plate Splice of Erie Railroad Steel Suburban Cars.

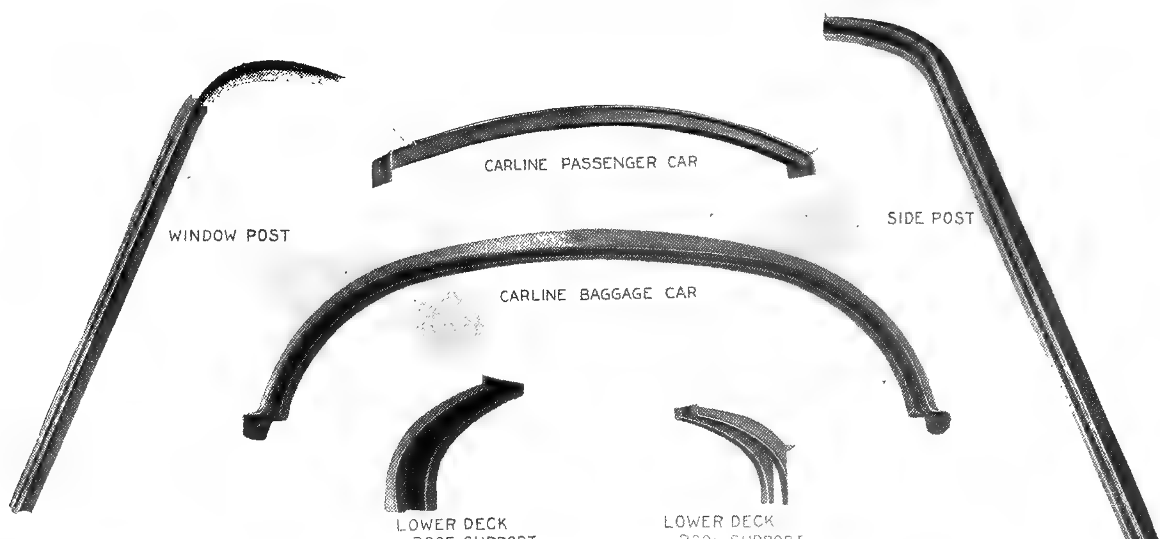


Fig. 475—Pressed Steel Shapes for Passenger Train Car Framing. Cleveland Car Specialty Company.

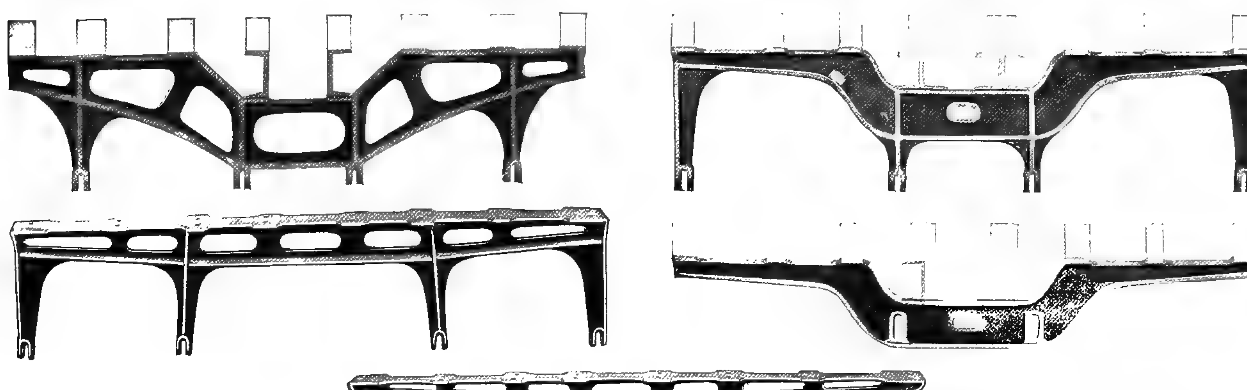


Fig. 476—Cast Steel Needle Beams. Commonwealth Steel Company.

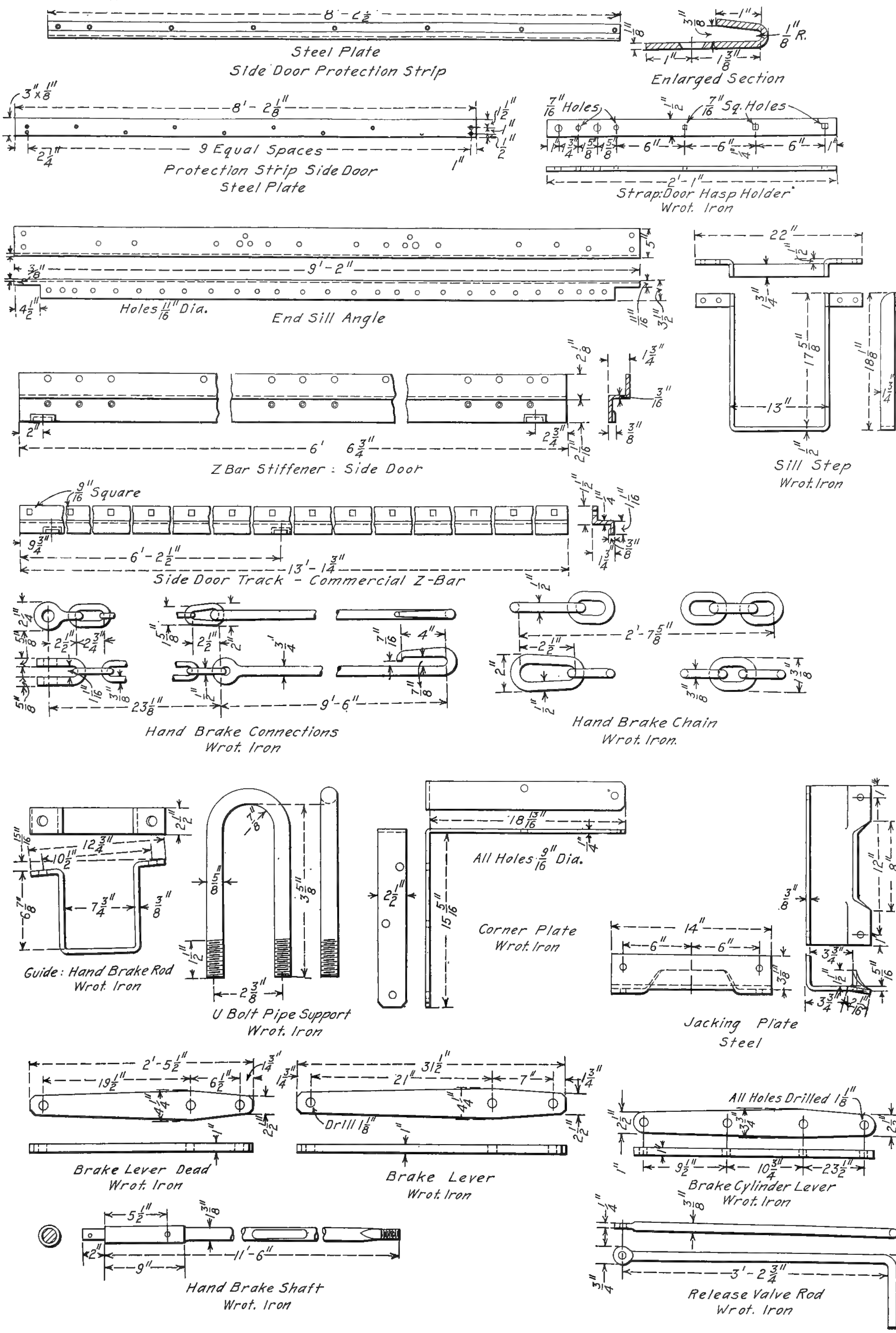


Fig. 477—Details Used on New York Central Steel Underframe Box Car Shown in Figs. 279 and 280. Side Door Protection Strip, Strap, Door Hasp Holder, Door Stiffener and Door Track Furnished by the Camel Company.

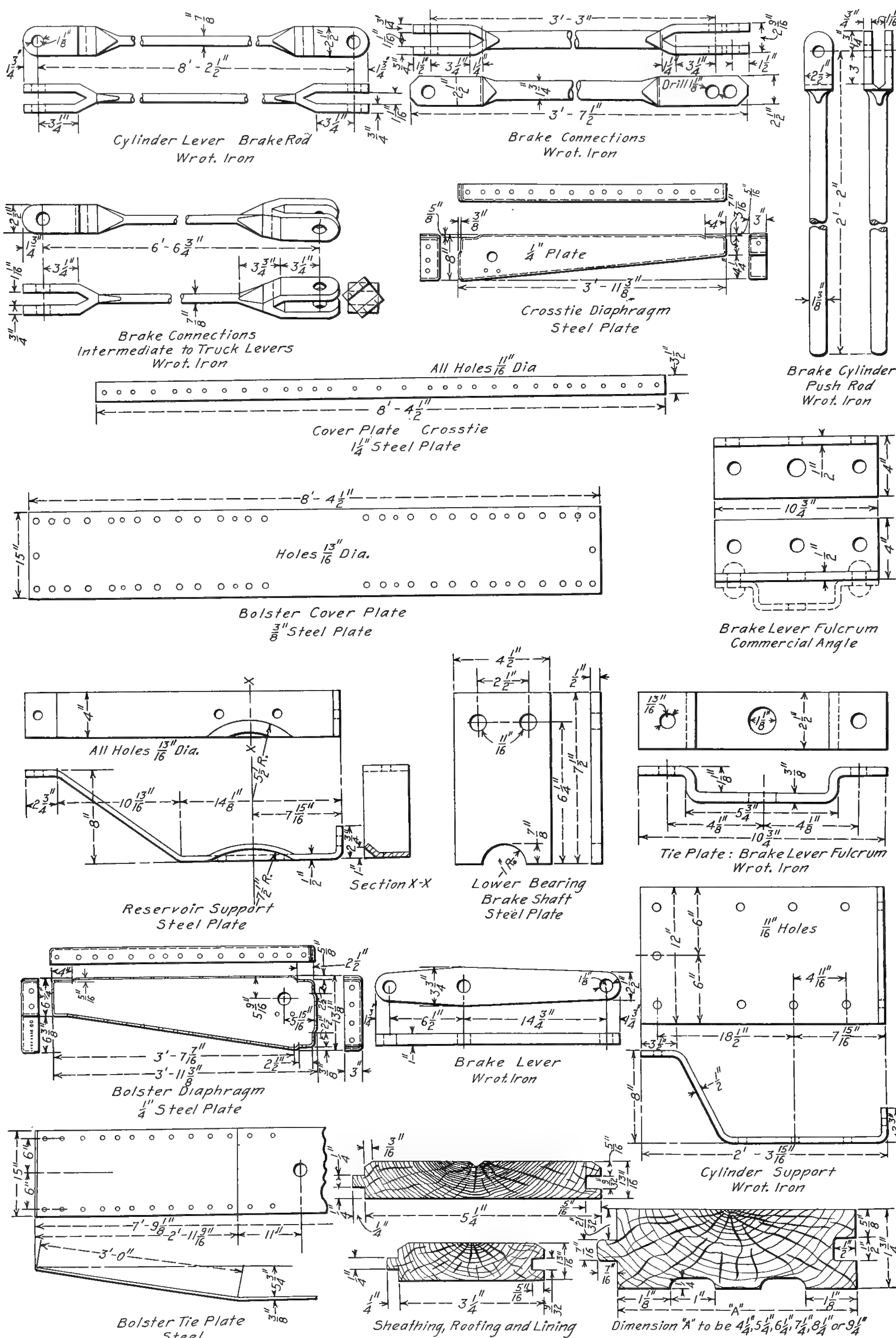


Fig. 478—Details Used on New York Central Steel Underframe Box Car Shown in Figs. 279 and 280.

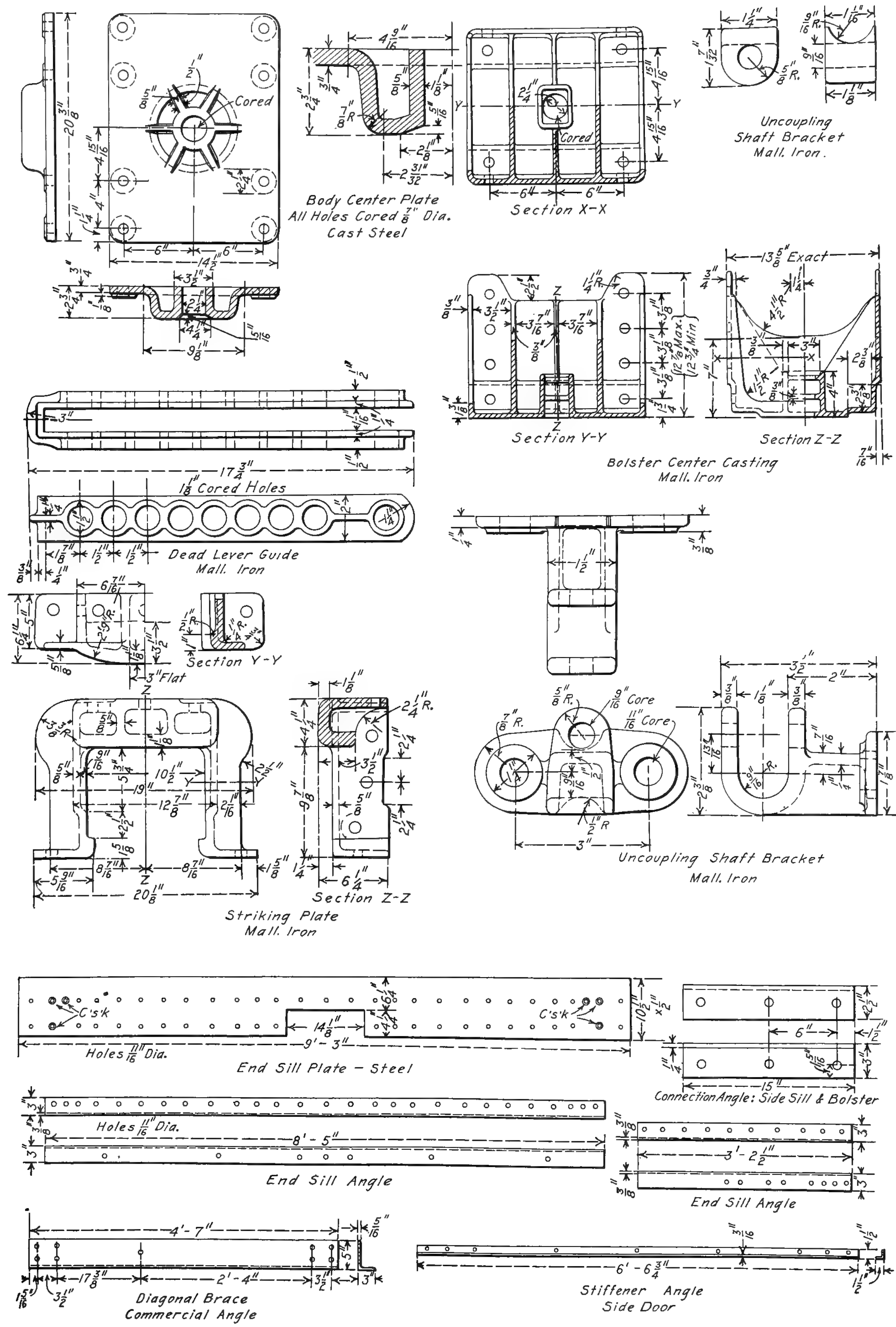


Fig. 479—Details Used on New York Central Steel Underframe Box Car Shown in Figs. 279 and 280.

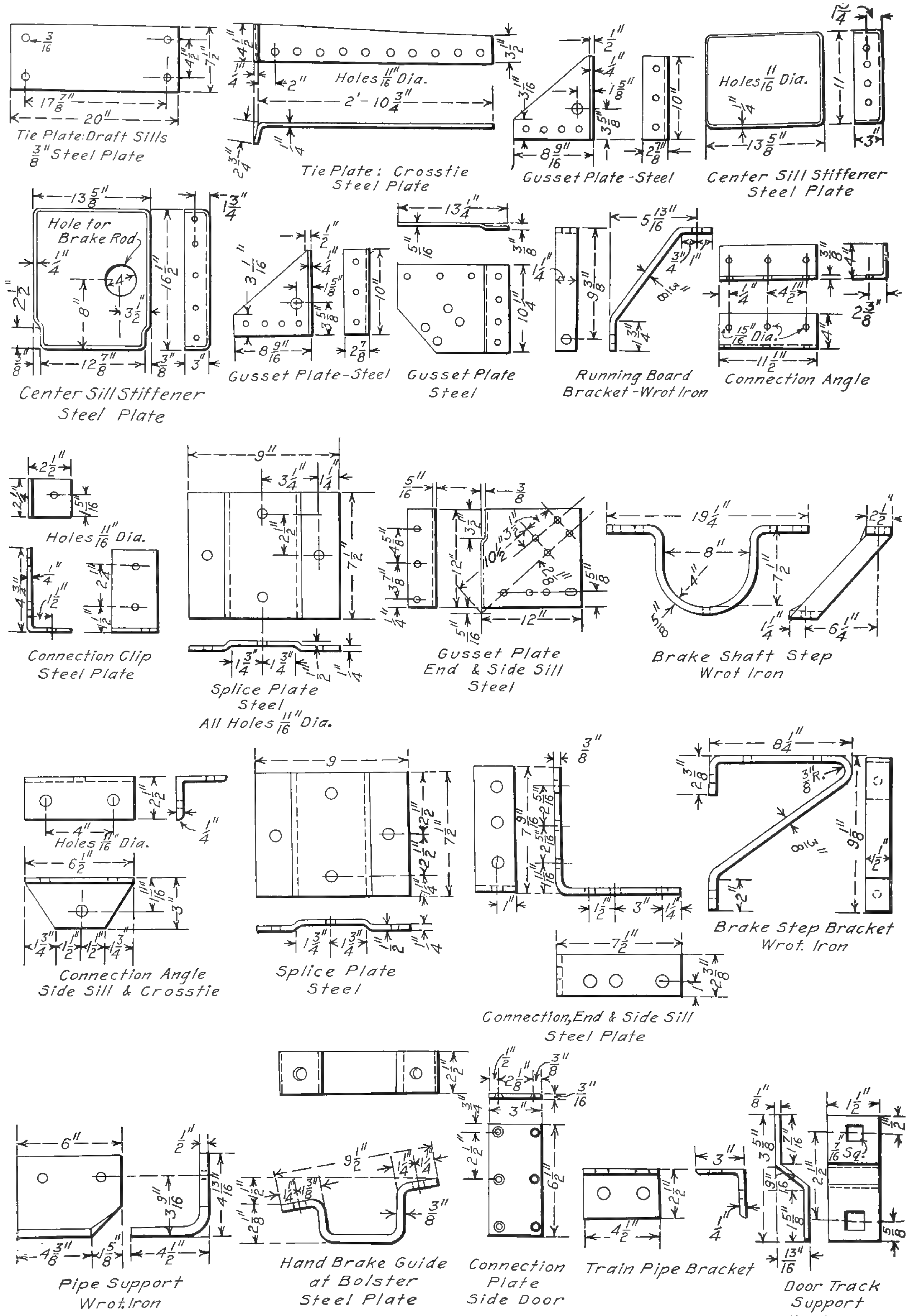


Fig. 480—Details Used on New York Central Steel Underframe Box Car Shown in Figs. 279 and 280.

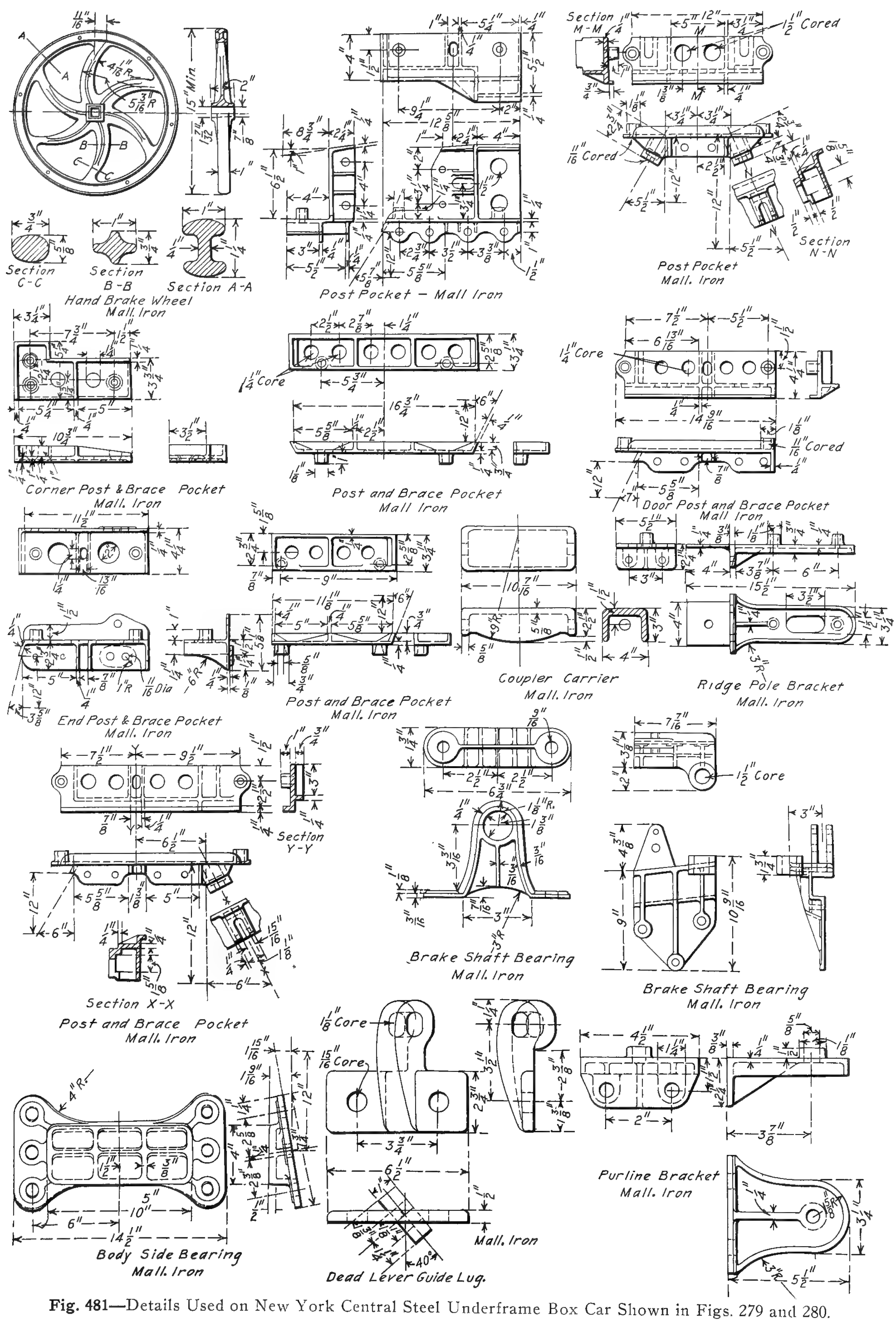


Fig. 481—Details Used on New York Central Steel Underframe Box Car Shown in Figs. 279 and 280.

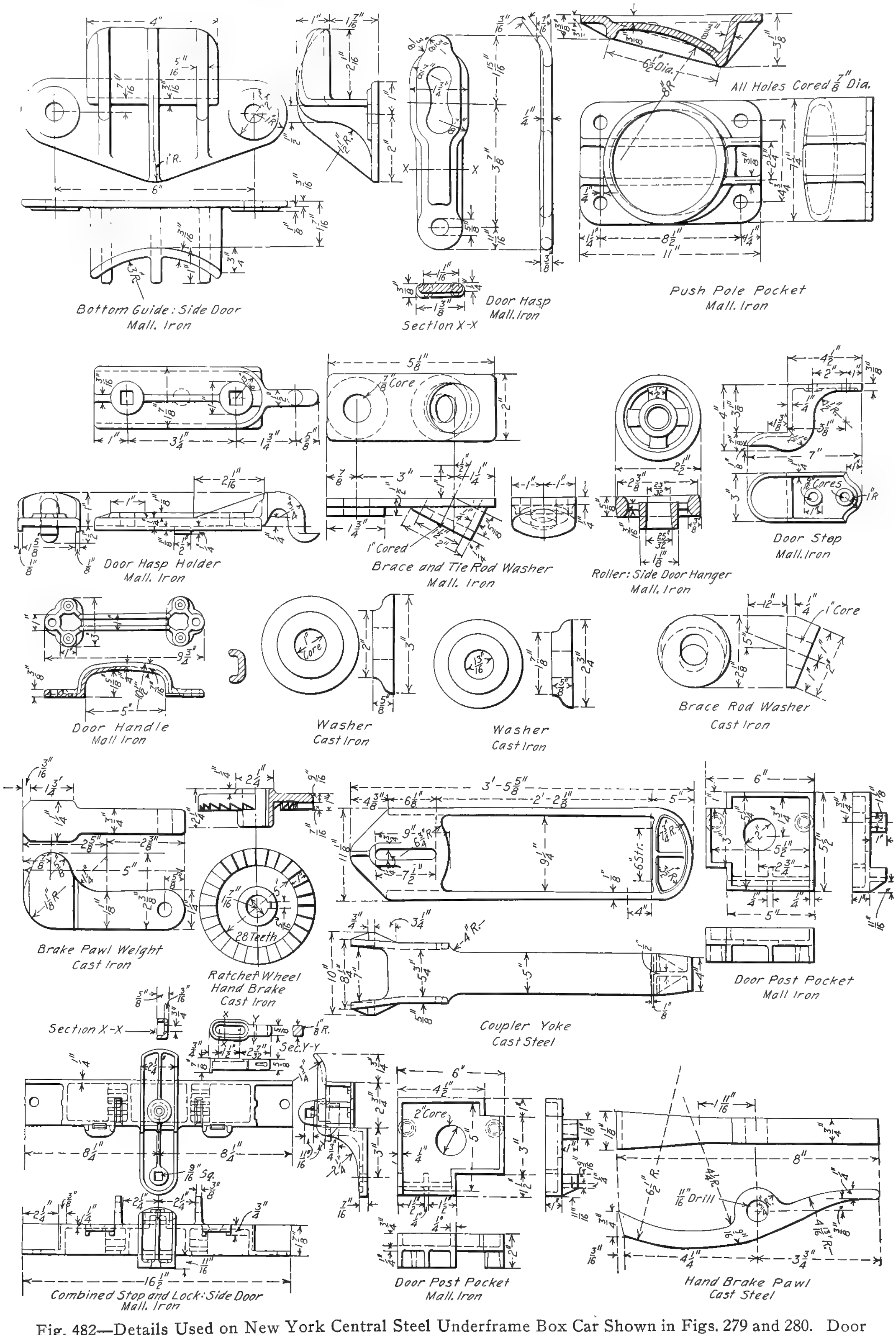


Fig. 482—Details Used on New York Central Steel Underframe Box Car Shown in Figs. 279 and 280. Door Bottom Guide, Stop and Lock, Roller, etc., Furnished by the Camel Company.

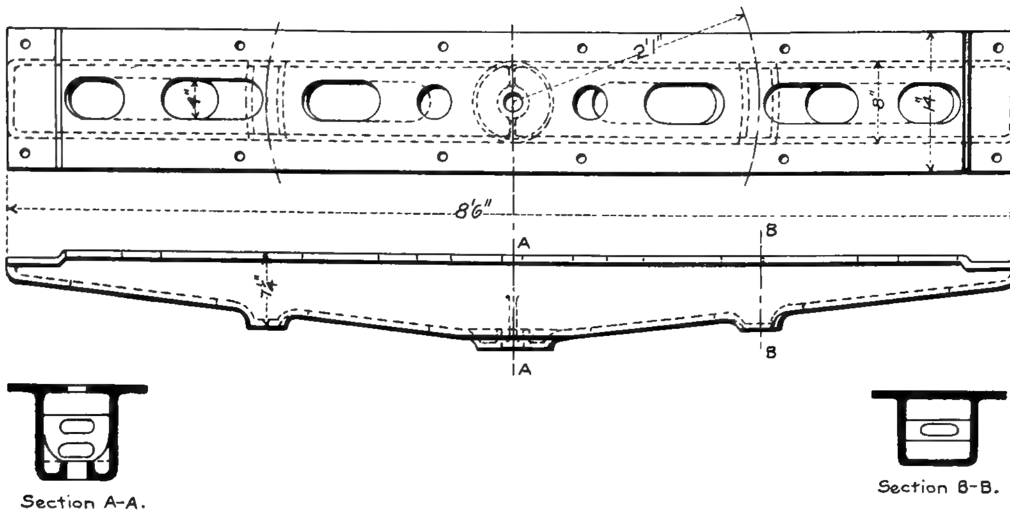


Fig. 483—Cast Steel Box Section Body Bolster. American Steel Foundries.

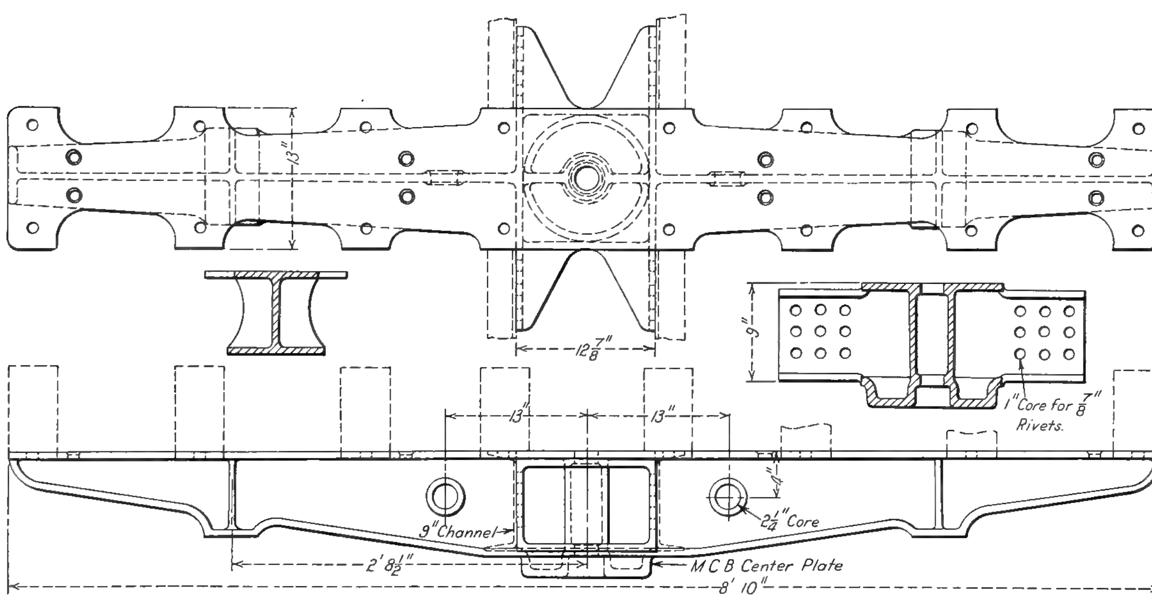


Fig. 484—Gould Cast Steel I-Beam Type Body Bolster. Gould Coupler Company.

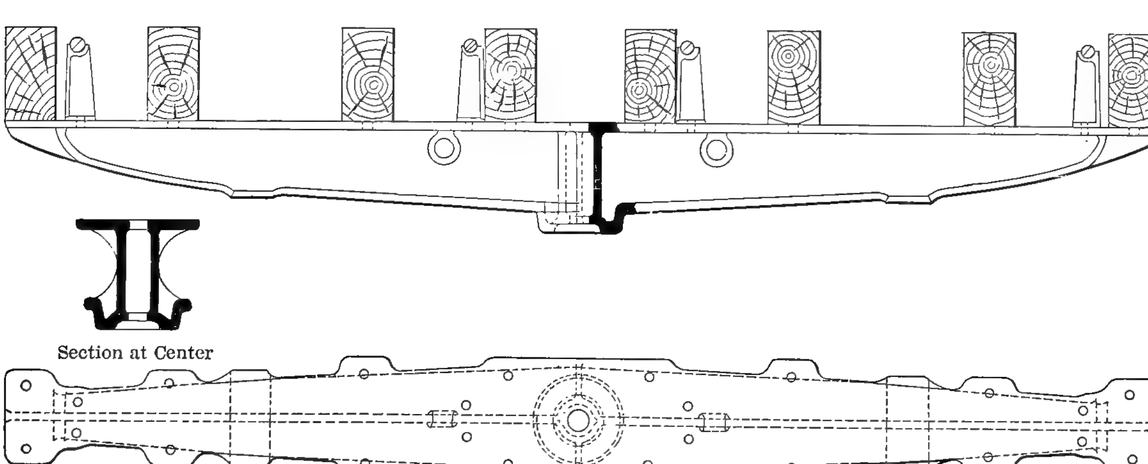


Fig. 485—Cast Steel I-Section Body Bolster. American Steel Foundries.

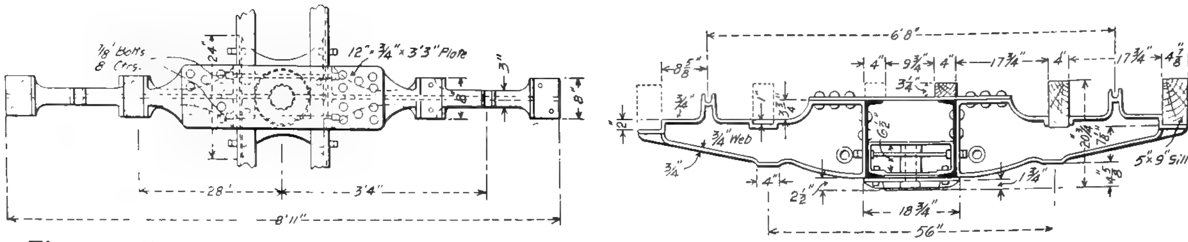


Fig. 486—Two Piece Cast Steel Body Bolster for Freight Cars with Channel Center Sills. American Steel Foundries.

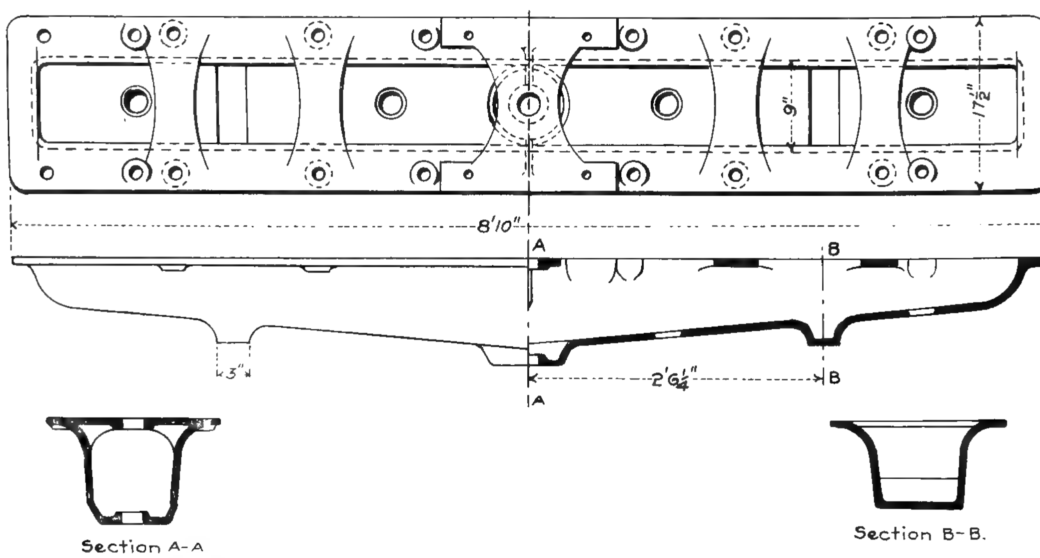


Fig. 487—Cast Steel Channel-Section Body Bolster. American Steel Foundries.

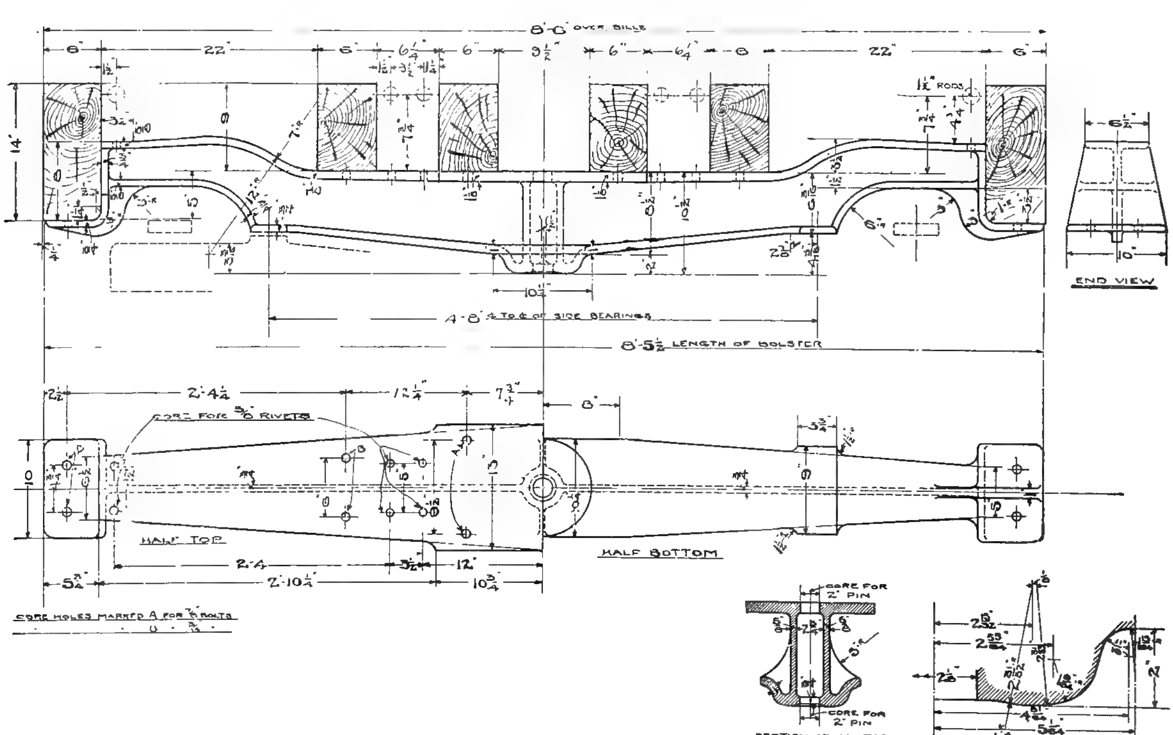


Fig. 488—Cast Steel Body Bolster for Wooden Underframe Flat Car. American Steel Foundries.

Body Bolster Parts, See Fig. 490.

1 *Top Plate*
2 *Bottom Plate*
4 *Thimble*
9 *Body Side Bearing*
10 *Truck Side Bearing*
11 *Body Center Plate*
12 *Truck Center Plate*
14 *Body Truss Rod Saddle*
15 *Body Truss Rod*
16 *Truck Bolster*
19 *Filling or Web Casting*

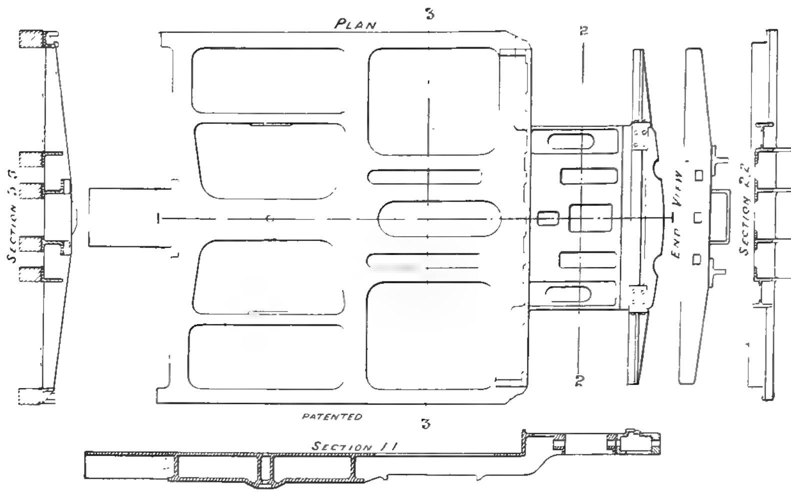


Fig. 489—Commonwealth Steel Company's Cast Steel Combined Platform and Double Body Bolster for Passenger Train Cars.

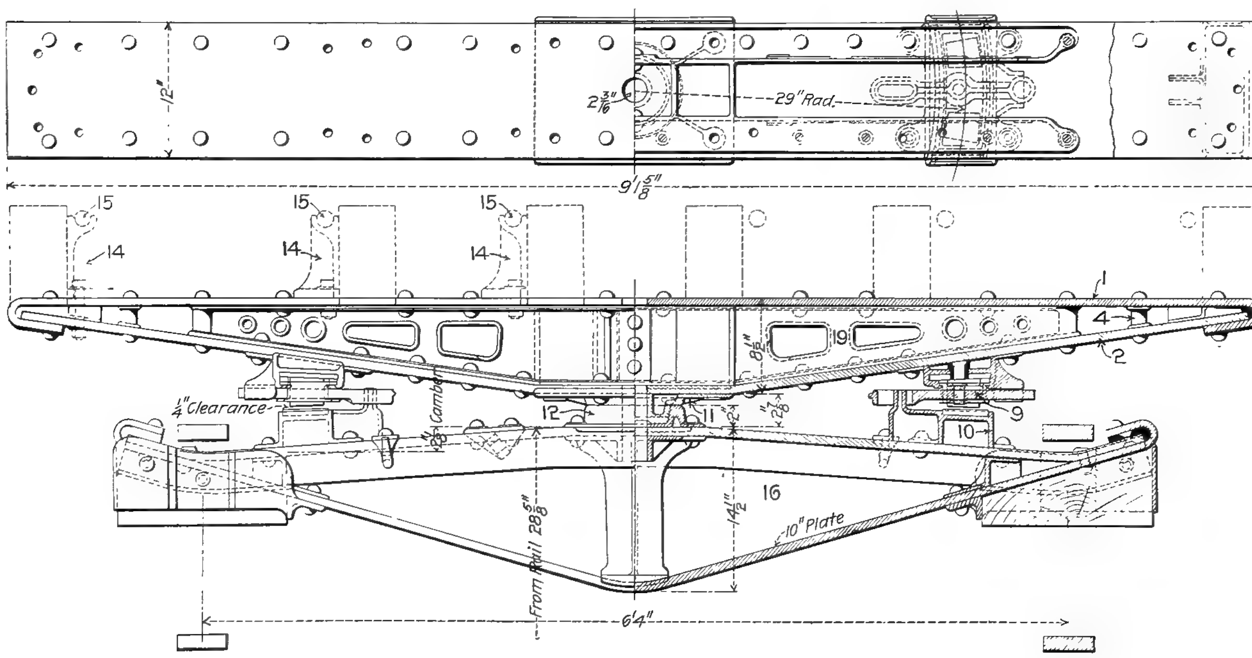


Fig. 490—"Simplex" Body and Truck Bolsters with Susemihl Roller Side Bearings. American Steel Foundries.

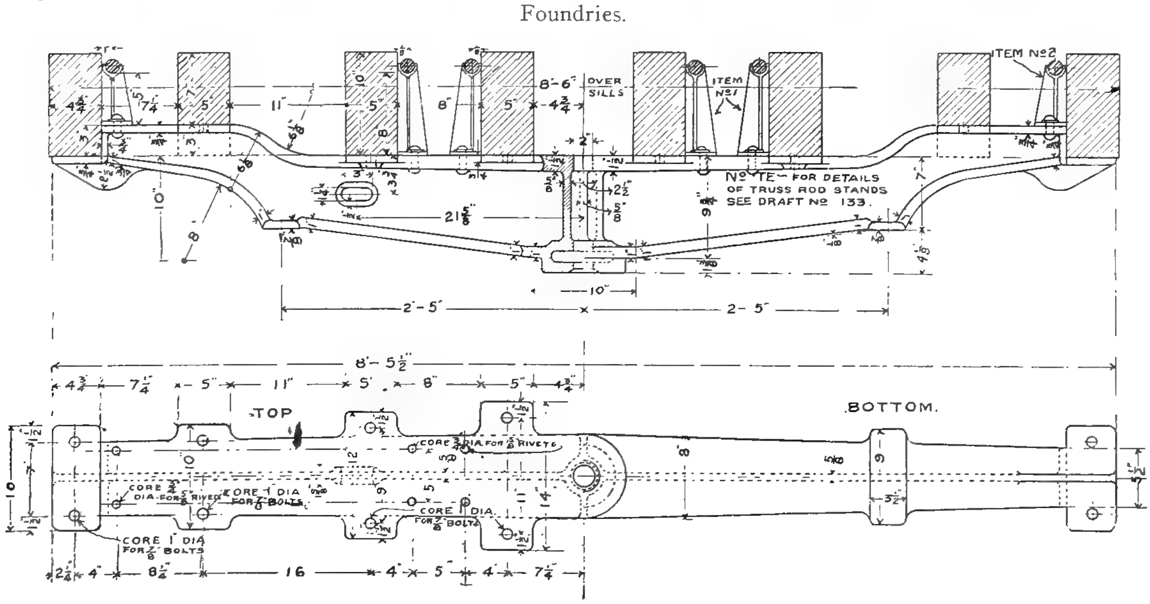


Fig. 491—Cast Steel Body Bolster for Wooden Gondola Car. American Steel Foundries.

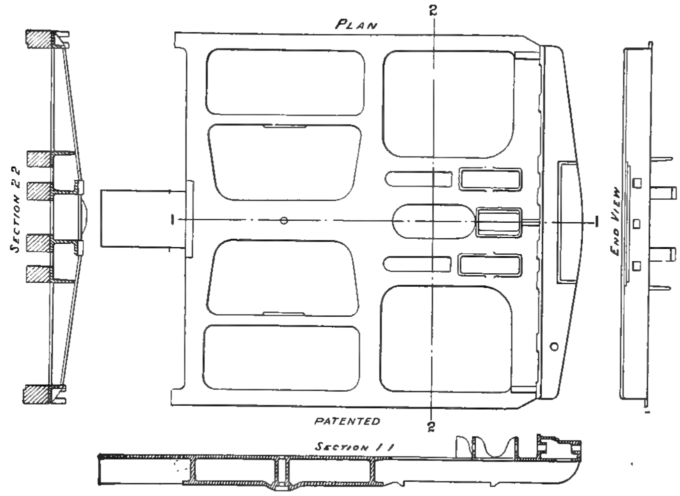


Fig. 492—Commonwealth Steel Company's Cast Steel Combined Platform and Double Body Bolster for Non-Vestibule Passenger Train Cars.

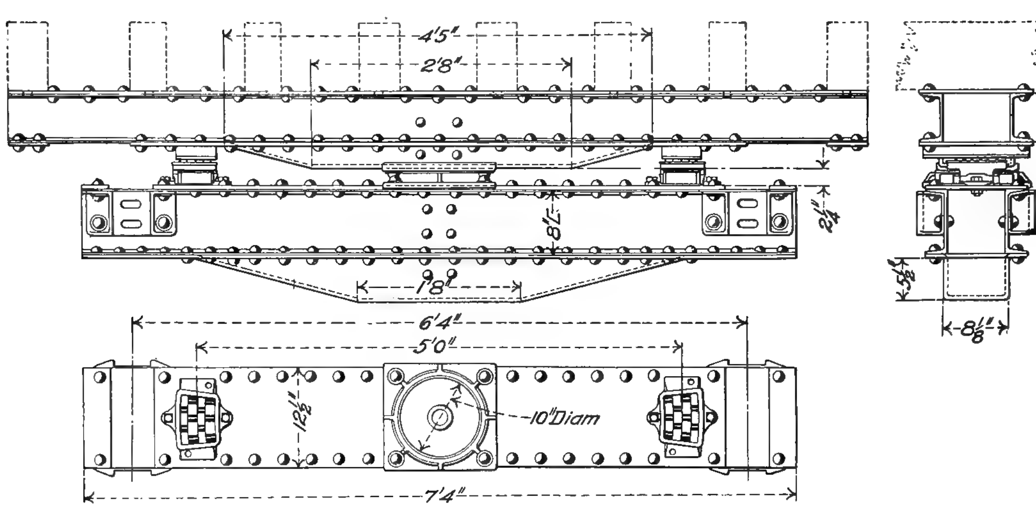


Fig. 493—Monitor Body and Truck Bolsters with Creco Side Bearings. Chicago Railway Equipment Company.

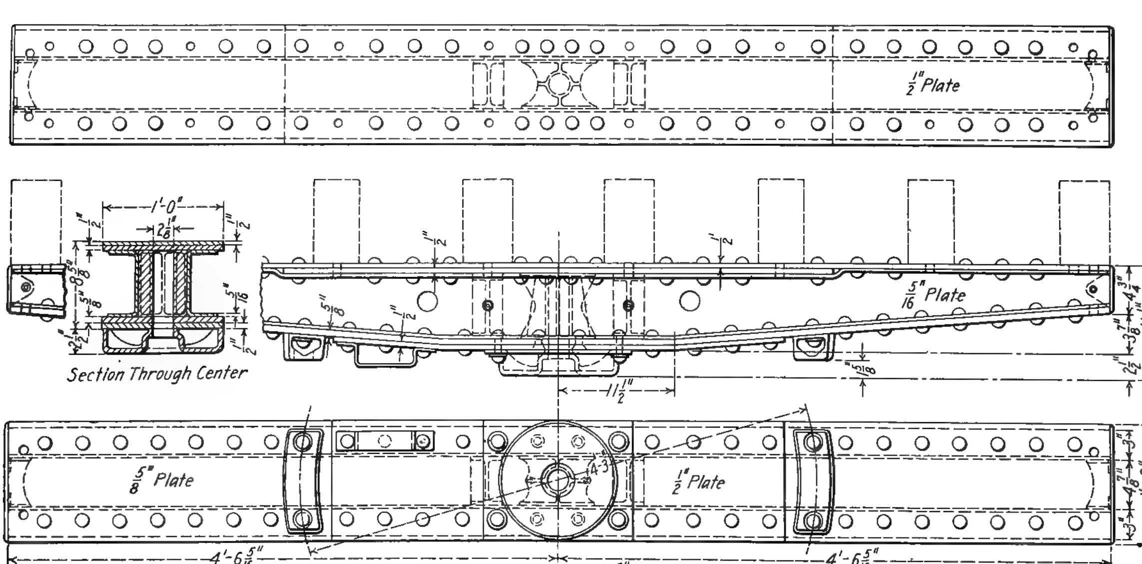


Fig. 494—American Car & Foundry Company's Body Bolster for 40-Ton Capacity Cars.

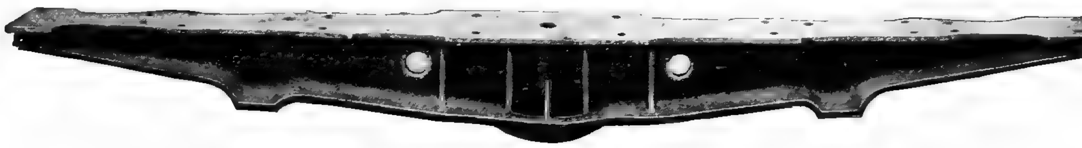


Fig. 495—Cast Steel I-Section Body Bolster. American Steel Foundries.

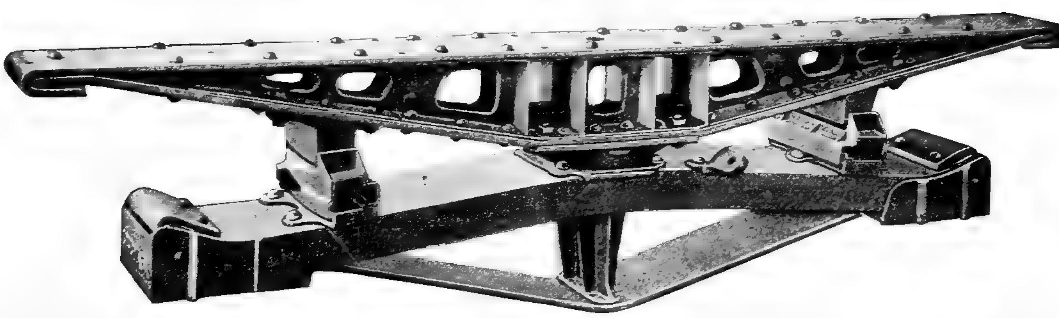


Fig. 496—Simplex Body Bolster with Cast Steel Web Filler, in Position on Simplex Truck Bolster with Susemihl Roller Side Bearings. American Steel Foundries.

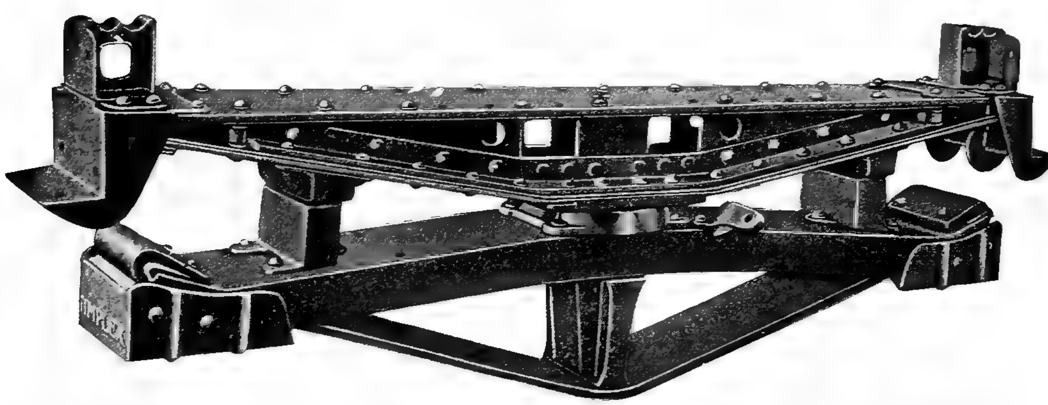


Fig. 497—Simplex Body and Truck Bolsters for Freight Cars with Long Draft Sills and Deep Side Sills. American Steel Foundries.

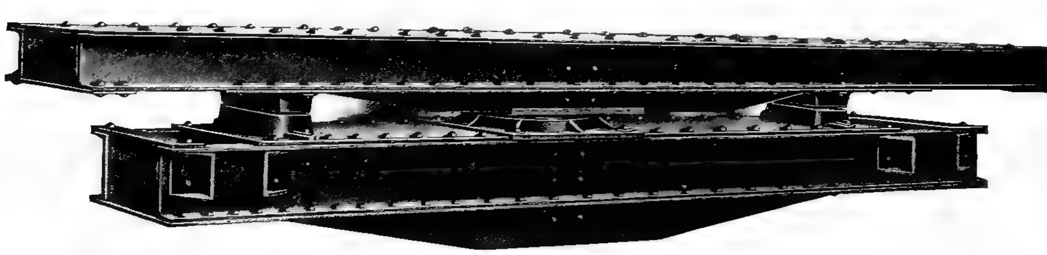


Fig. 498—Monitor Body Bolster in Position on Monitor Truck Bolster. Chicago Railway Equipment Company.

Fig. 499—Bettendorf Body Bolster in Position on Bettendorf Truck Bolster. The Bettendorf Company.

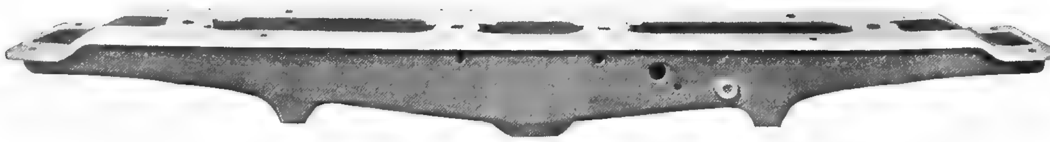


Fig. 500—Keystone Type Double Web Cast Steel Body Bolster. American Steel Foundries.

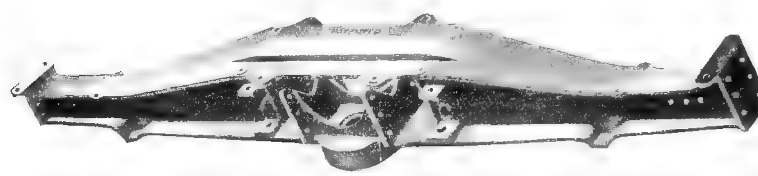


Fig. 501—Commonwealth Steel Company's Cast Steel Separable Body Bolster for Steel Freight Cars.

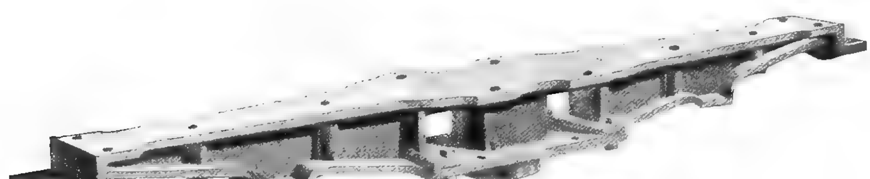


Fig. 502 -Commonwealth Steel Company's Cast Steel Separable Body Bolster for Wooden Freight Cars.

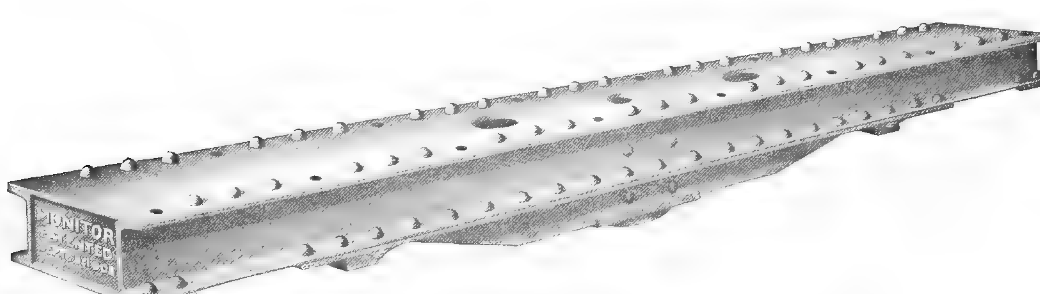


Fig. 503 Monitor Body Bolster. Chicago Railway Equipment Company.

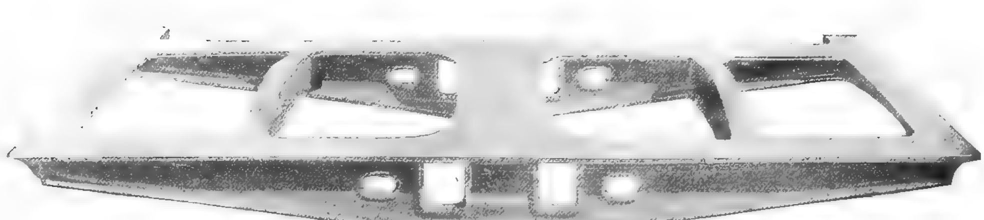


Fig. 504—One-Piece Cast Steel Double Body Bolster for Passenger Train Cars. Commonwealth Steel Company.

Fig. 505—Commonwealth Steel Company's Combined Cast Steel Platform and Double Body Bolster for Vestibuled Steel Cars.

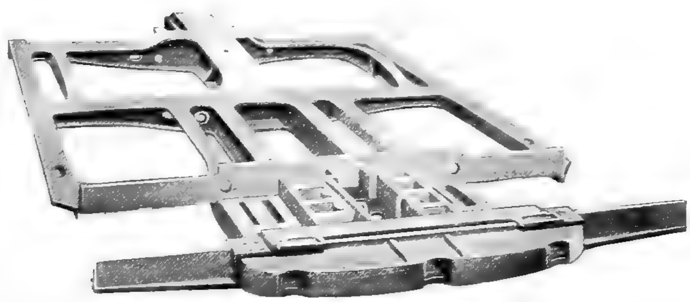


Fig. 506—Commonwealth Steel Company's Combined Cast Steel Platform and Double Body Bolster for Vestibuled Cars with Combined Wood and Steel Underframes.

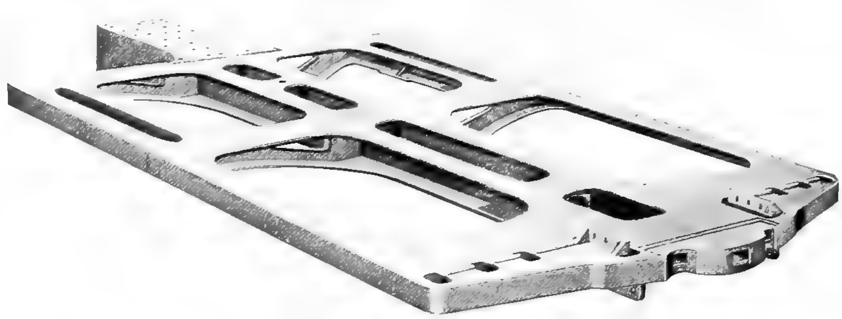


Fig. 507—Commonwealth Steel Company's Cast Steel Combined Platform and Double Body Bolster for Non-Vestibuled Steel Cars.

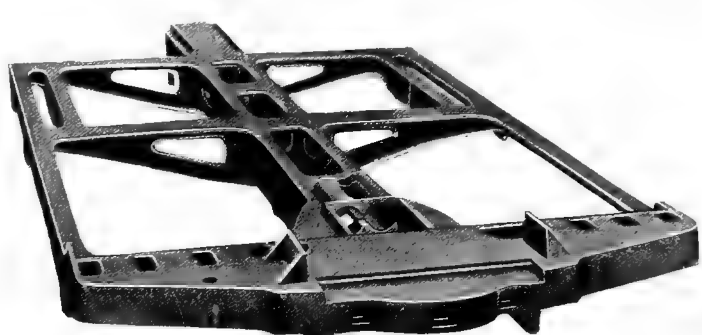


Fig. 508—Commonwealth Steel Company's Cast Steel Combined Platform and Double Body Bolster for Non-Vestibuled Cars with Combined Wood and Steel Underframe.

Fig. 509—Commonwealth Steel Company's Cast Steel Buffer Sill for Passenger Train Cars

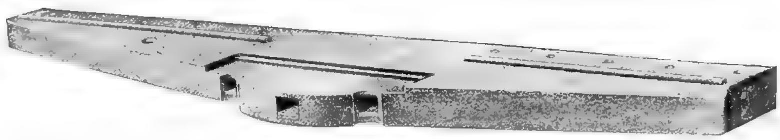


Fig. 505—Commonwealth Steel Company's Cast Steel Combined End and Buffer Sill.

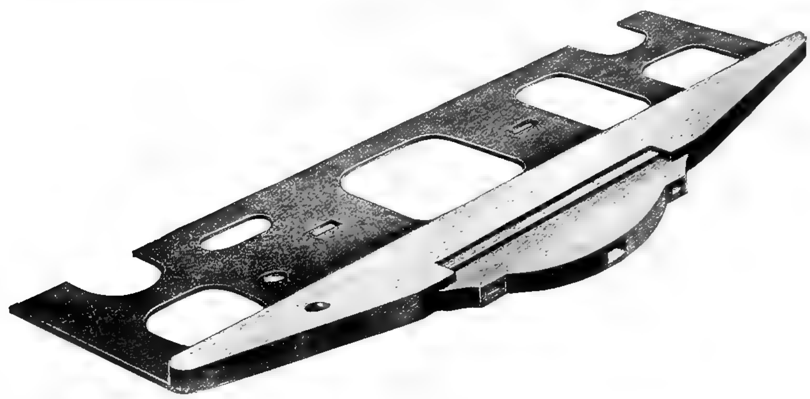


Fig. 506—Commonwealth Steel Company's One Piece Cast Steel Buffer Sill and Anti-Telescoping Plate for Non-Vestibuled Cars.

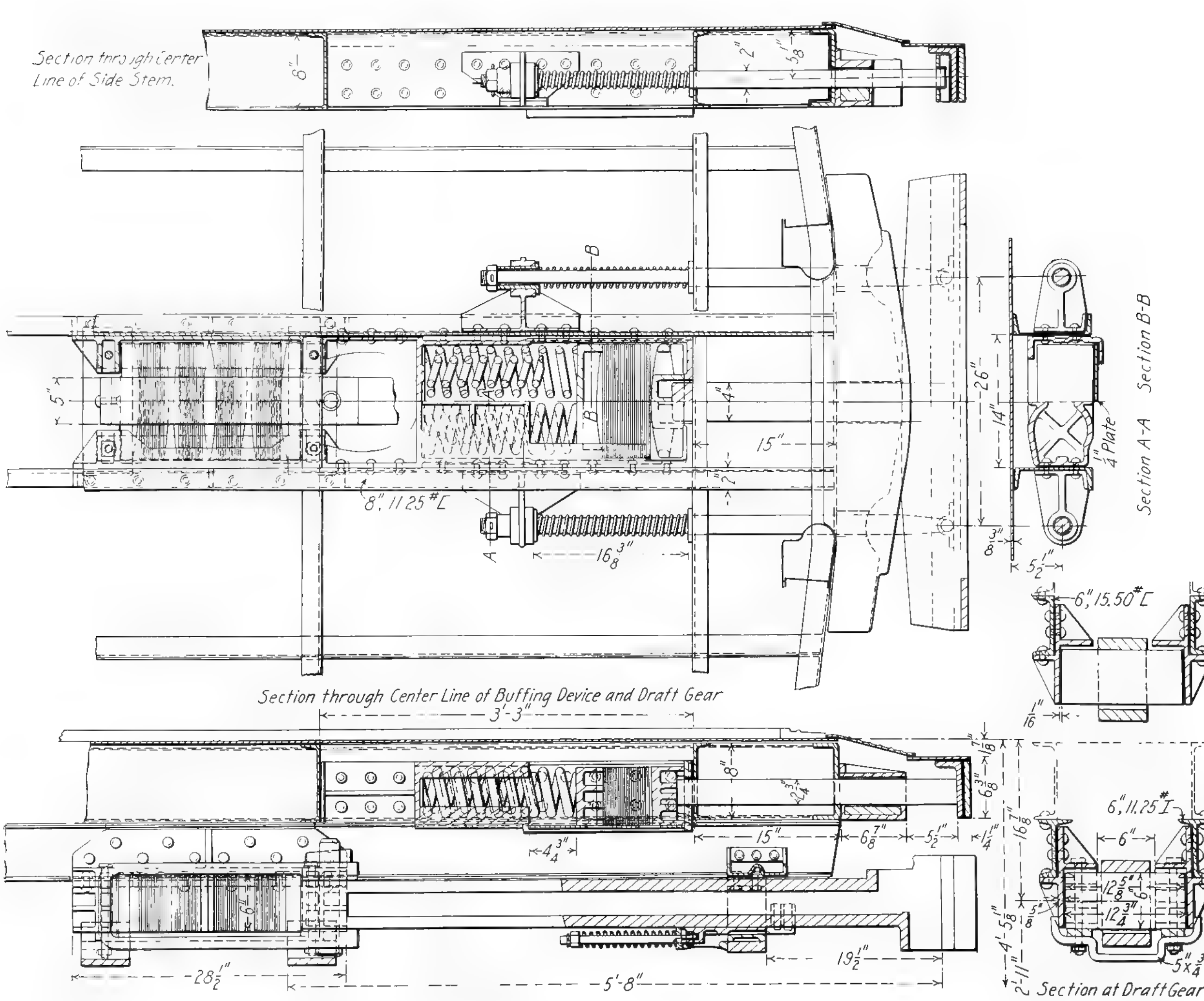


Fig. 507—Waugh-Forsyth Buffing Device and Waugh Draft Gear as Applied to New York, Westchester & Boston Passenger Equipment. Waugh Draft Gear Company.

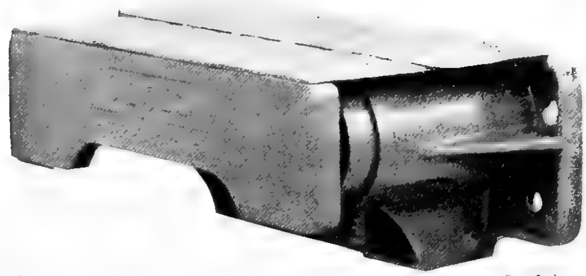


Fig. 508—Gould Spring Buffer for Express Refrigerator and Freight Cars. Gould Coupler Company.

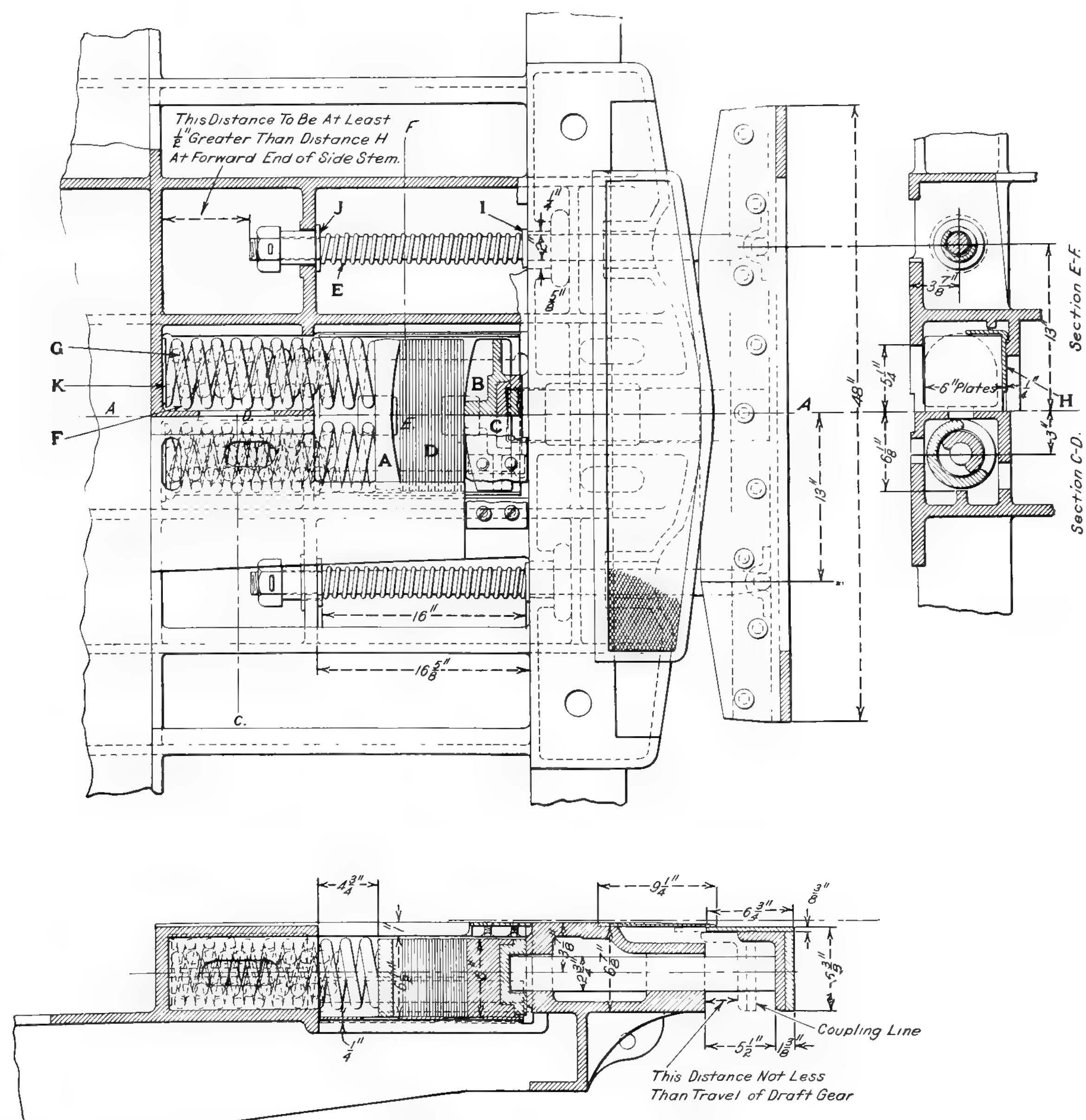


Fig. 509—Waugh-Forsyth High Capacity Buffing Device Applied to Cast Steel Platform. Waugh Draft Gear Company.

See Page 414 for Names of Lettered Parts.

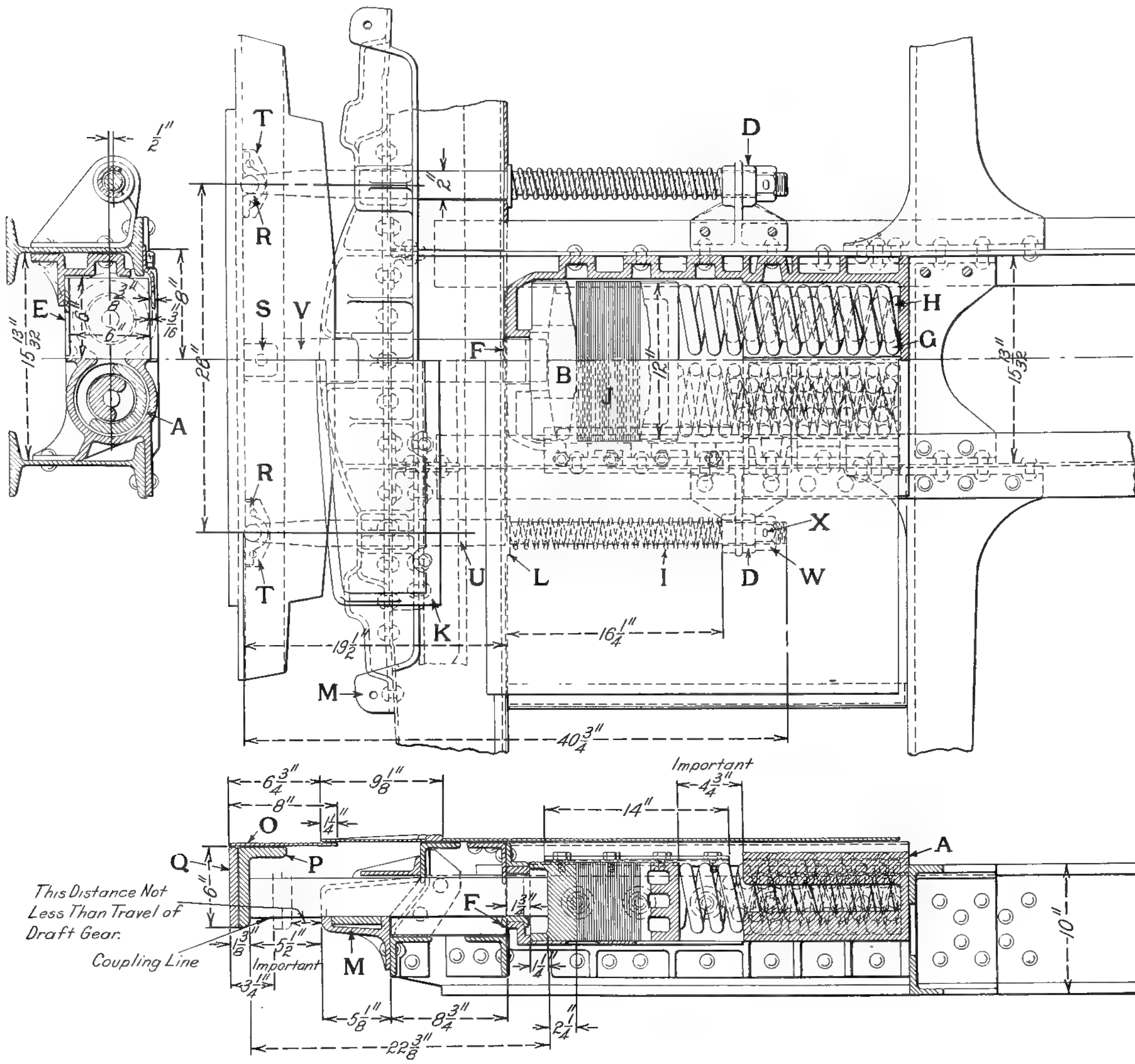


Fig. 510—Waugh-Forsyth High Capacity Buffing Device Applied to Built Up Steel Platform. Waugh Draft Gear Company.

Parts of Waugh-Forsyth Buffing Device Shown in Fig. 509.

A *Housing Casting*
B *Convex Follower*
C *Concave Follower*
D *Side Stem Brackets*
E *Bottom Wear Plates*
F *Chafing Plates, Center Stem*
G *No. 50 Spring*
H *No. 51 Spring*
I *No. 53 Spring*
J *Spring Friction Plates*
K *Tread Plates*
L *Side Stem Spring Washer*
M *Buffer Face Casting with Inserts—Vestibule End Only*
N *Buffers*
O *Buffer Tread Plate*
P *Buffer Angle*
Q *Buffer Face Plate*
R *Hinge Plate*
S *Center Stem Chafing Block*
T *Side Stem Chafing Block*
U *Vestibule End Side Stems*
V *Vestibule End Center Stems*
W *1¾-inch Hexagon Nut*
X *¼-inch Cotter Pin*

Parts of Waugh-Forsyth Buffing Device Shown in Fig. 510.

A *Concave Followers*
B *Convex Followers*
C *Interlock Followers*
D *2 Complete Sets of Friction Plates*
E *Side Stem Spring No. 53*
F *Outside Springs No. 50*
G *Inside Springs No. 51*
H *Bottom Wear Plates*
I *Side Stem Spring Washer*
J *Side Stem Spring Thimble*
K *Main Spring Washers*

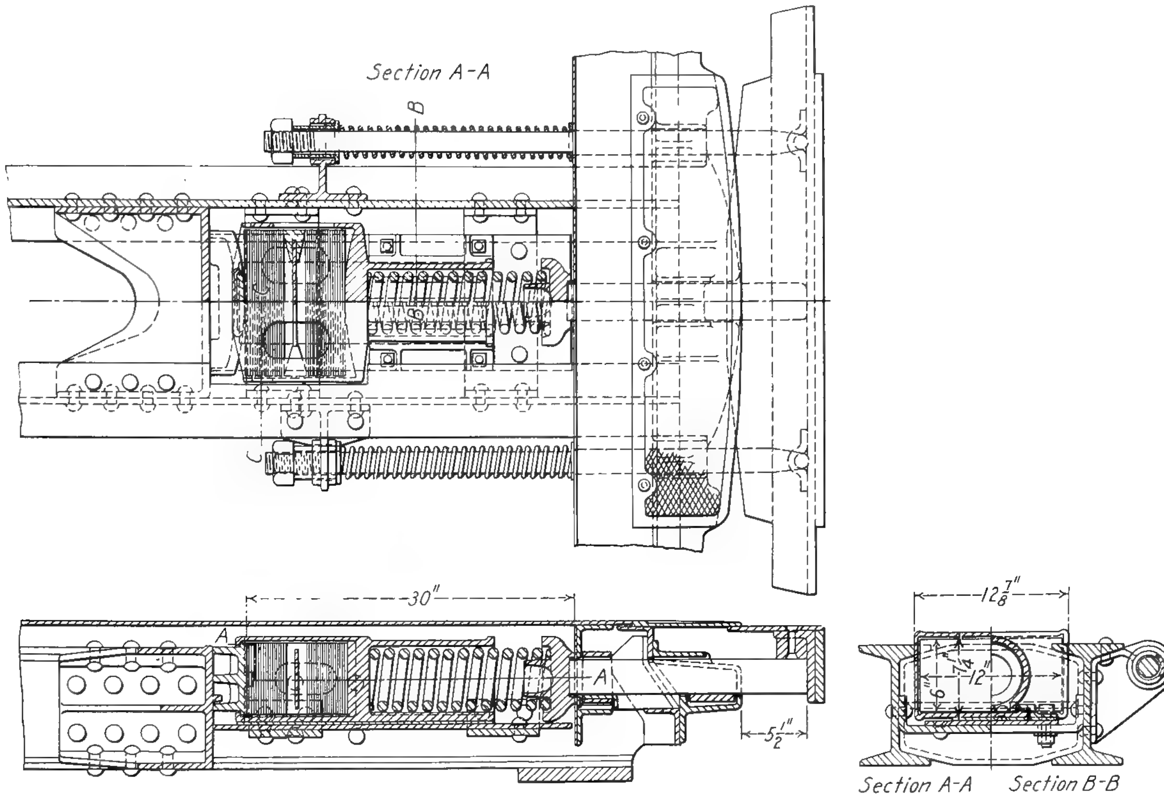


Fig. 511—Waugh Buffing Device Arranged for Steel Passenger Train Cars. Waugh Draft Gear Company.

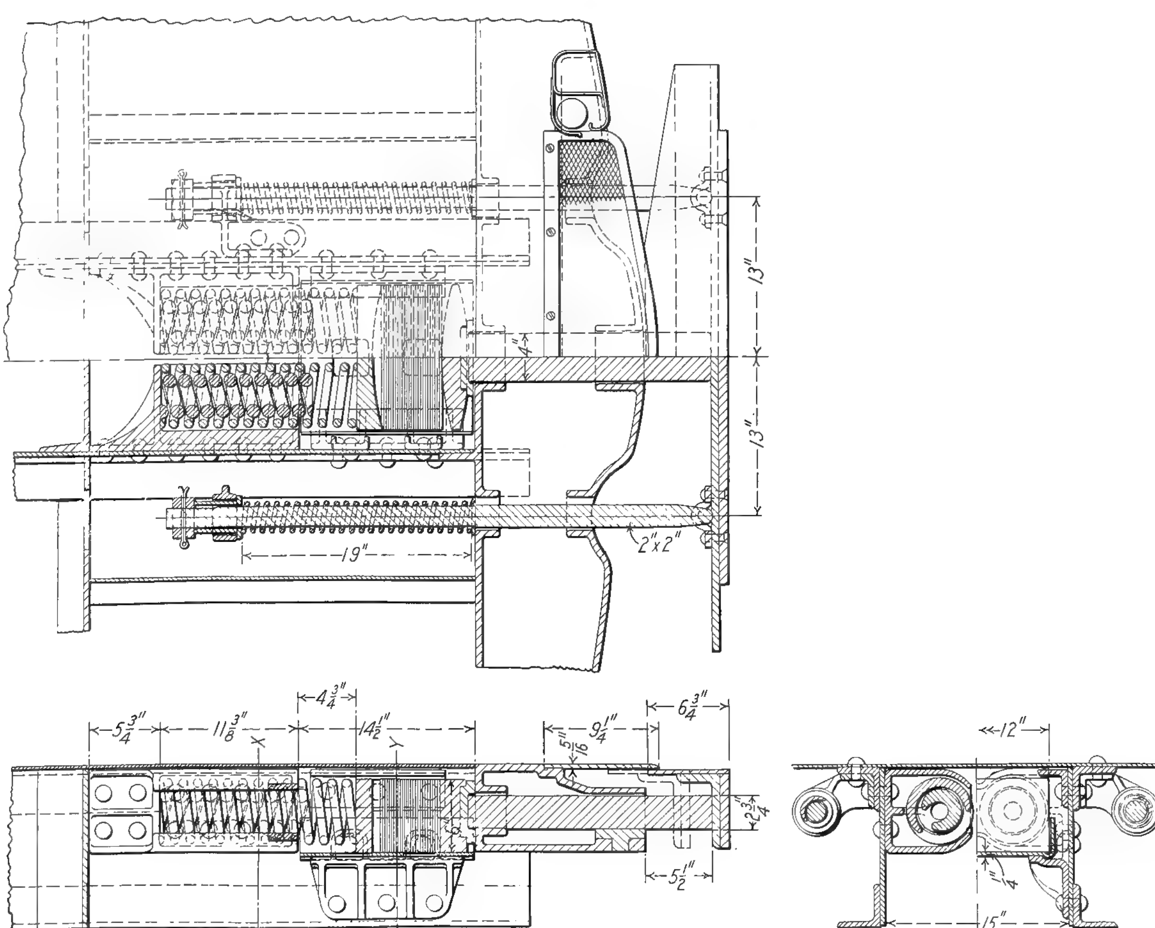


Fig. 512—Waugh-Forsyth Buffing Device, Type D. Waugh Draft Gear Company.

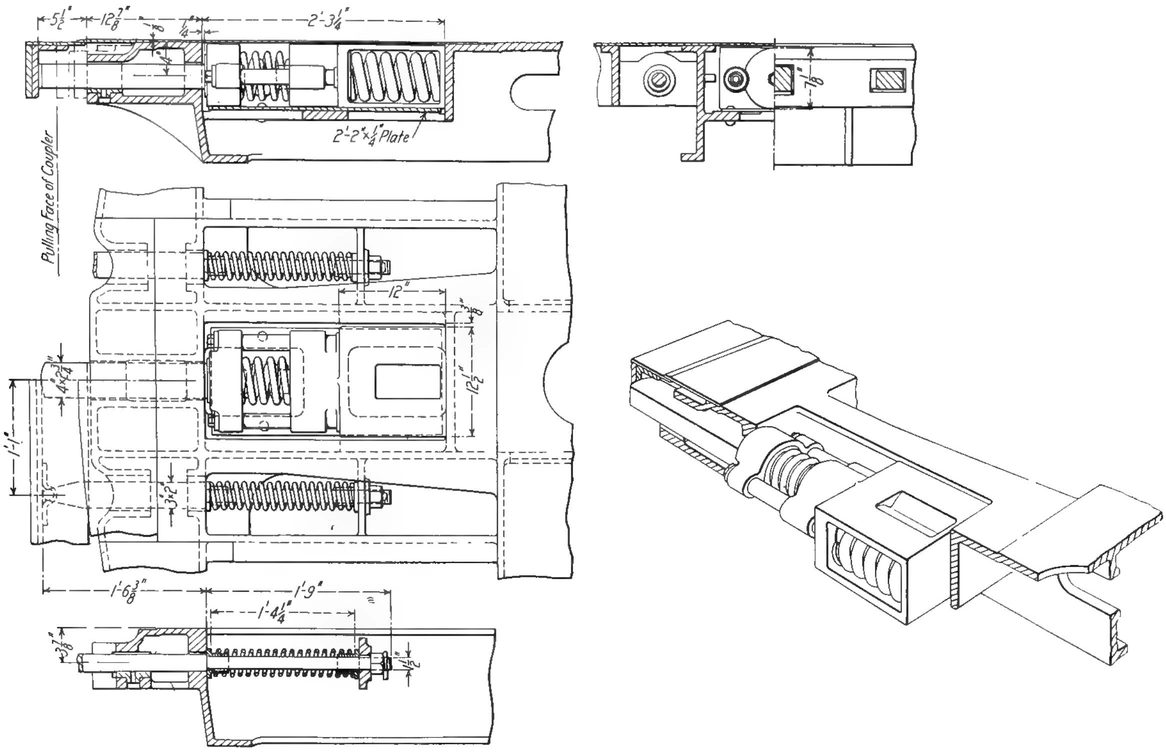


Fig. 513—Miner Friction Buffer for Passenger Equipment with Cast Steel Platforms. W. H. Miner.

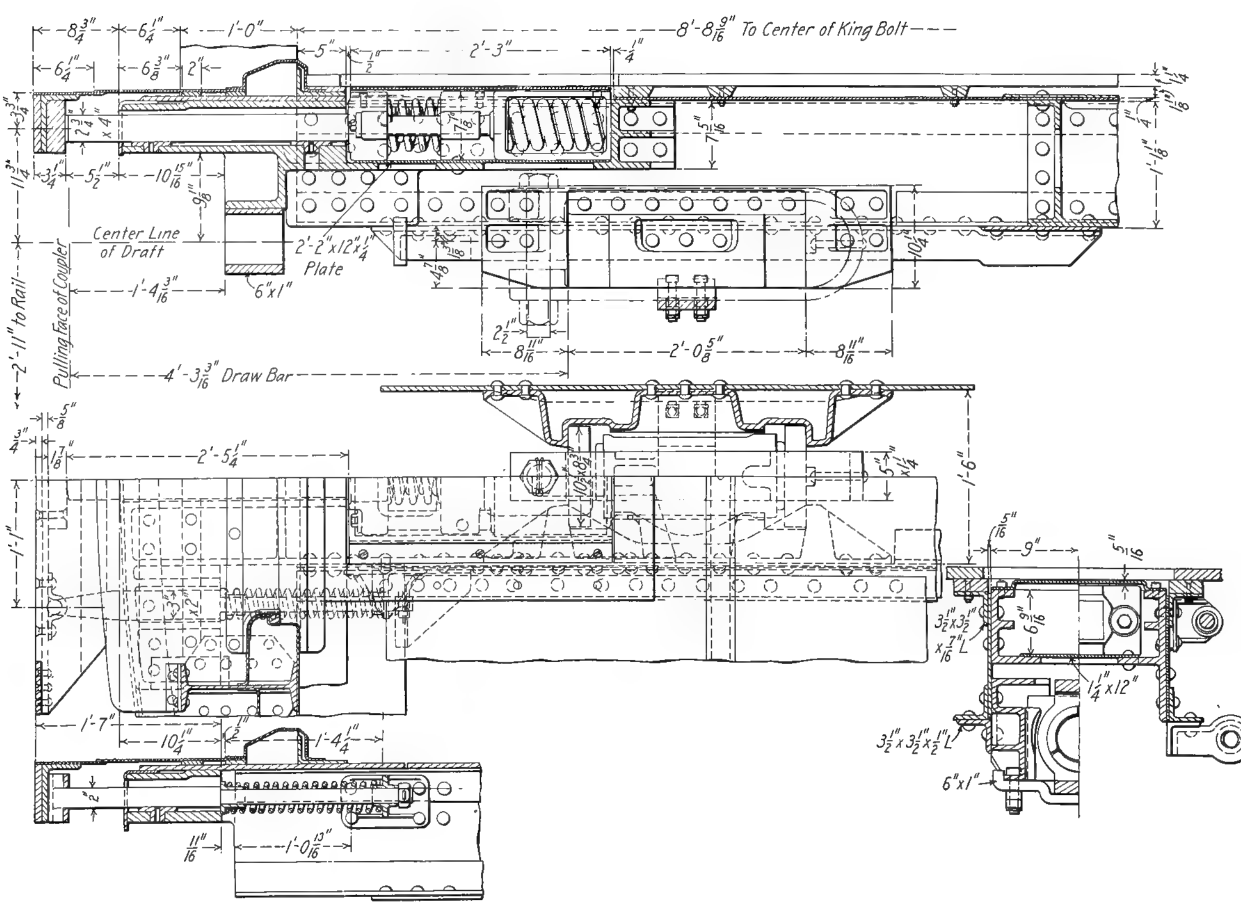


Fig. 514—Miner Friction Buffer and Miner Friction Draft Gear for New York, New Haven & Hartford Steel Baggage Cars. W. H. Miner.

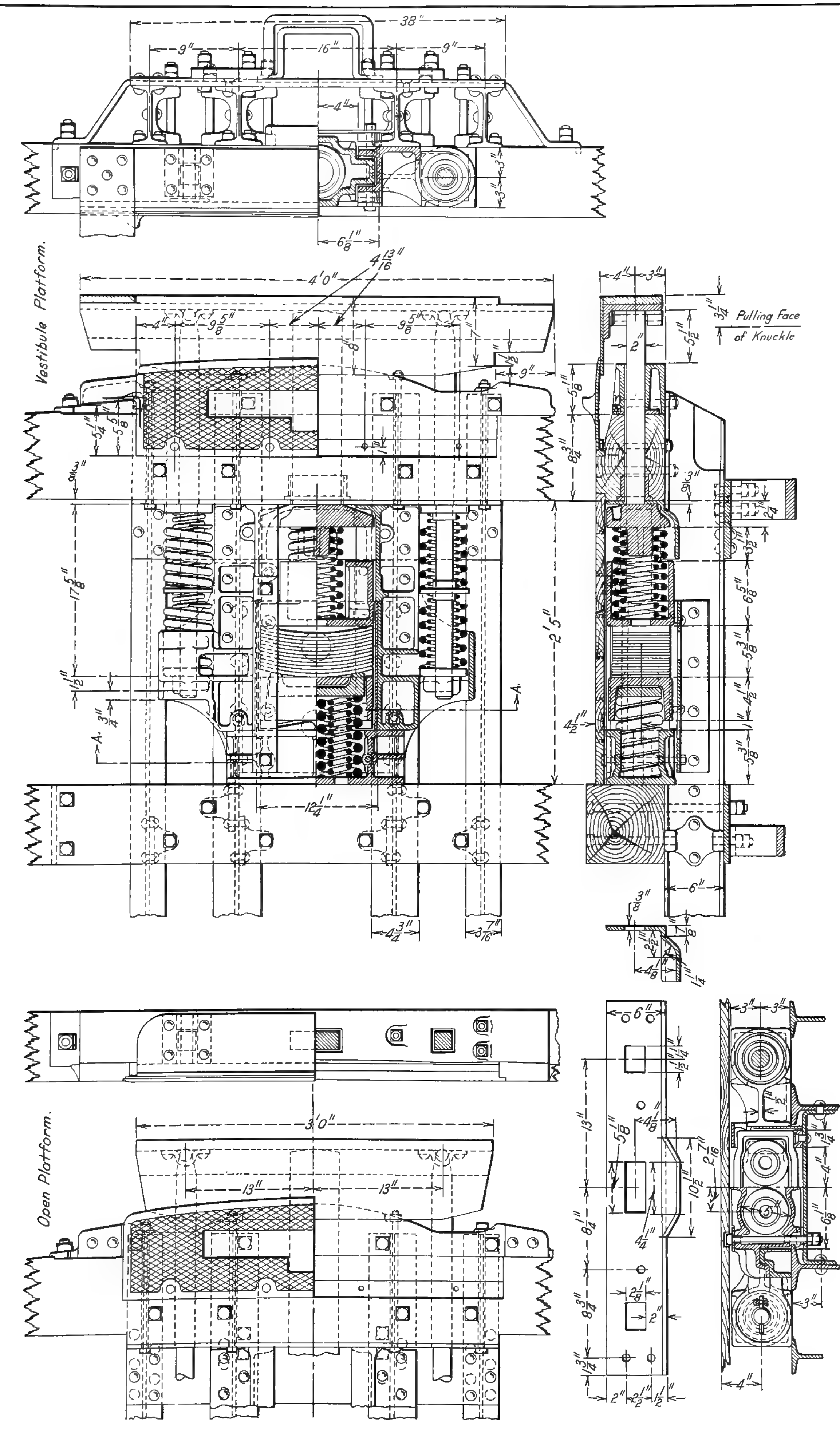
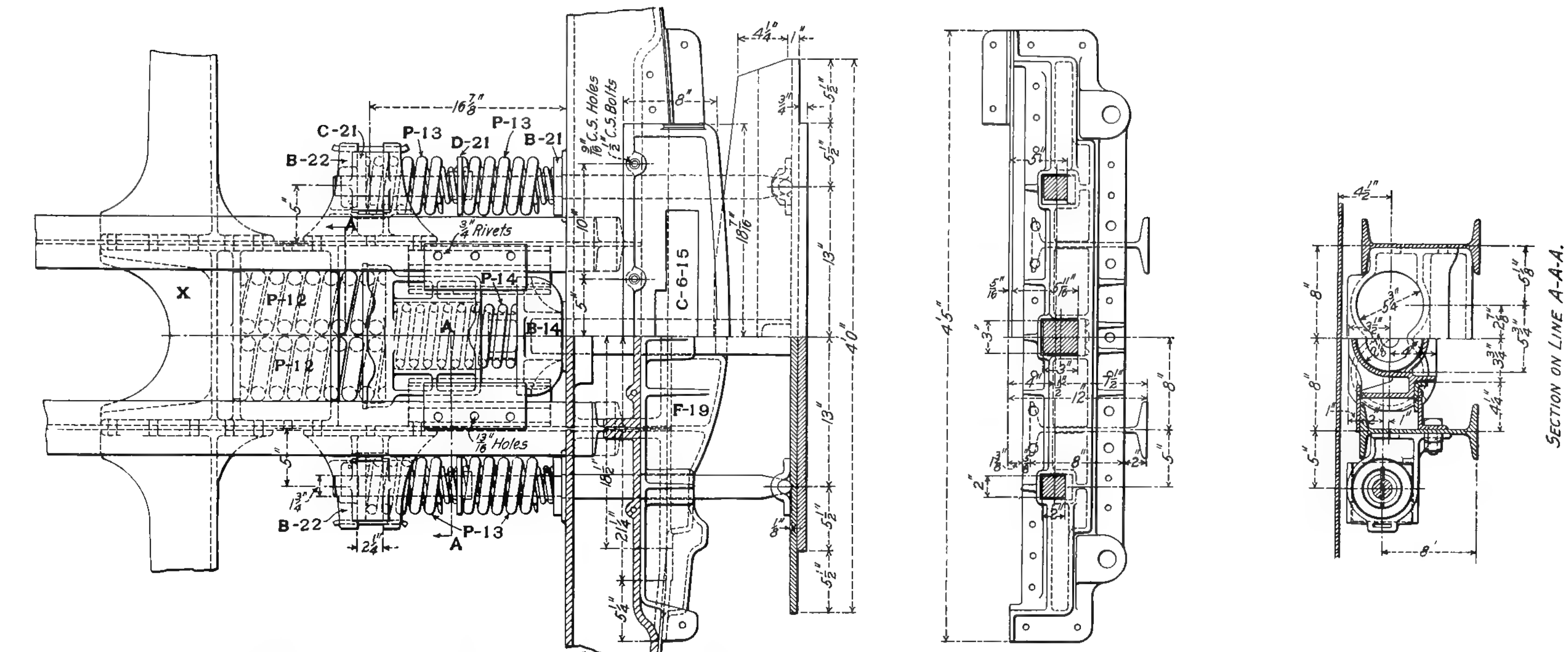
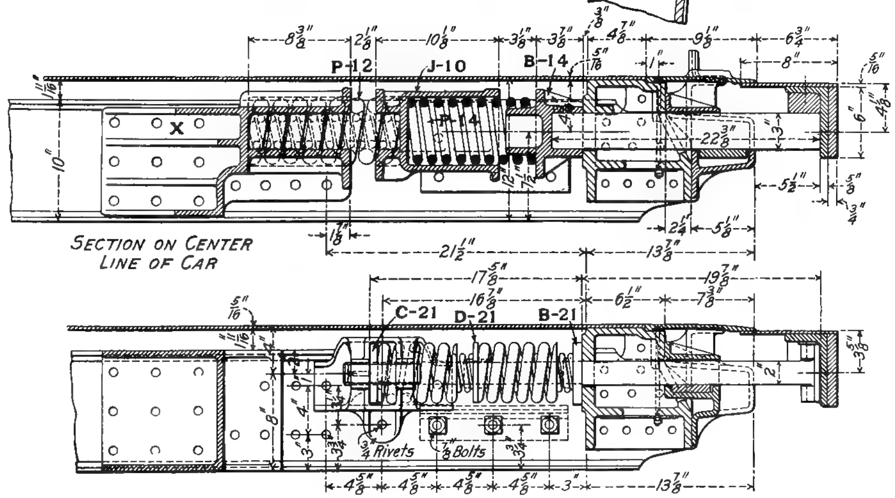


Fig. 515—Standard Steel Buffers Applied to Standard Steel Platforms. Standard Coupler Company.

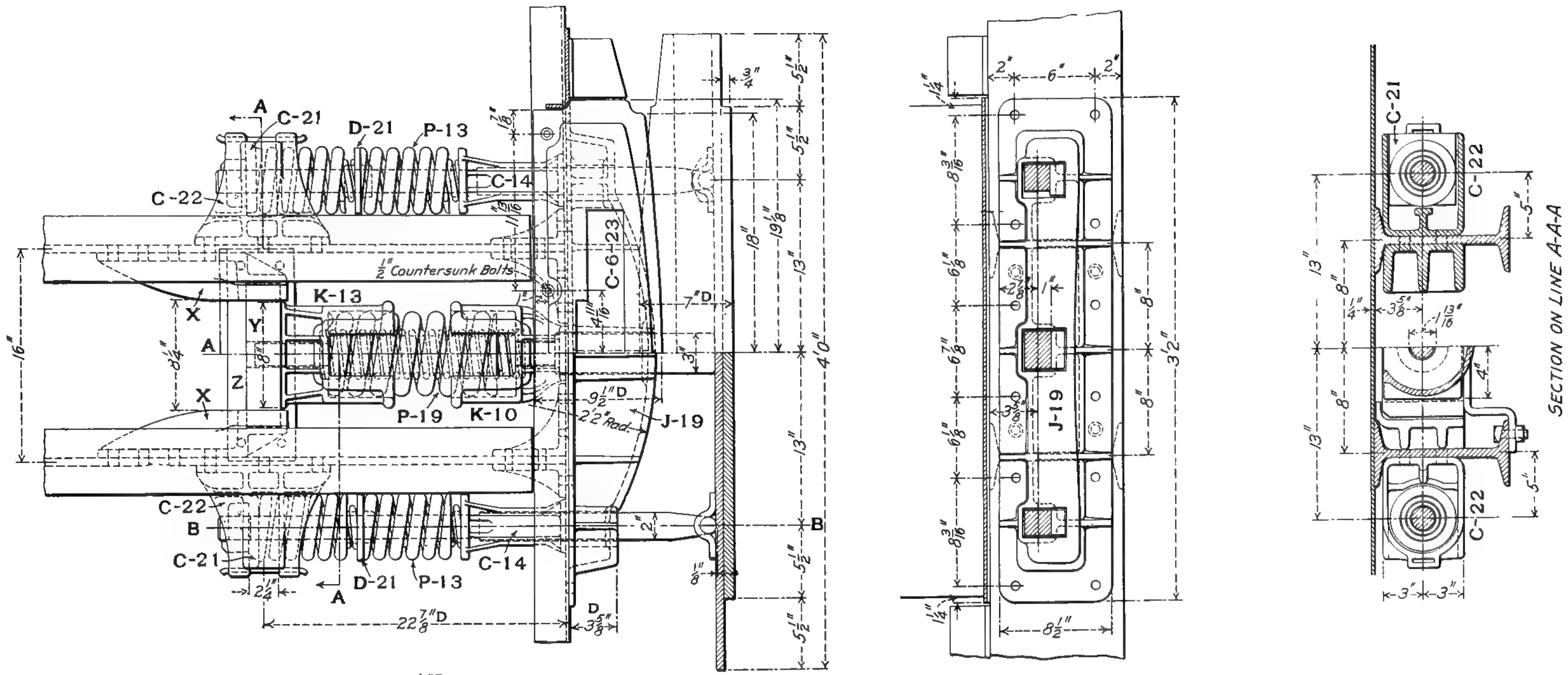


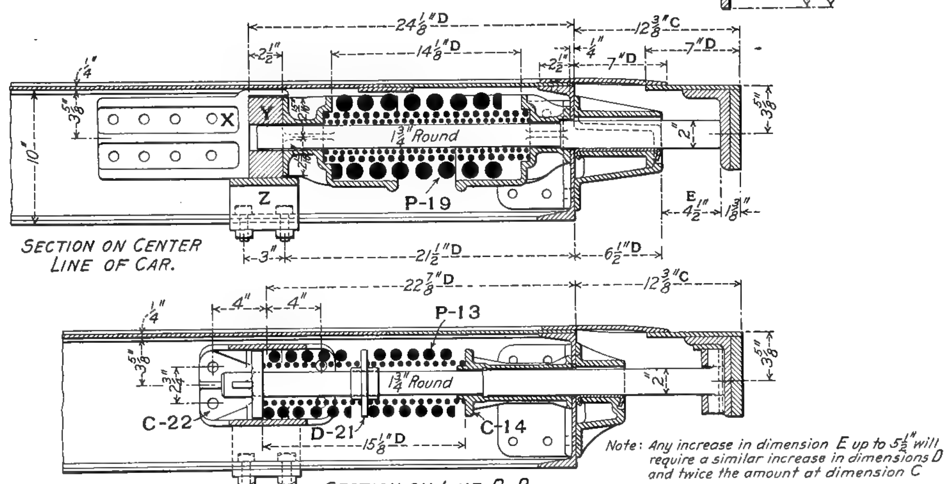


Parts of Standard Steel Platform Buffers, Type D-3, for Steel Cars.

2 *Buffer Beam Extensions, with Inserts*
2 *Name Plates*
2 *Buffer Spring Followers*
2 *Buffer Spring Casings*
4 *Side Stem Brackets, with Keys*
12 *Side Stem Washers*
2 *Buffer Center Stems*
2 *Buffer Face Angles*
2 *Buffer Face Plates*
2 *Buffer Tread Plates*
4 *Buffer Side Stems*
4 *Side Stem Keys and Cotters*
4 *Hinge Plates*
6 *Chafing Plates*
2 *Single Coil Buffer Springs, P-14*
4 *Double Coil Buffer Springs, P-12*
8 *Double Coil Buffer Springs, P-13*
Back Spring Cap, X, to Suit Car Construction.

Fig. 516—Standard Steel Platform Buffers for Steel Cars. Standard Coupler Company.

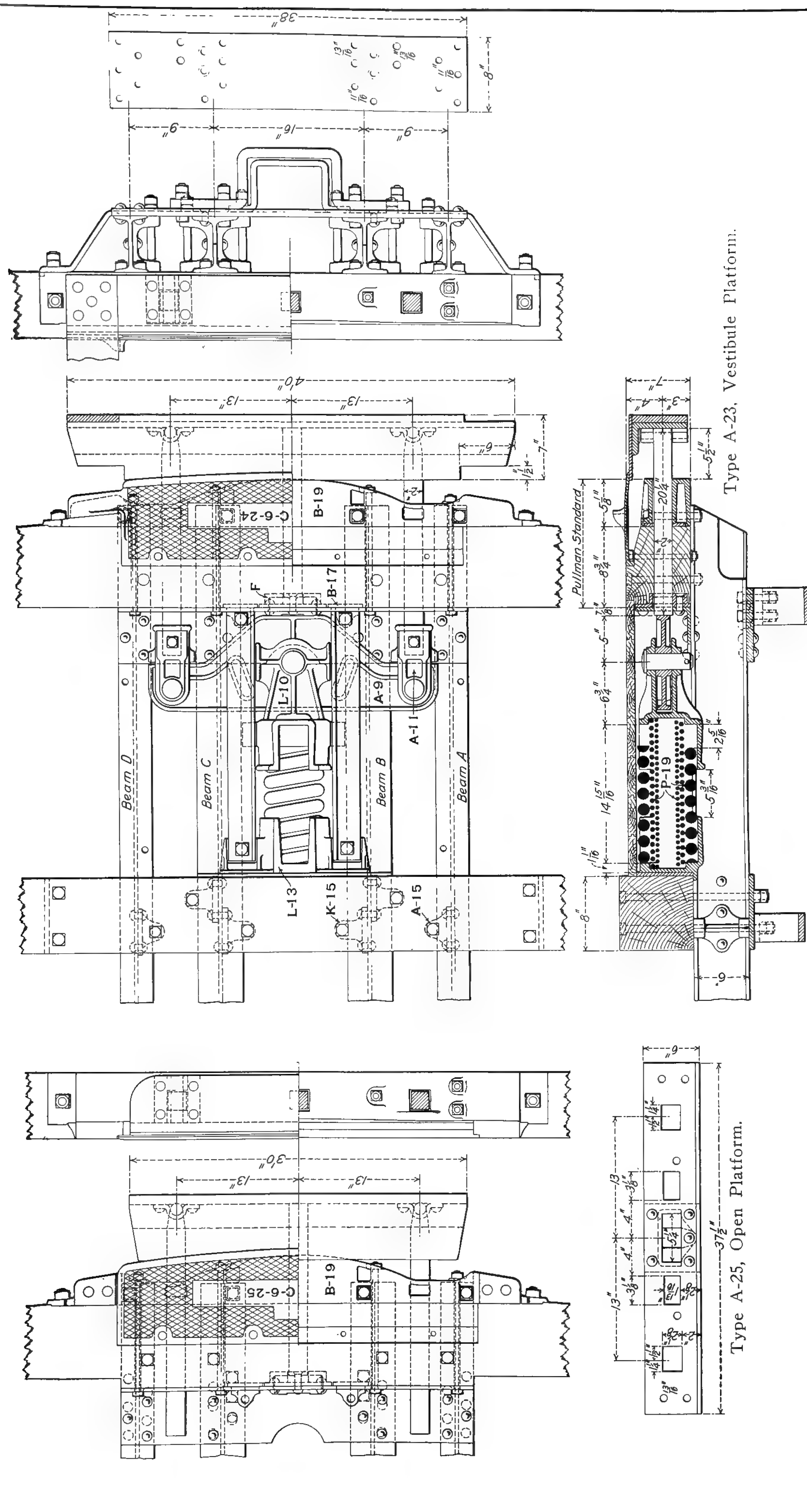




Parts of Standard Steel Platform Buffers, Type E-3, for Steel Cars.

2	*Buffer Beam Extensions and Inserts*	2	*Buffer Tread Plates*
2	*Name Plates*	4	*Buffer Side Stems*
2	*Front Spring Cups*	4	*Side Stem Keys and Cotters*
2	*Back Spring Cups*	4	*Hinge Plates*
4	*Side Stem Brackets, with Keys*	4	*Chafing Plates*
8	*Side Stem Washers*	8	*Double Coil Buffer Springs, P-13*
4	*Side Stem Followers*	2	*Triple Coil Buffer Springs, P-19*
2	*Buffer Center Stems*		*Back Stops, X, Y, Z, to Suit Car Construction.*
2	*Buffer Face Angles*		
2	*Buffer Face Angle Plates*		

Fig. 517—Standard Steel Platform Buffers for Steel Cars. Standard Coupler Company.



Type A-23, Vestibule Platform.

Type A-25, Open Platform.

Fig. 518—Standard Steel Platforms for Vestibuled and Open End Cars. Standard Coupler Company.

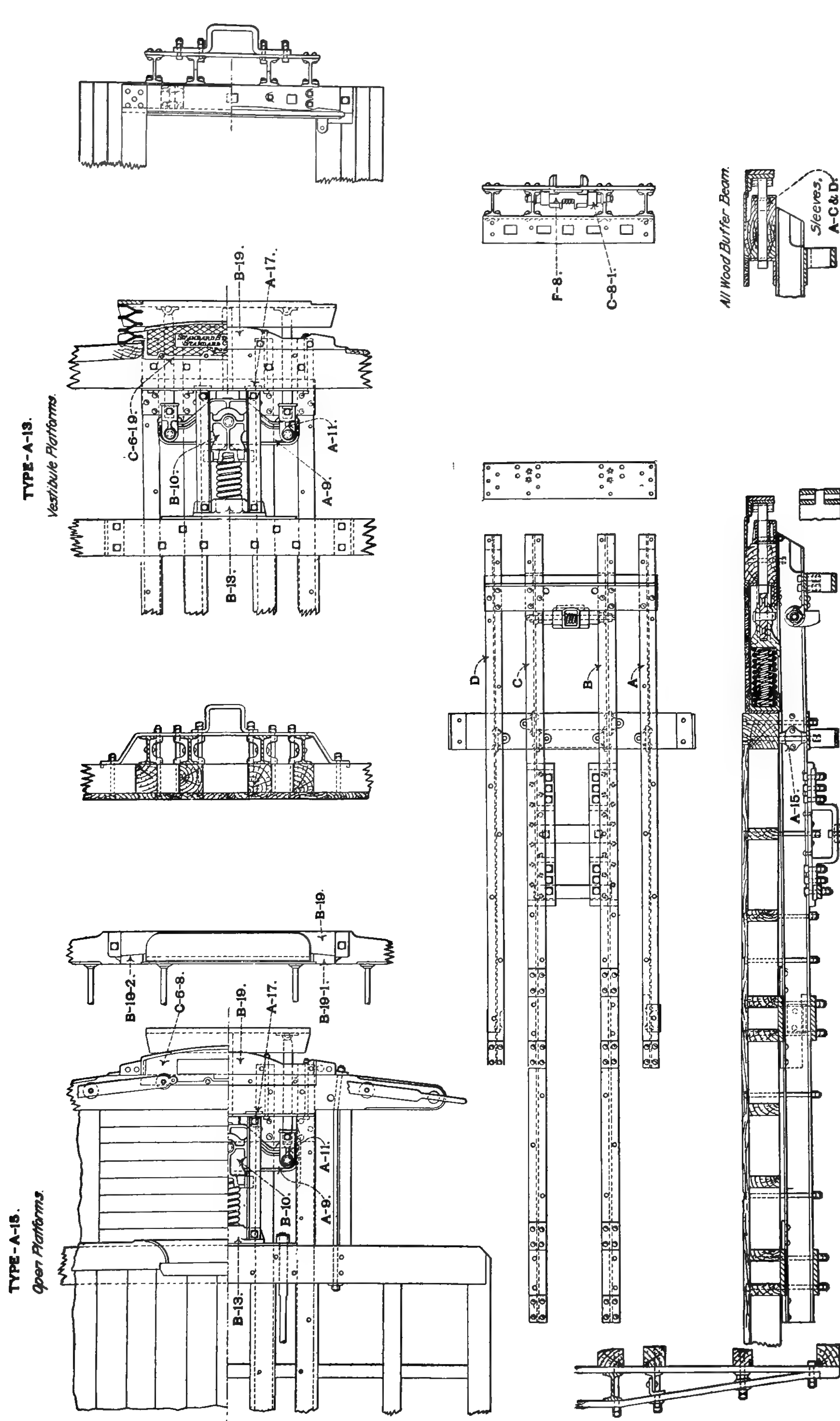


Fig. 519—Standard Steel Platforms for Vestibuled and Open End Platforms of Wooden Cars. Standard Coupler Company.

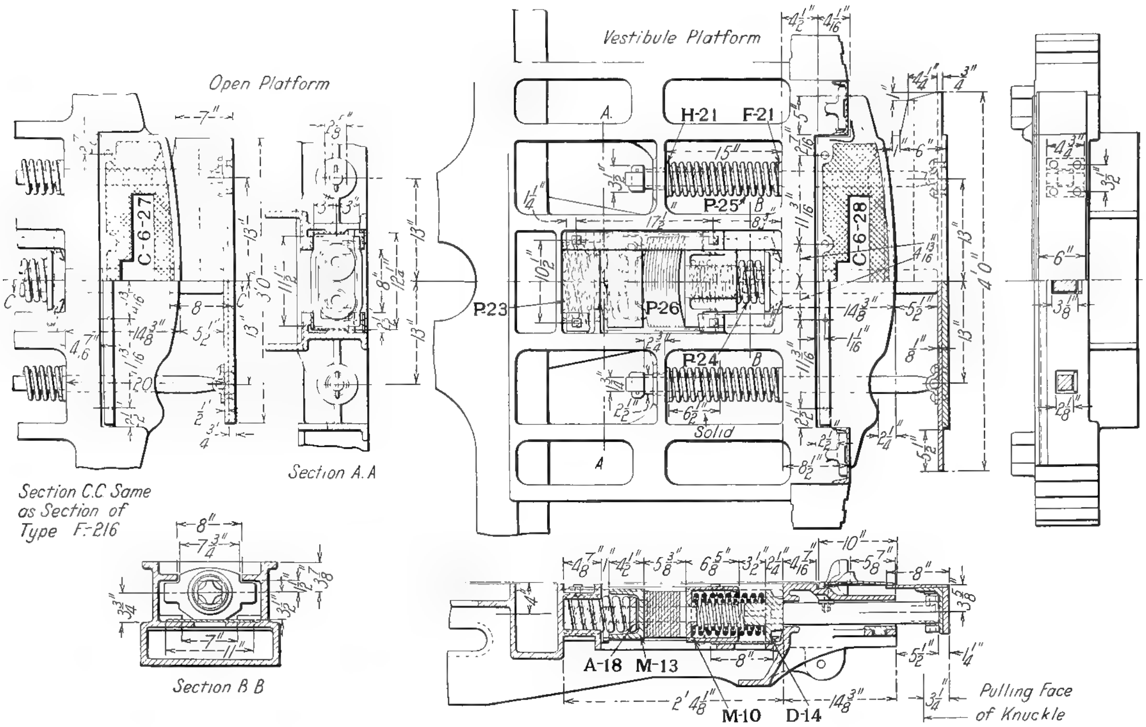


Fig. 520—Application of Standard Steel Buffers to Cast Steel Platforms. Standard Coupler Company

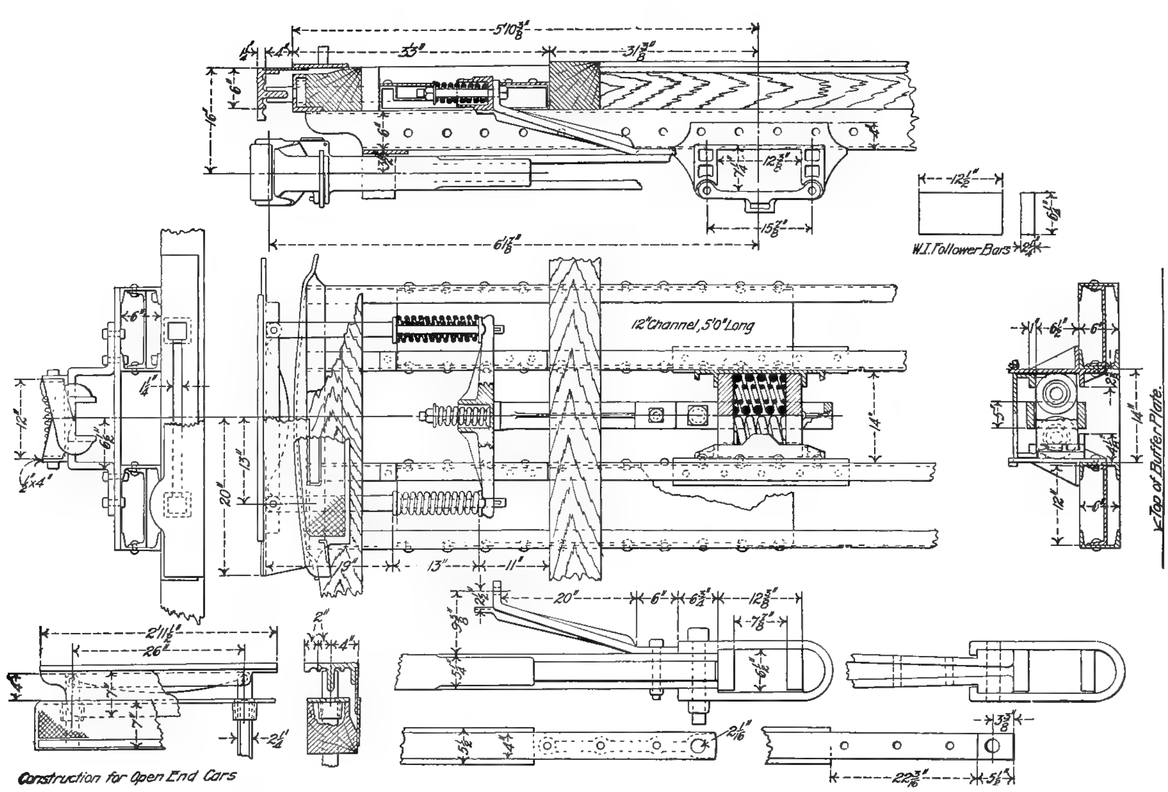


Fig. 521—National Steel Platform and Buffer with Hinson Twin Spring Draft Gear, for Vestibuled and Open End Cars. National Car Coupler Company.

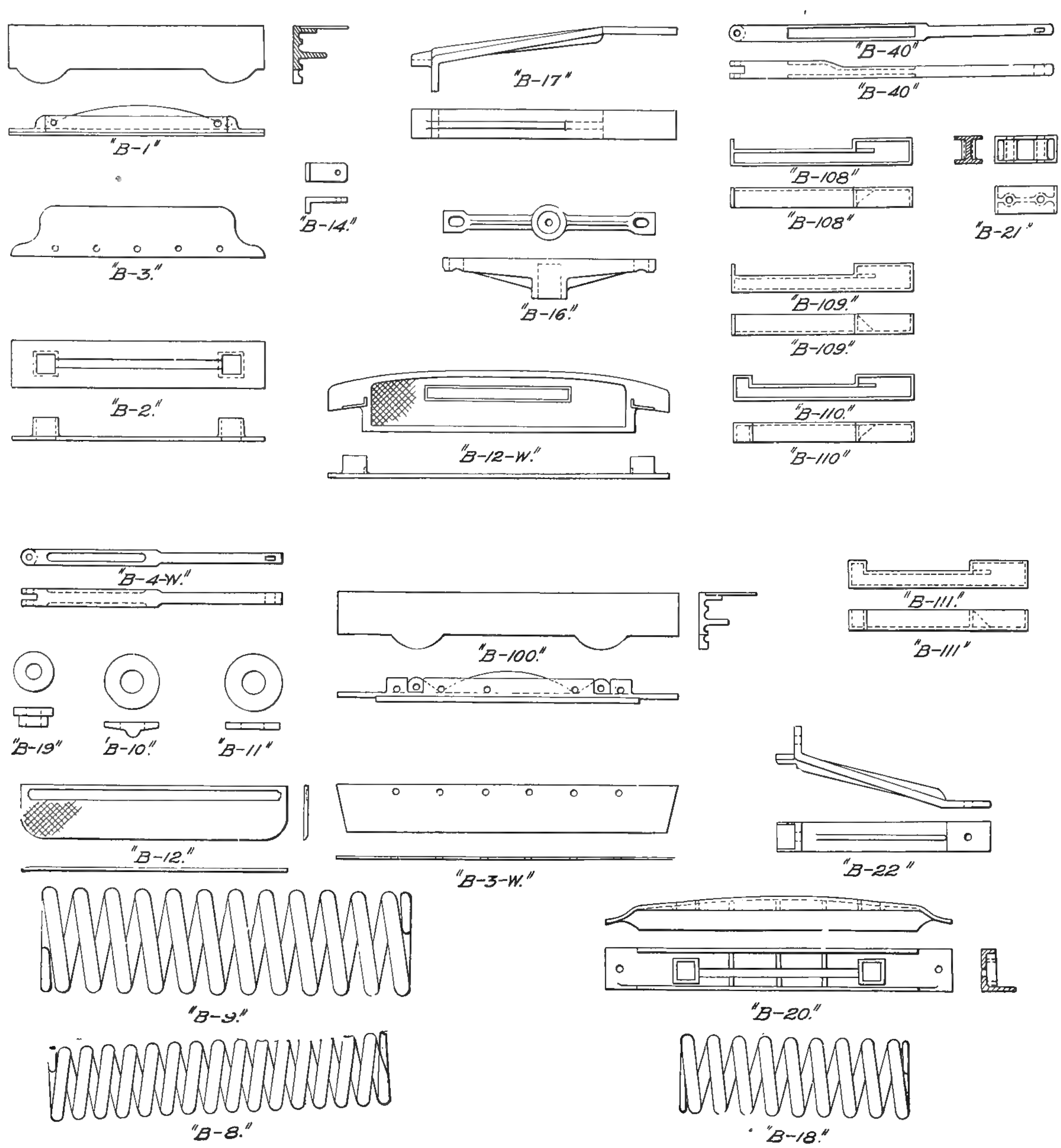


Fig. 522—Parts of National Steel Platform and Buffer. National Car Coupler Company.

B-1	*Buffer Plate*	**B-16**	*Buffer Yoke*
B-2	*Buffer Face Plate*	**B-17**	*Push Bar or Strut Beam*
B-3	*Sliding Foot Plate*	**B-18**	*Buffer Yoke Spring*
B-3-W	*Sliding Foot Plate*	**B-19**	*Buffer Yoke Spring Washer*
B-4-W	*Buffer Stem*	**B-20**	*Buffer Face Plate*
B-8	*Buffer Spring*	**B-21**	*Buffer Yoke Stop Block*
B-9	*Buffer Spring*	**B-22**	*Buffer Push Bar*
B-10	*Buffer Stem Washer*	**B-40**	*Buffer Stem*
B-11	*Buffer Stem Washer*	**B-108**	*Buffer Yoke Stop Block*
B-12	*Buffer Foot Plate*	**B-109**	*Buffer Yoke Stop Block*
B-12-W	*Buffer Foot Plate*	**B-110**	*Buffer Yoke Stop Block*
B-14	*Buffer Stem Key*	**B-111**	*Buffer Yoke Stop Block*

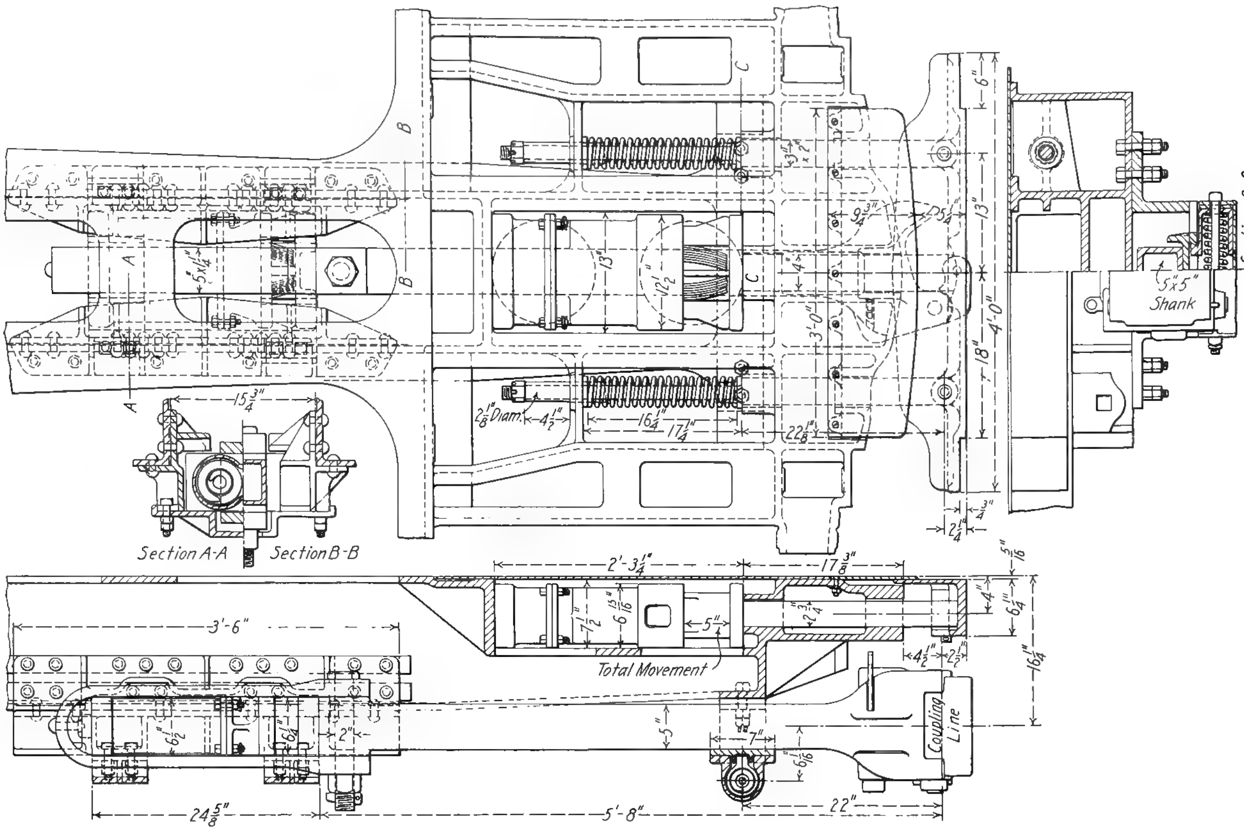


Fig. 523—Wide Vestibule Steel Platform with Cast Steel End Sill, Buffer, Coupler Rightener and Draft Gear. Gould Coupler Company.

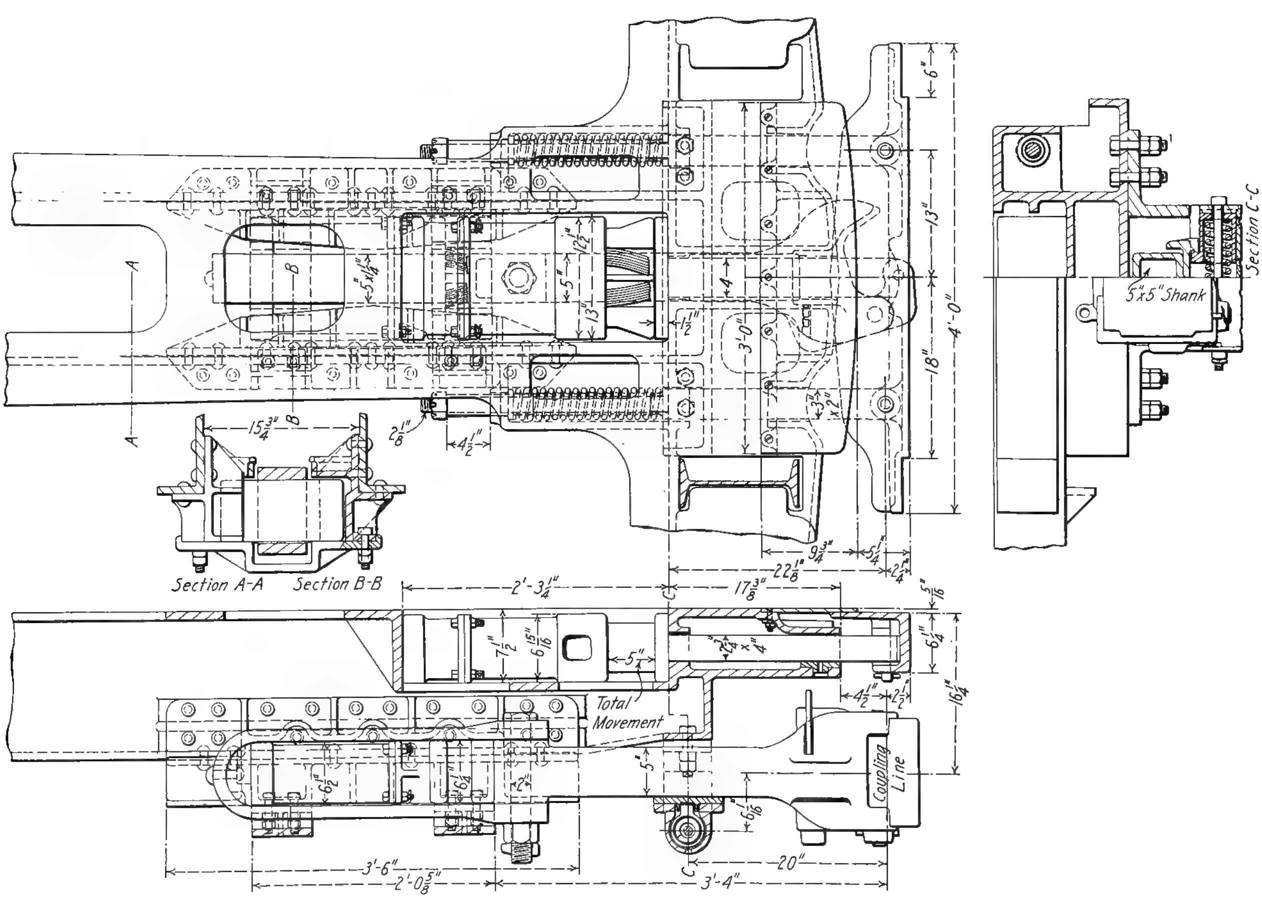


Fig. 524—Friction Buffer, Draft Gear, Coupler and Coupler Rightener Applied to Stub or Dummy End Cast Steel Platform. Gould Coupler Company.

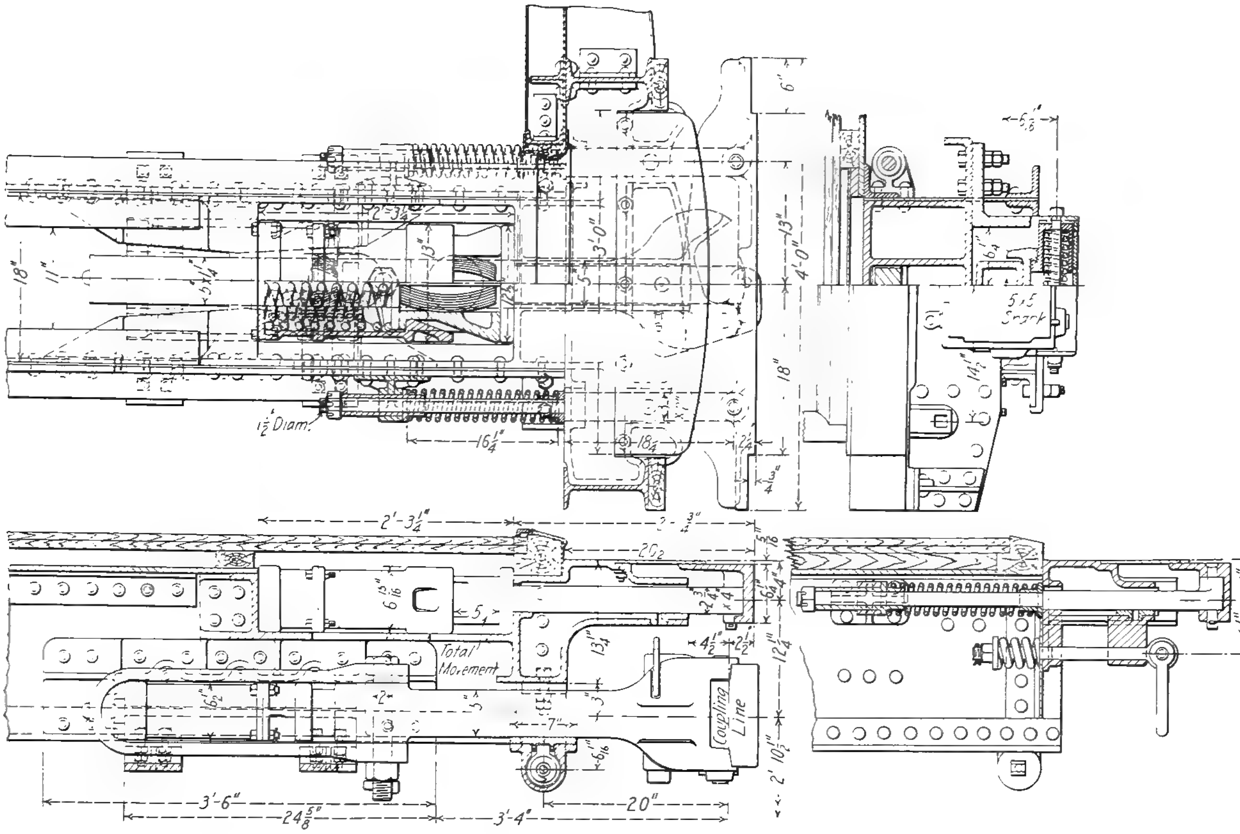


Fig. 525—Cast Steel End Sill-Buffer, Coupler Rightener and Draft Gear for U. S. Postal Car. Gould Coupler Company.

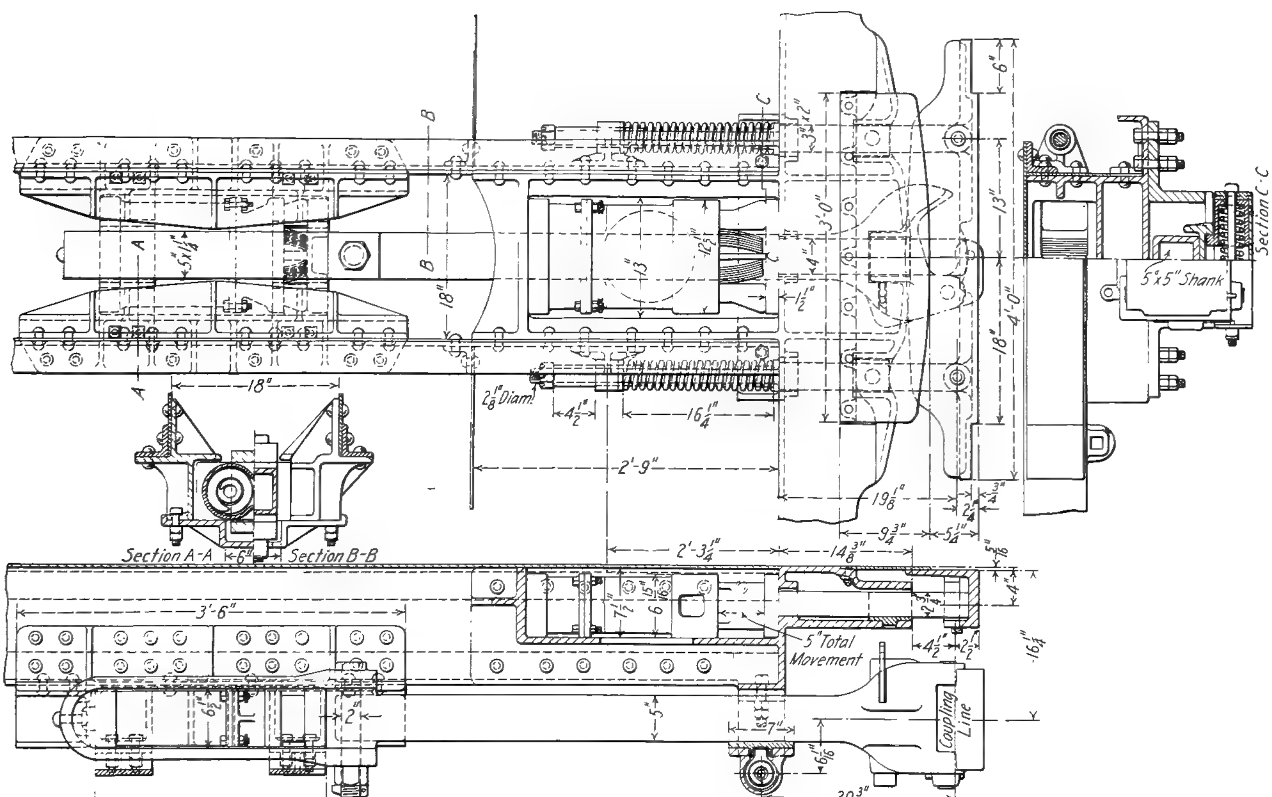


Fig. 526—Wide Vestibule Steel Platform with Cast Steel End Sill, Buffer, Coupler, Coupler Rightener and Draft Gear. Gould Coupler Company.

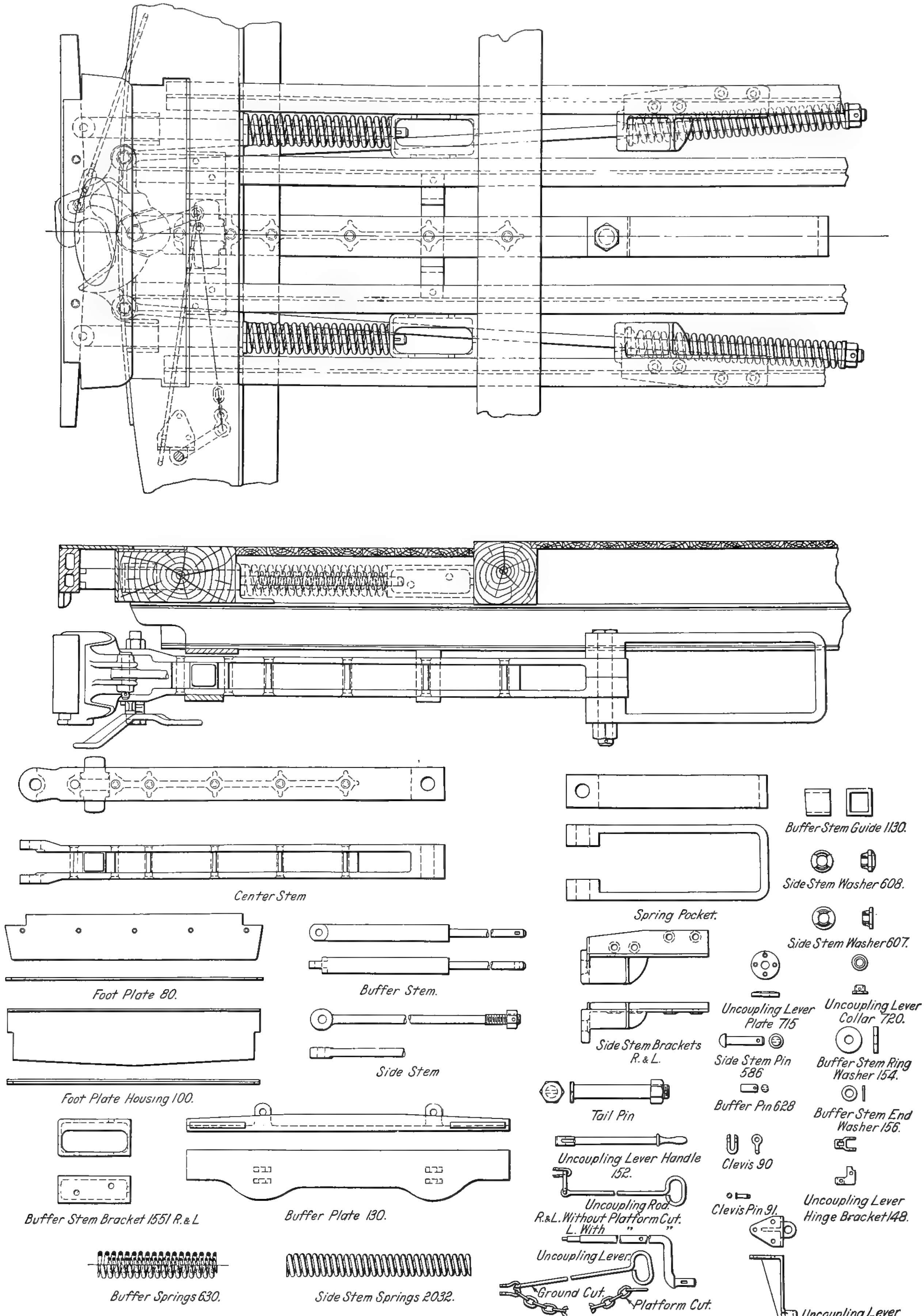


Fig. 527—Buhoup Three-Stem Equipment and Parts for Passenger Train Car Platforms. McConway & Torley Company.

Parts of Buhoup Wide Vestibule. See Fig. 528.

4	*Foot Plate*
6	*Spanner Bar, Lower*
8	*Curtain Plate, Front*
9	*Curtain Plate, Rear*
10	*Curtain Roller*
11	*Curtain*
12NP	*Post Plate, L and R*
20	*Curtain Bearing, Lower*
20A	*Curtain Bearing, Lower, Used with Standard Steel Platform*
21	*Curtain Bearing, Upper*
23	*Curtain Socket*
40	*Patent Plate*
44	*Curtain Spring, L and R*
45	*Curtain Roller Plug*
46	*Arch Plate and Buffer Spring*
49	*Arch Plate Band*
50	*Shield*
52	*Curtain Spring Plug, Large*
53	*Curtain Spring Plug, Small*
54	*Piston Stem*
79	*Buffer Plate for Standard Steel Platform*
80	*Foot Plate for Standard Steel Platform*
81	*Buffer Plate Spring*
91	*Arch Plate*
94	*Spanner Bar, Upper*
95	*Angle Connection, Top, R*
96	*Angle Connection, Top, L*
100	*Foot Plate Housing*
101	*Bulb Angle*
111	*Spanner Bar Bolt*
115	*Angle Connection, Bottom, R*
116	*Angle Connection, Bottom, L*
119	*Piston Stem Bracket*
120	*Piston Stem Guide*
123	*Accordion Hood Band*
124	*Accordion Hood*
125	*Hood Brace Bracket, Front, R*
126	*Hood Brace Bracket, Front, L*
127	*Hood Brace Bracket, Rear, R*
128	*Hood Brace Bracket, Rear, L*
129	*Hood Brace*
130	*Buffer Plate*
134	*Foot Plate Bolt*
154	*Piston Stem Spring*
155	*Piston Stem Washer*
156	*Piston Stem Ferrule*
628	*Buffer Plate Pin*

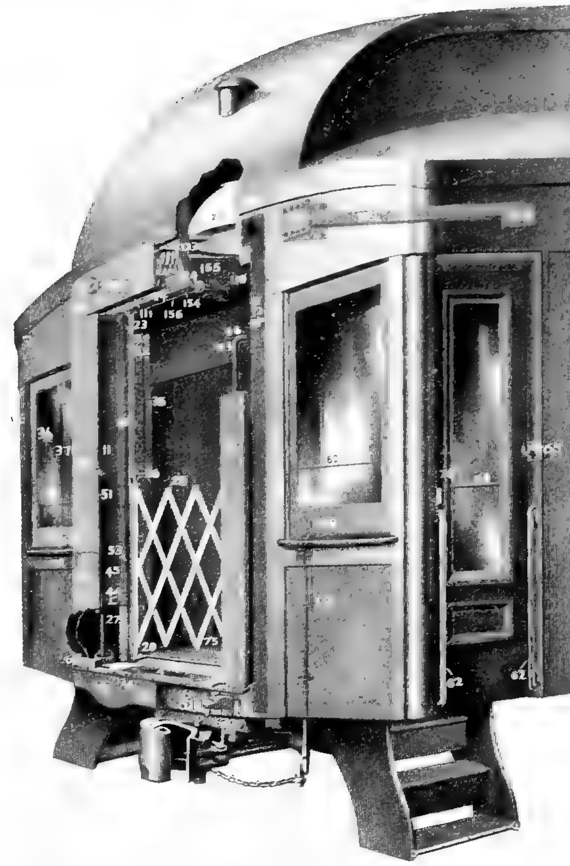


Fig. 528- Buhoup Wide Vestibule McConway & Torley Company.

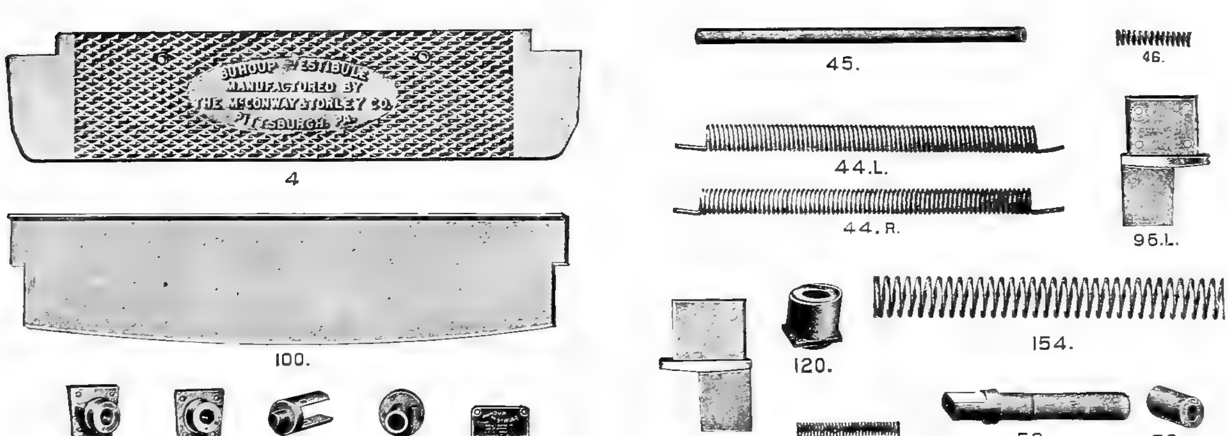


Fig. 529—Details of Buhoup Wide Vestibule. See also Figs. 528, 530 and 531 and Names of Parts on This Page.

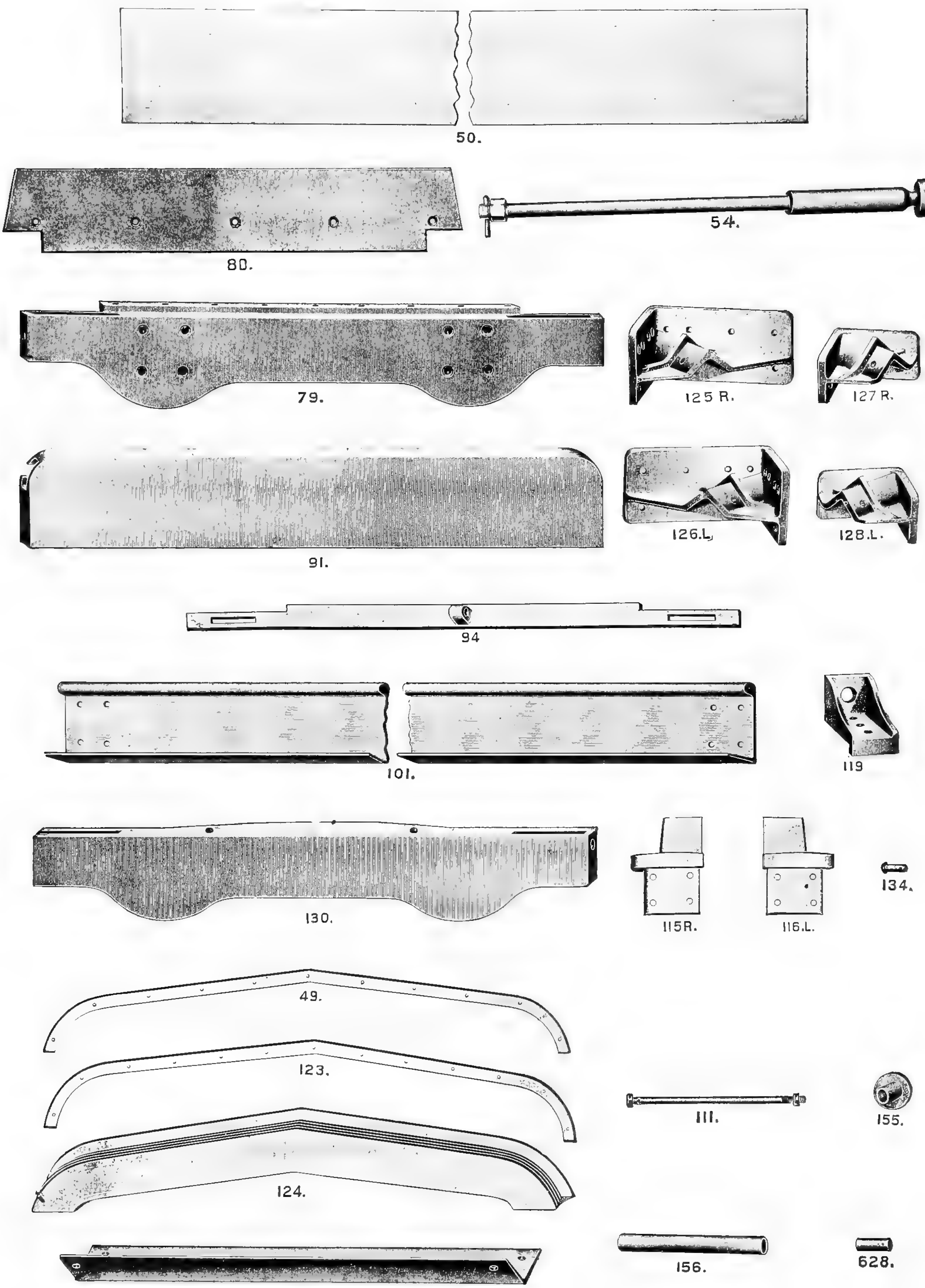


Fig. 530—Details of Buhoup Wide Vestibule. See also Figs. 528, 529 and 531 and Names of Parts on Page 427. McConway & Torley Company.

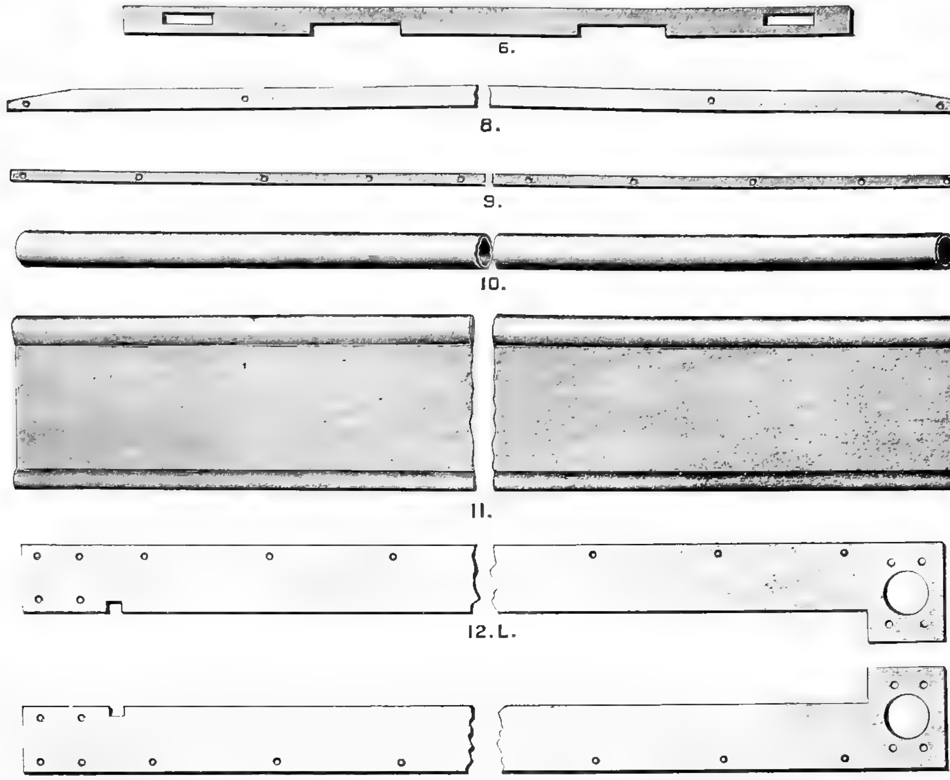


Fig. 531—Details of Buhoup Wide Vestibule. See also Figs. 528, 529 and 530 and Names of Parts on Page 427.

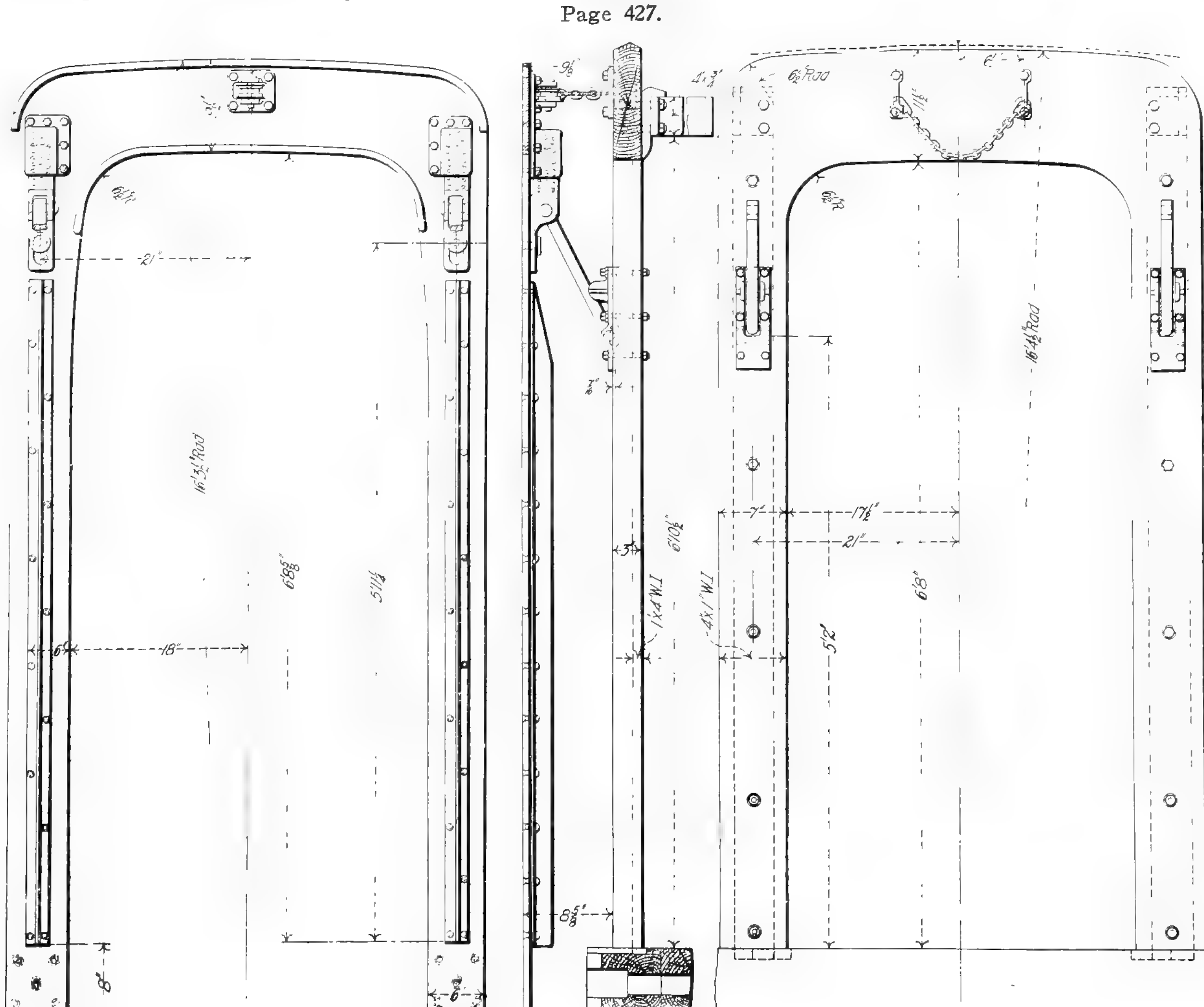


Fig. 532—Gould Vestibule Face Plate. Gould Coupler Company.

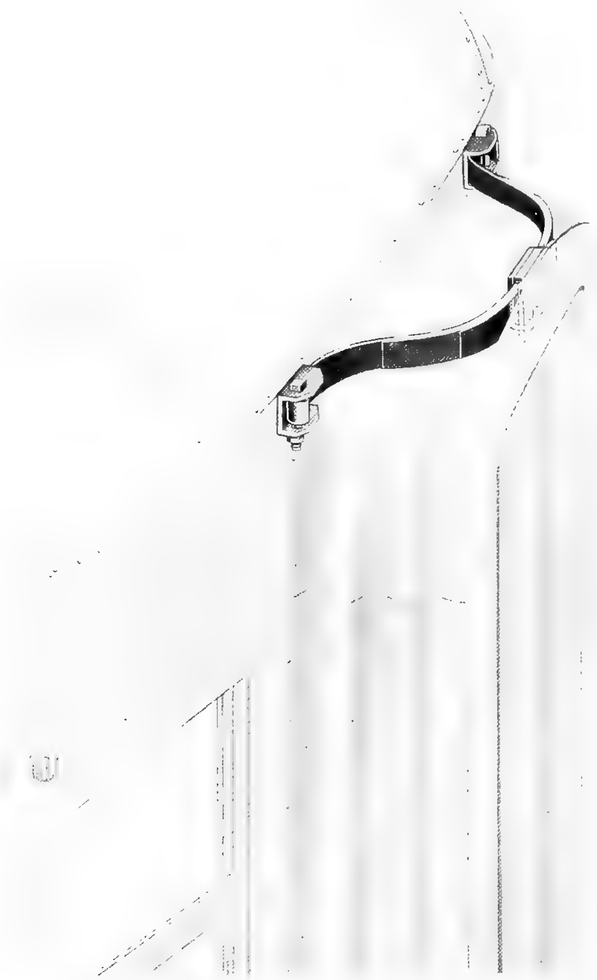
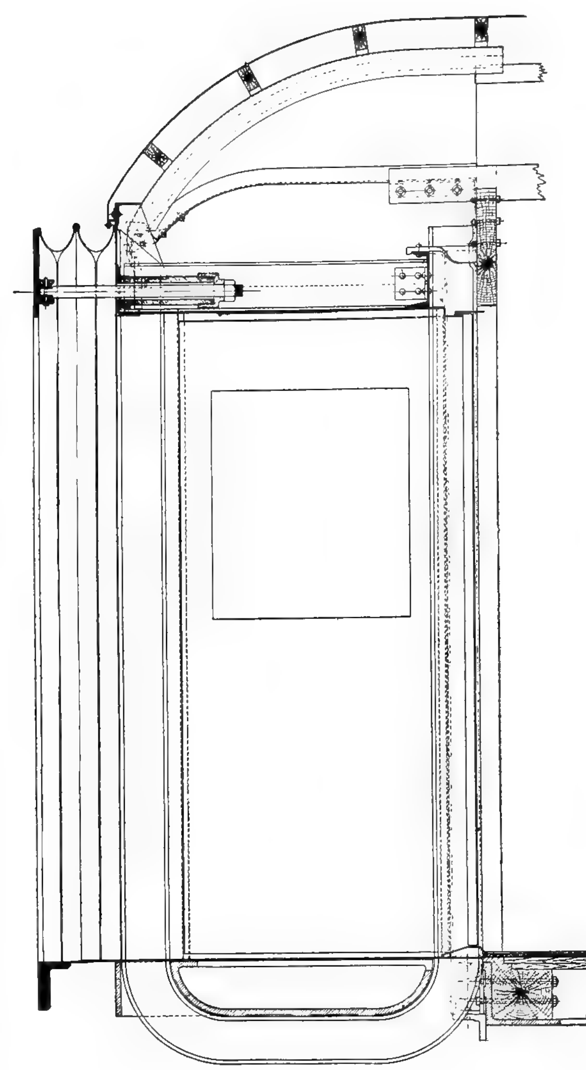


Fig. 533—Fowler Upper Buffer Spring. Imperial Appliance Company.



No. 534—End Construction Used on Pullman Wide Vestibule Cars.

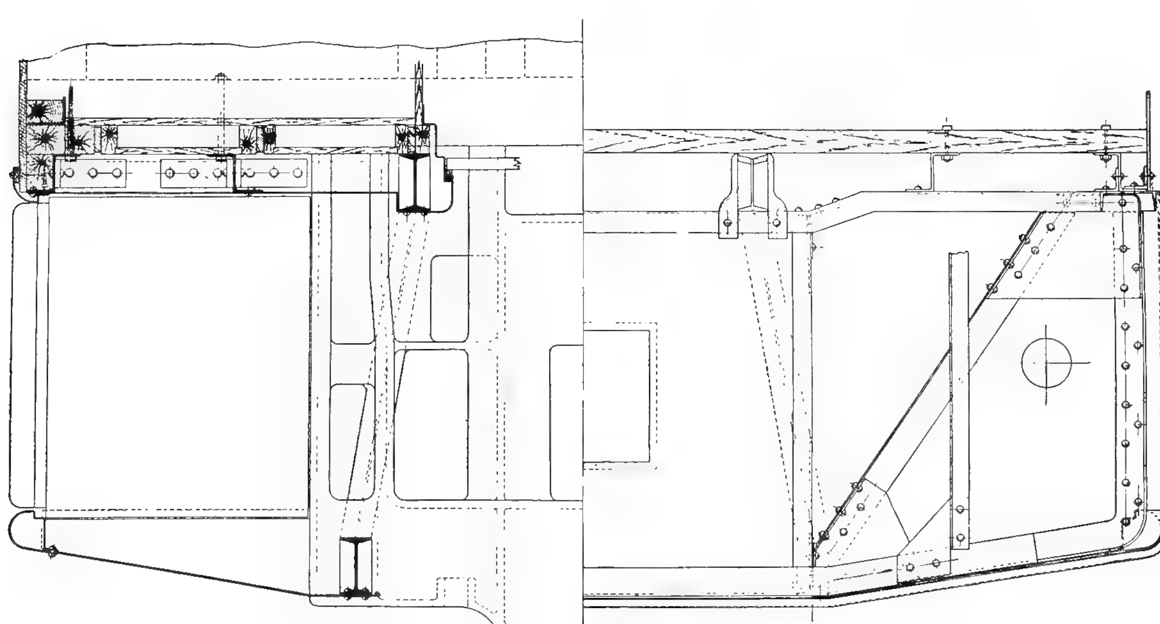


Fig. 535—Plan Views Showing Pullman End Construction for Wide Vestibule Cars.

Fig. 536—Acme Simplex Sectional "T" Iron Diaphragm. Acme Supply Company.

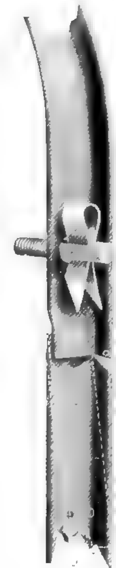


Fig. 537—Flexible Joint of Acme Diaphragm Attachment.

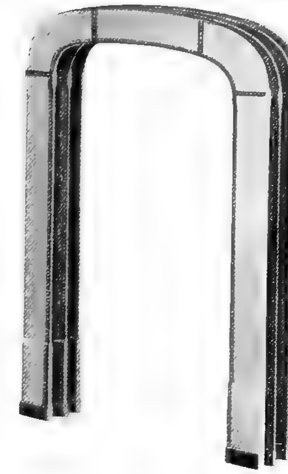


Fig. 538—Acme Vestibule Diaphragm. Acme Supply Company.

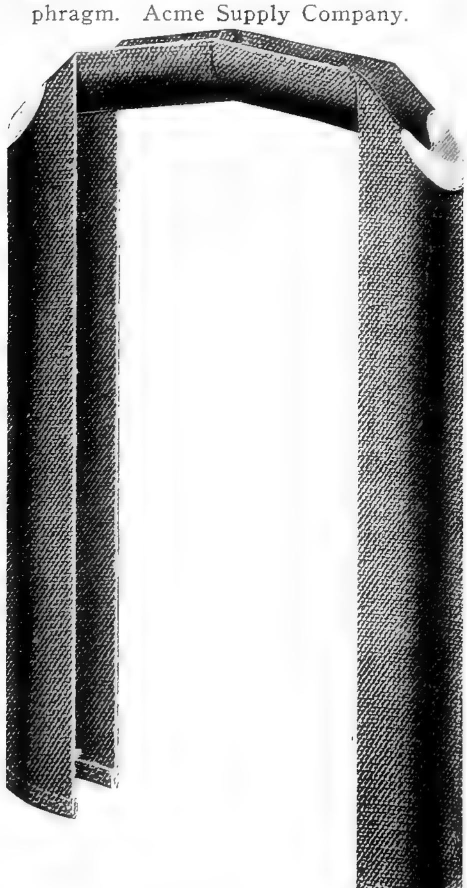


Fig. 539—Acme Reverse Unifold Diaphragm. Acme Supply Company.

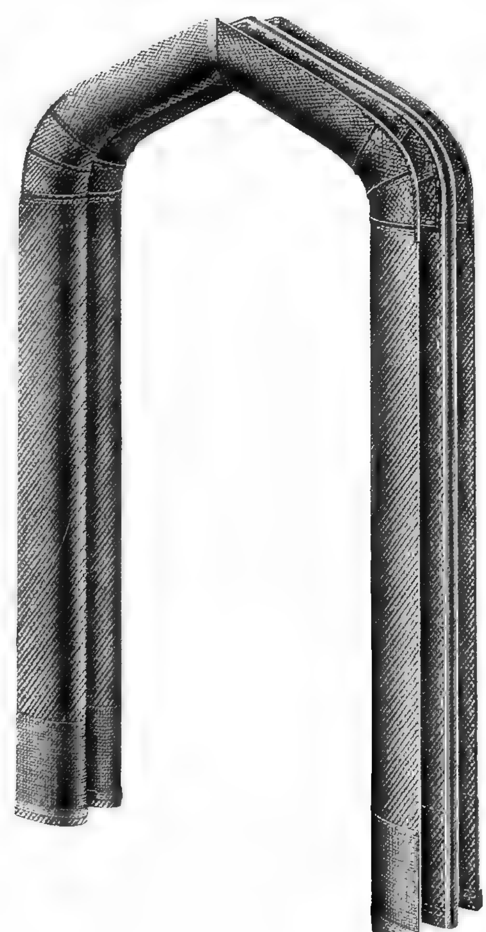


Fig. 540—Acme Apex Simplex "T" Iron Diaphragm. Acme Supply Company.

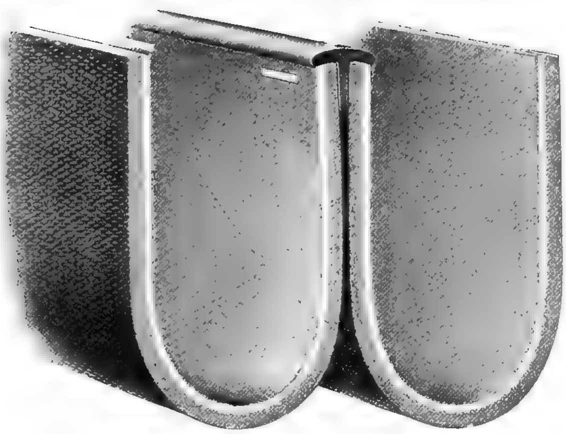


Fig. 541—Section Through Top of Acme Simplex "T" Iron Diaphragm (Double Fold), Showing "T" Iron Reinforcement and Asbestos Woven Fireproof Belting. Acme Supply Company.

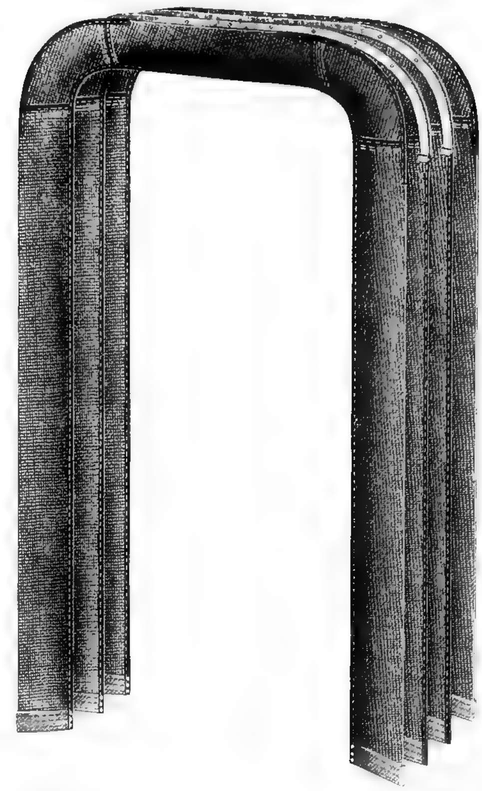


Fig. 542—CSCO Standard Six-Plait Vestibule Diaphragm, Fire and Waterproofed. Curtain Supply Company.

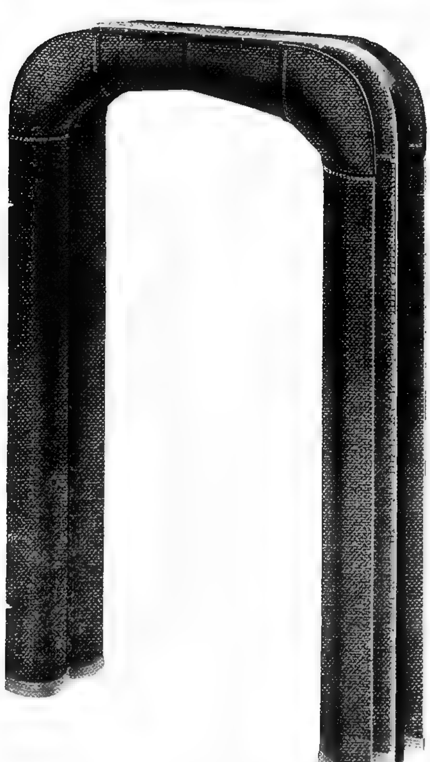


Fig. 543—Rex U-Shape Sloping Top Vestibule Diaphragm, Fire and Waterproofed.

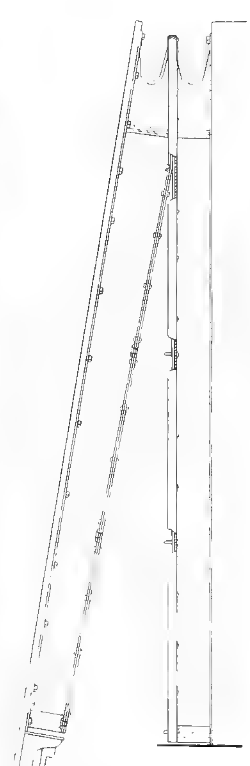


Fig. 544—Rex U-Shape Diaphragms with Open Plait to Swing Out with Face Plates.

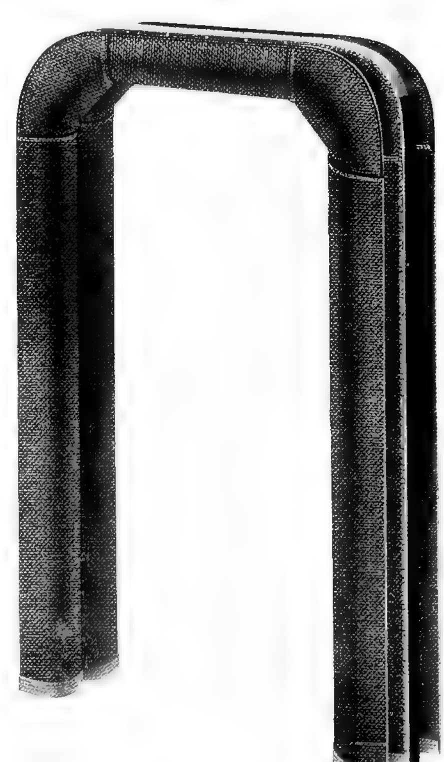


Fig. 545—Rex U-Shape Flat Top Vestibule Diaphragm, Fire and Waterproofed.

Curtain Supply Company.

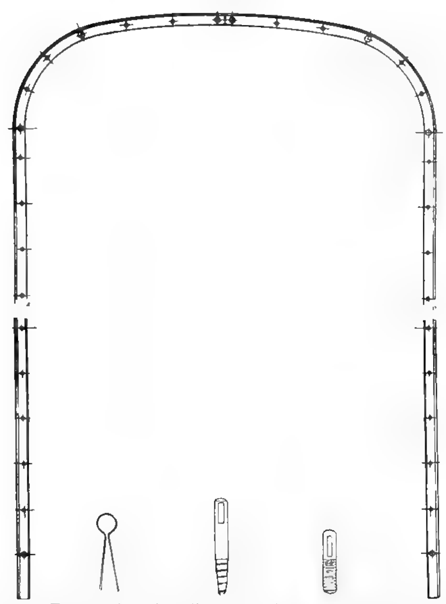
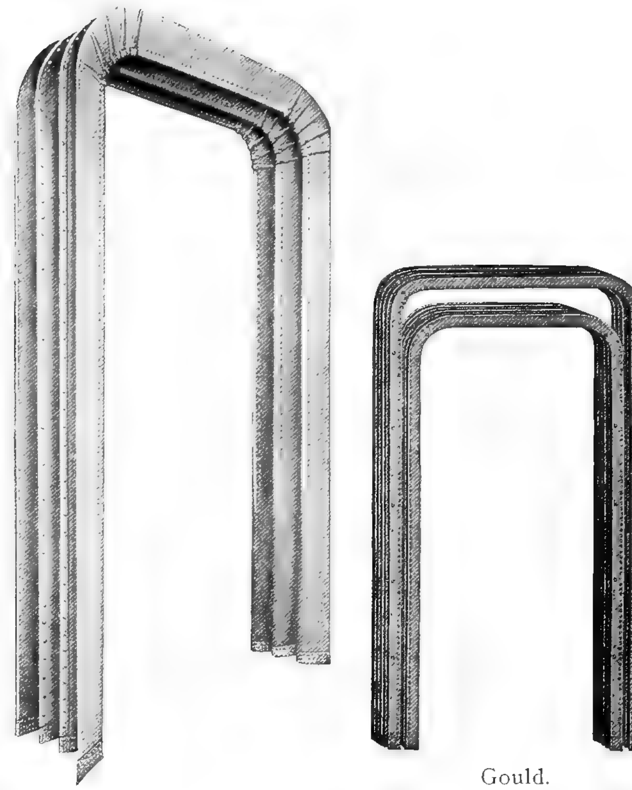


Fig. 546—Rex Angle Iron Diaphragm Attachments with Slotted Posts and Spring Keys. Curtain Supply Company.



Gould.

One-Piece; Corrugated Corners.

Fig. 547—Ajax Vestibule Diaphragms. The Q & C Company.

American Car & Foundry. Pullman.

Fig. 548—Ajax Vestibule Diaphragms. The Q & C Company.

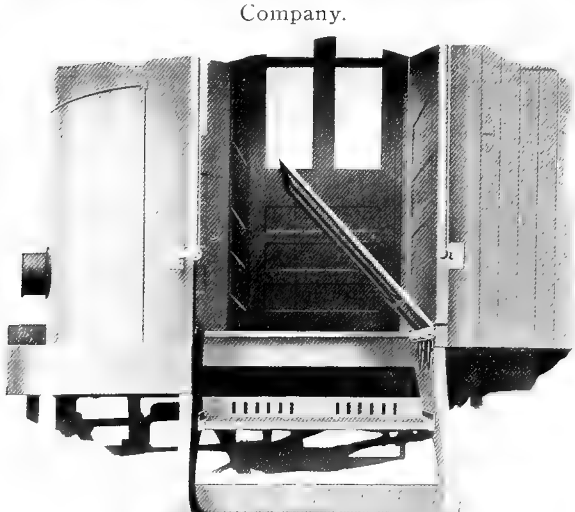


Fig. 549—National Steel Trap Door, Interurban Type. Transportation Utilities Company.

Fig. 550—National Steel Trap Door and Lifting Device, with Door Raised to 45 Degrees. Transportation Utilities Company.

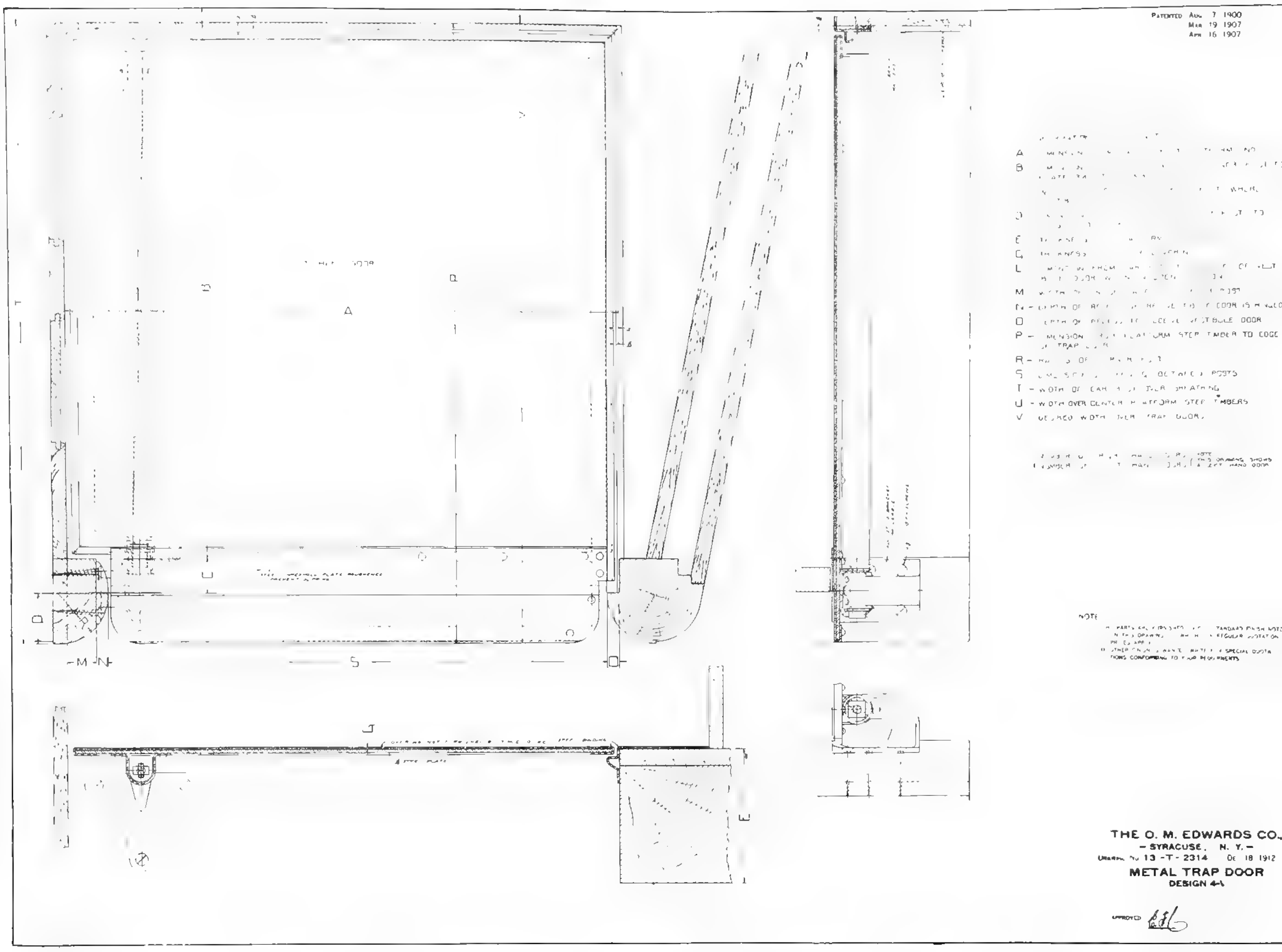


Fig. 551—Edwards Trap Door for Elevated Station Platforms. O. M. Edwards Company.

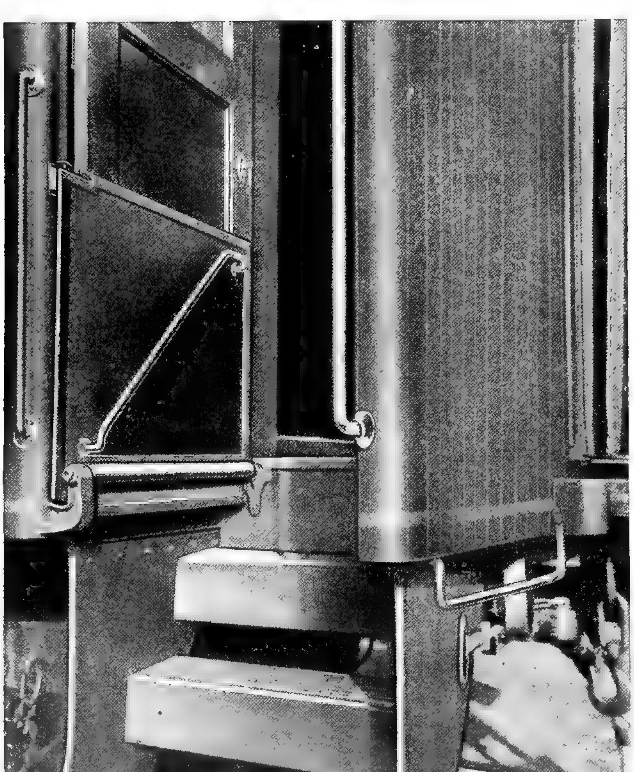


Fig. 552—Edwards Metal Trap Door for Elevated Station Platforms; Door Open.

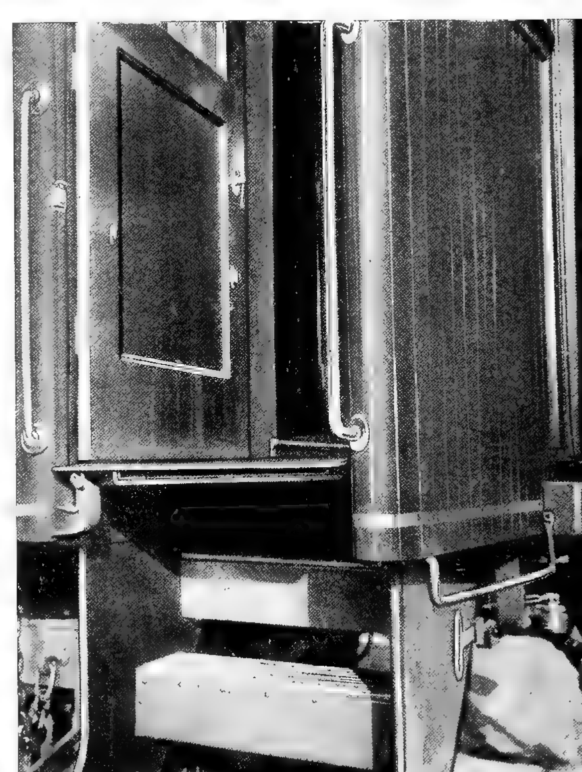


Fig. 553—Edwards Metal Trap Door for Elevated Station Platforms; Door Closed.

O. M. Edwards Company.

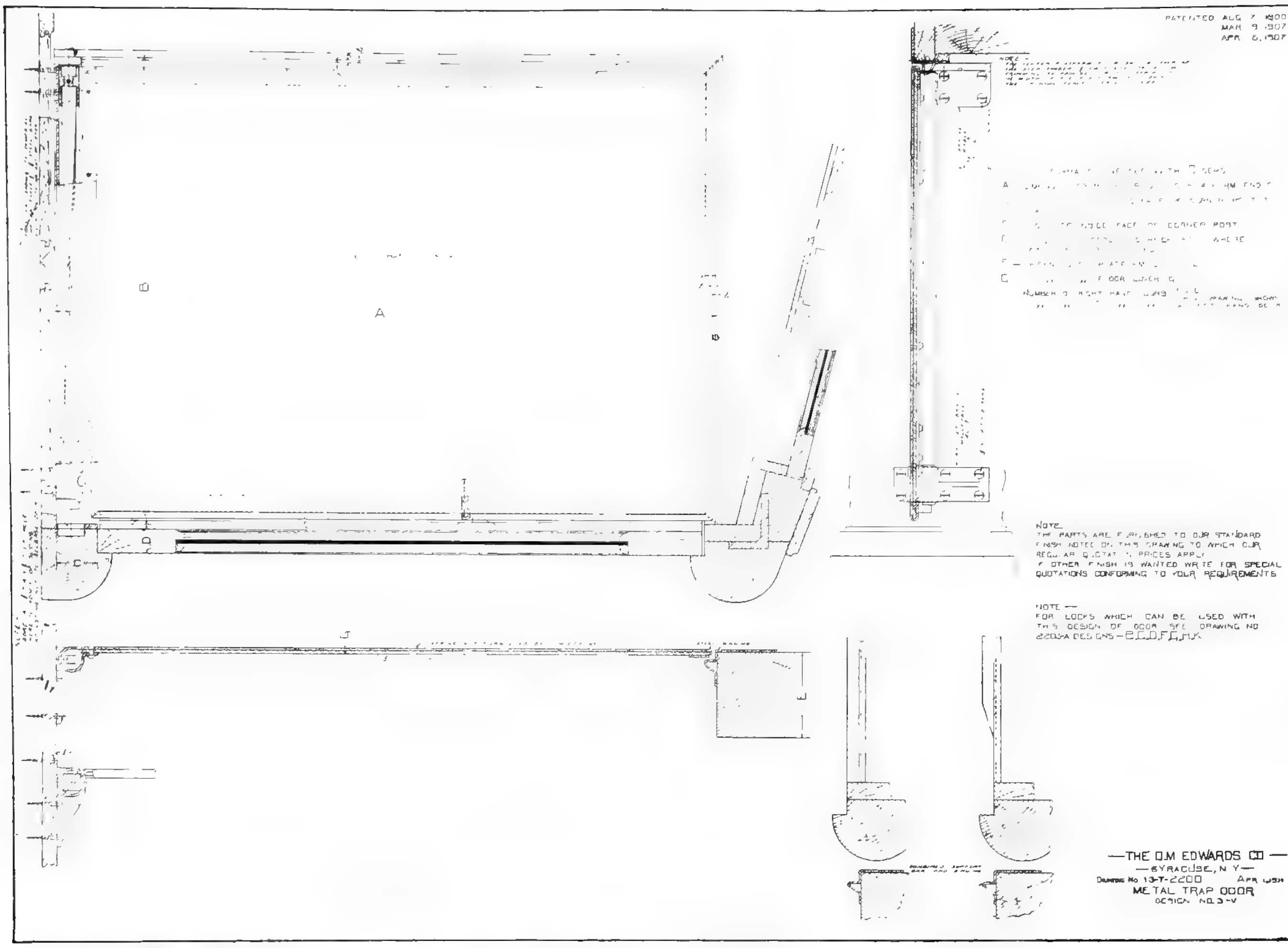


Fig. 554—Edwards Metal Trap Door for Grade Level Platforms. O. M. Edwards Company.

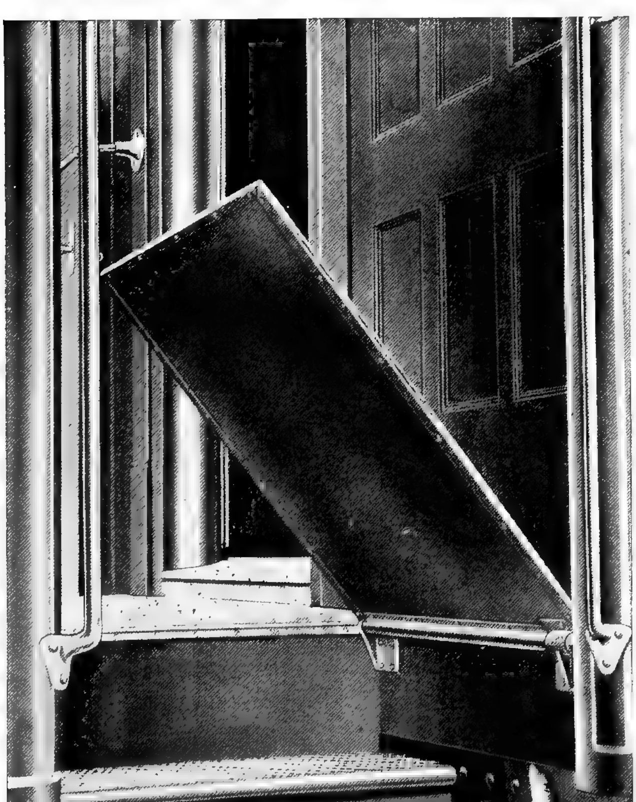


Fig. 555—Edwards Metal Trap Door, Grade Level Type. O. M. Edwards Company.

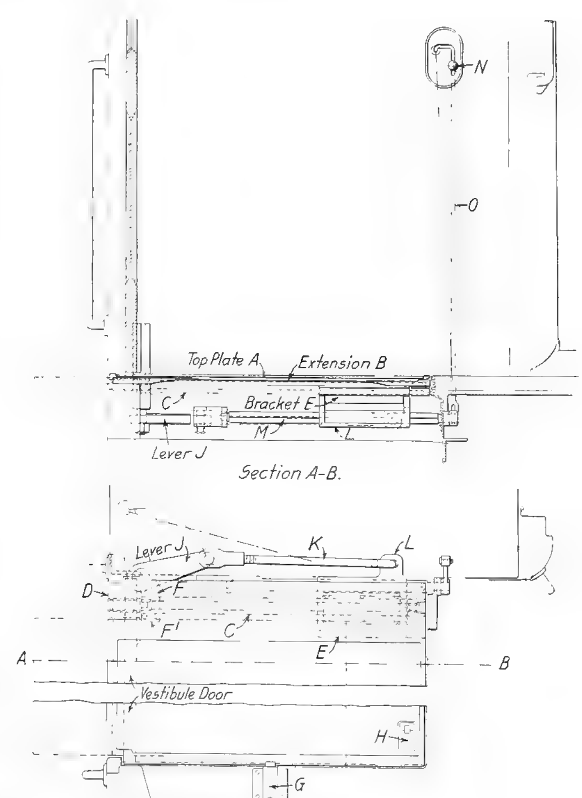


Fig. 556—Sickles Extensible Trap Door as Applied to a Pennsylvania Railroad Coach.

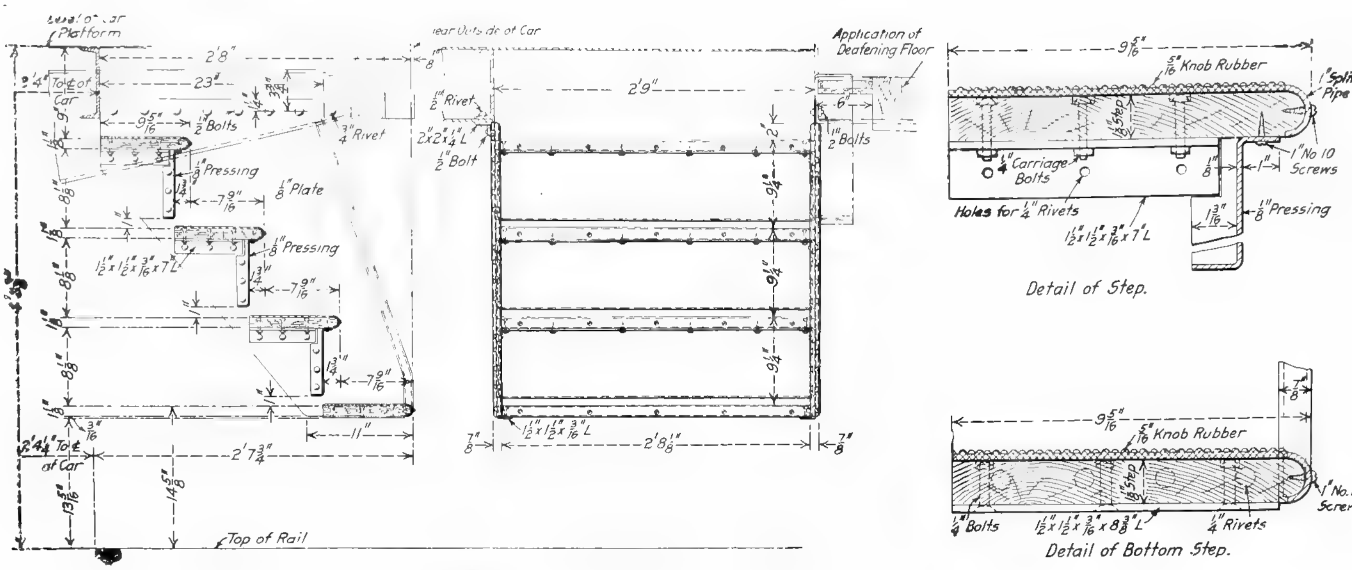


Fig. 557—Four-Tread Coach Step Used on the Grand Trunk.

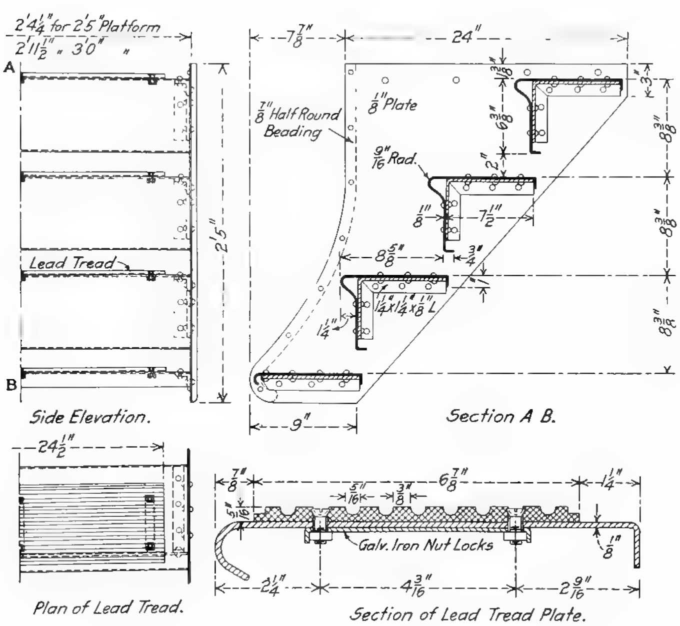


Fig. 558—Steel Coach Step Used on the Canadian Pacific.

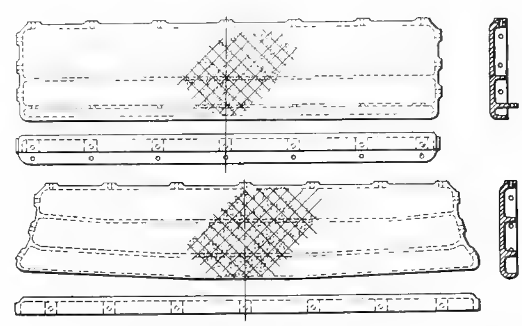
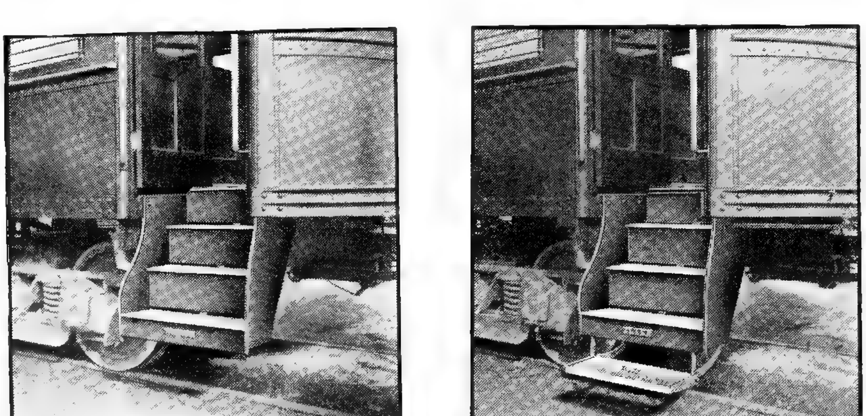


Fig. 559—Feralun Safety Treads for Pennsylvania Railroad Steel Cars. American Abrasive Metals Company.



Figs. 560 and 561—Blake Step in Raised and Lowered Positions. Blake Car Step Works.

Fig. 562—Feralun Safety Tread Applied to Car Steps. American Abrasive Metals Company.

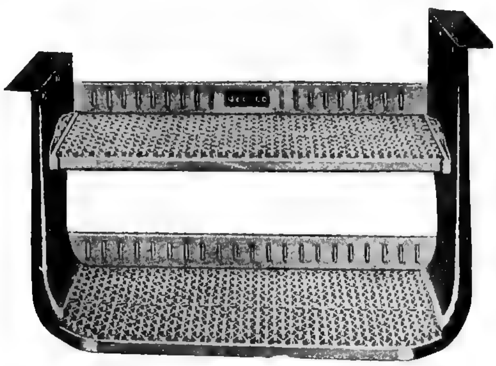


Fig. 563—Stanwood Self-Cleaning, Non-Slipping. Double Car Step. American Mason Safety Tread Company.

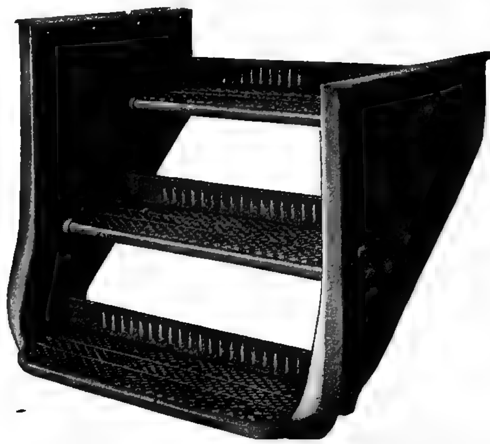


Fig. 564—Stanwood Self-Cleaning, Non-Slipping, Triple Car Step. American Mason Safety Tread Company.

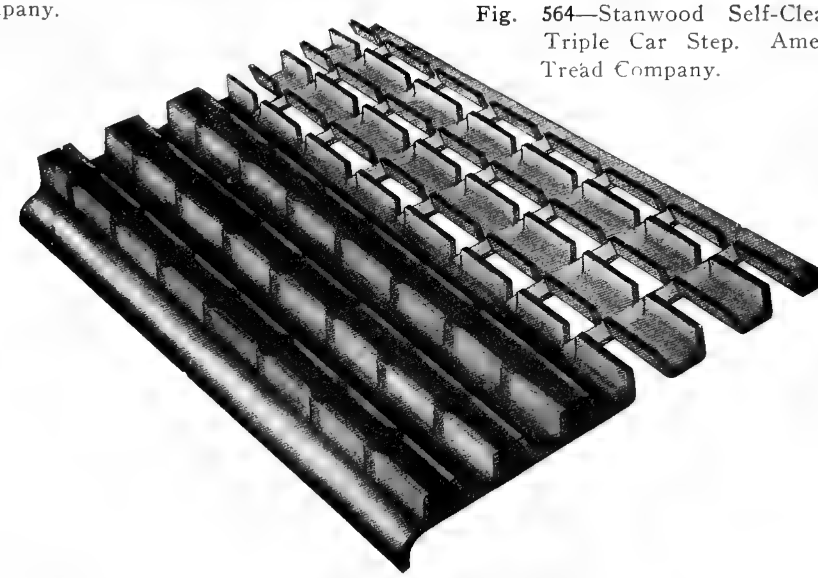


Fig. 565—Universal Safety Tread, Showing Steel Base Before and After Lead is Rolled In. Universal Safety Tread Company.

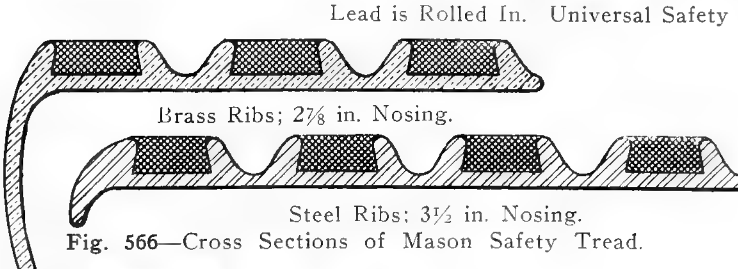


Fig. 566—Cross Sections of Mason Safety Tread.

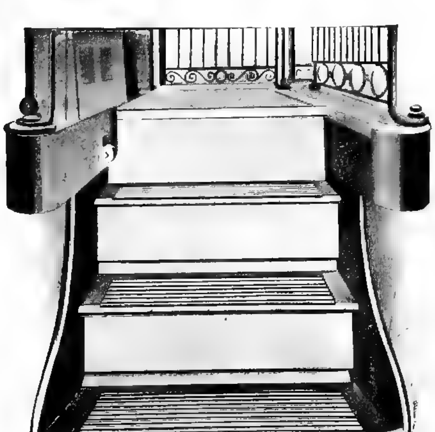


Fig. 567—Mason Safety Tread Applied to Steps of Pullman Car.

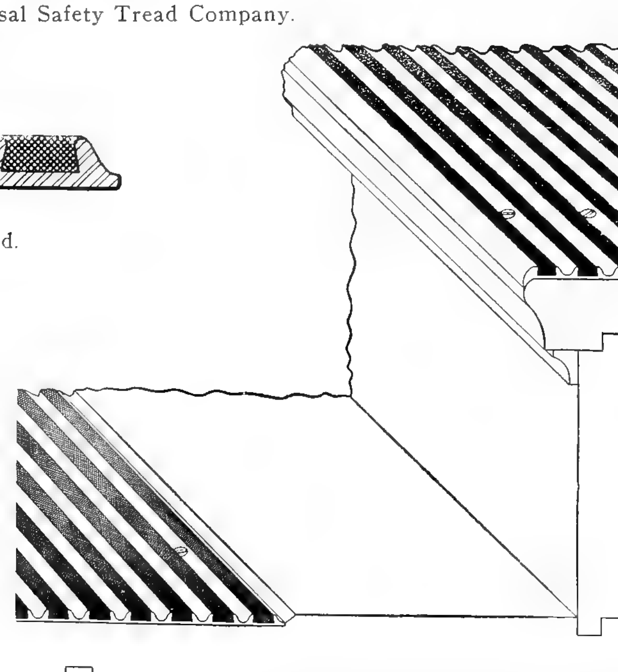


Fig. 568—Mason Safety Tread Applied to Wooden Car Steps. Upper Tread Carborundum Filled; Lower Tread Lead Filled.

American Mason Safety Tread Company.

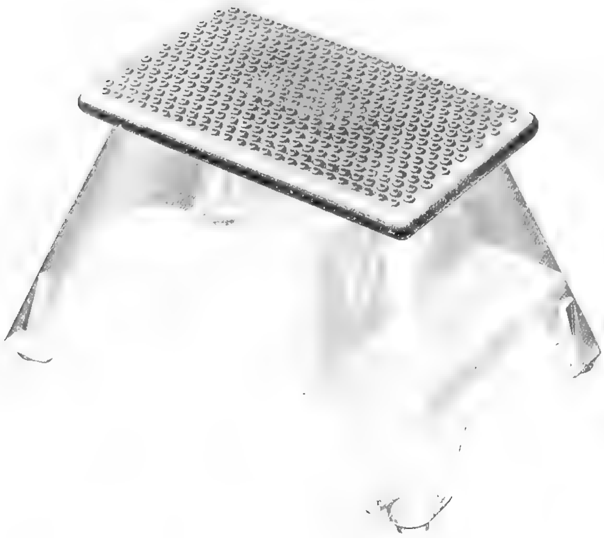


Fig. 569—Acme Safety Step Box. Acme Supply Company.

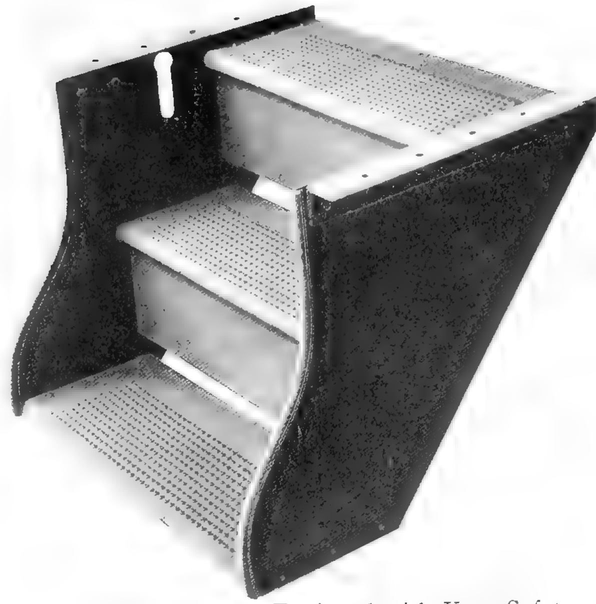


Fig. 570—Steel Step Equipped with Kass Safety Treads. Acme Supply Company.

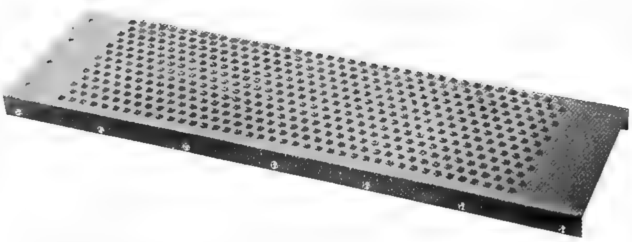


Fig. 571—Kass Safety Step Tread for Application to Steps Now in Service. Acme Supply Company.

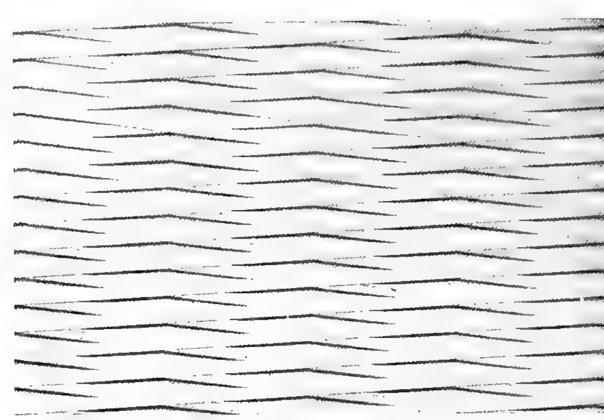


Fig. 574—Firmtread Steel Floor Plate for Vestibules, etc. Joseph T. Ryerson & Son.

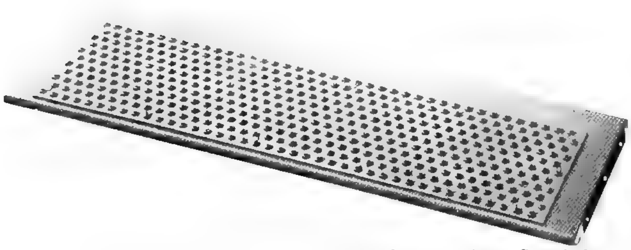


Fig. 572—Kass Safety Tread Step with Straight Drop Front and Back. Acme Supply Company.

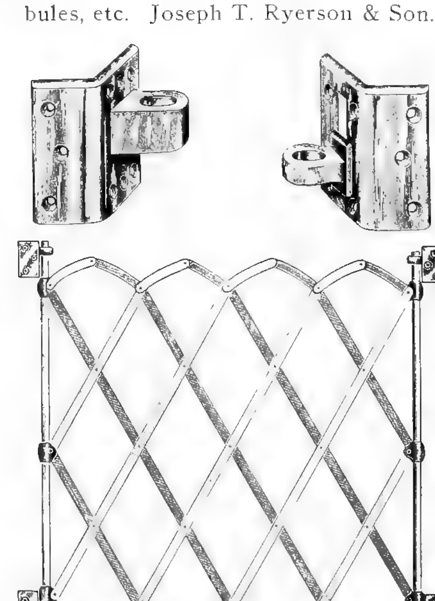


Fig. 575—Tail Gate and Fixtures. Dayton Manufacturing Company.

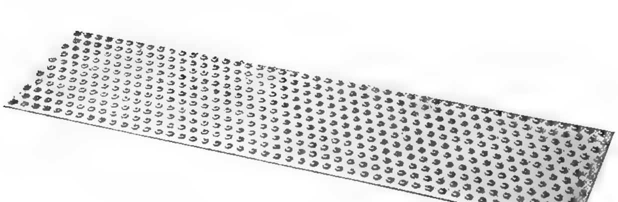


Fig. 573—Kass Safety Tread Step with Round Nose. Acme Supply Company.

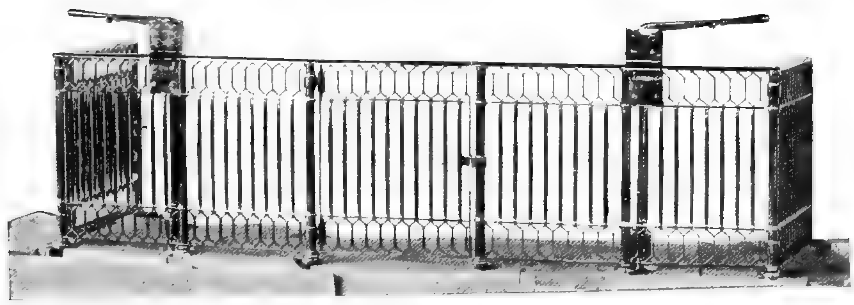


Fig. 576—Observation Platform Railing. Adams & Westlake Company.

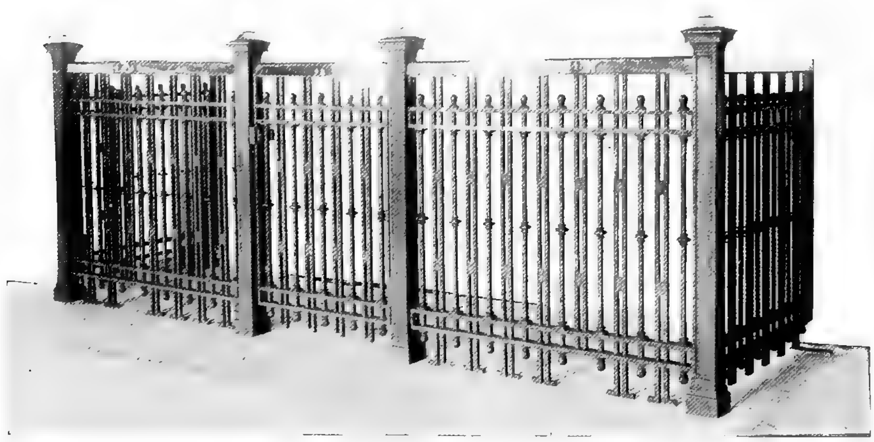


Fig. 577—Observation Platform Railing. Adams & Westlake Company.

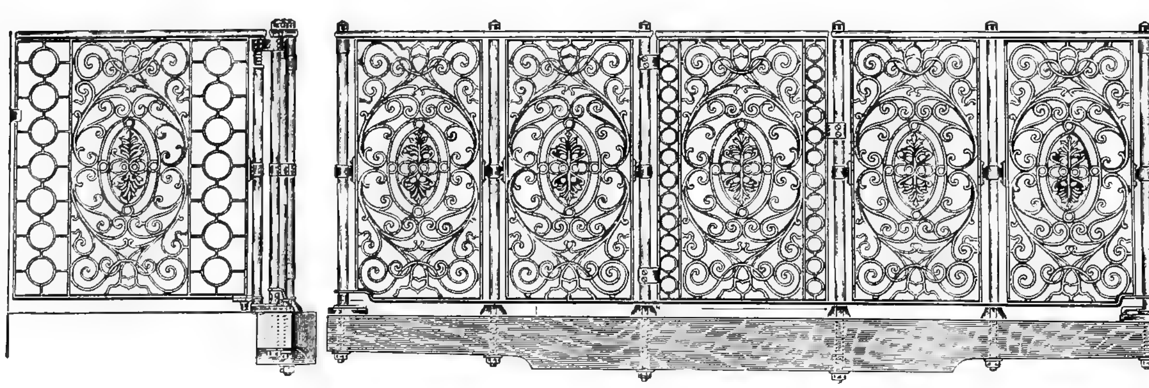


Fig. 578—Observation Platform Railing. Dayton Manufacturing Company.

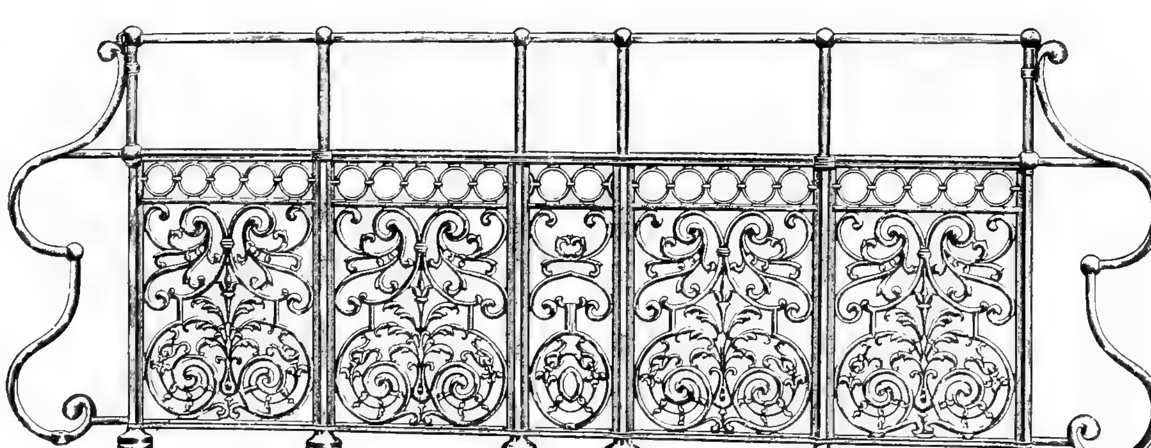


Fig. 579—Platform End Railing. Dayton Manufacturing Company.

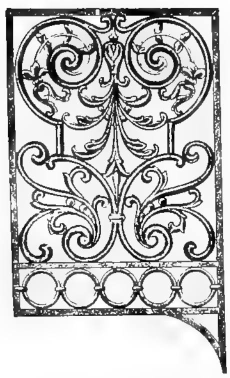


Fig. 580—Platform Gate Panel. Adams & Westlake Company.

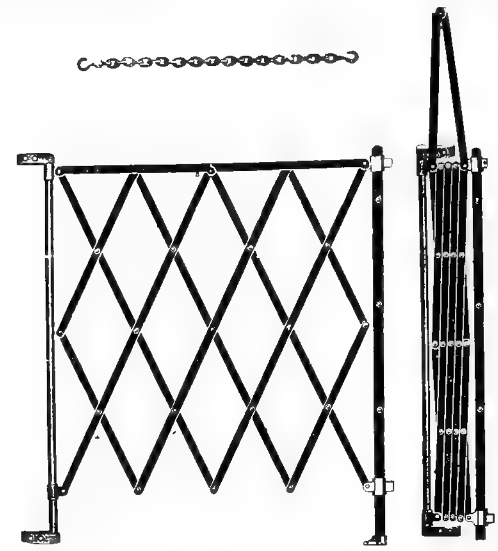


Fig. 581—Folding Platform Tail Gate. Adams & Westlake Company.

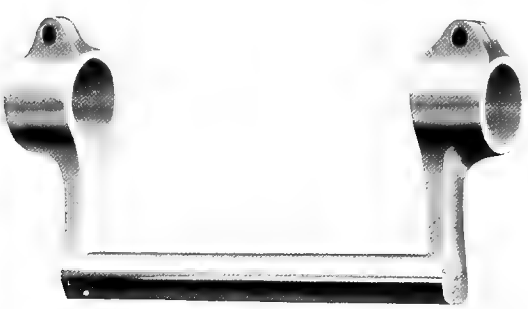


Fig. 582—Acme Vestibule Curtain Handle. Type A. Acme Supply Company.

Fig. 583—Acme Vestibule Curtain Handle. Type B. Acme Supply Company.

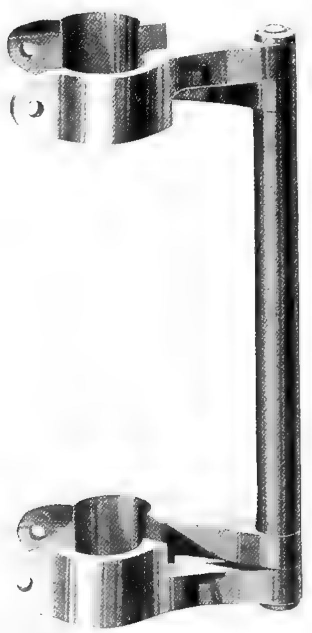


Fig. 584—Acme Vestibule Curtain Handle. Type C. Acme Supply Company.

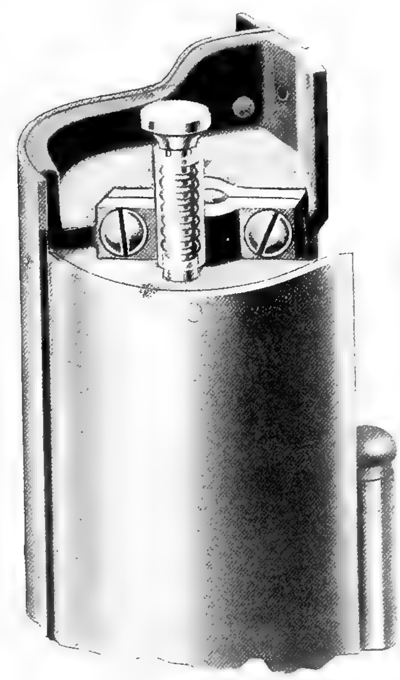


Fig. 585—Acme Revolving Vestibule Curtain Shield; Top View of Casing with Revolving Shield Closed. Acme Supply Company.

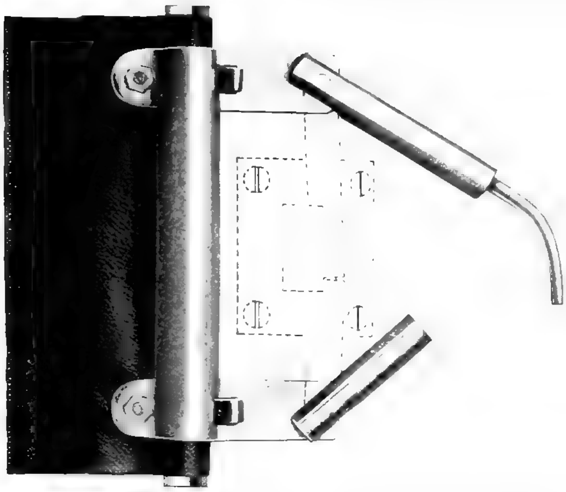


Fig. 586—Rycco Vestibule Curtain Release Handle, Open. Railway Supply & Curtain Company.

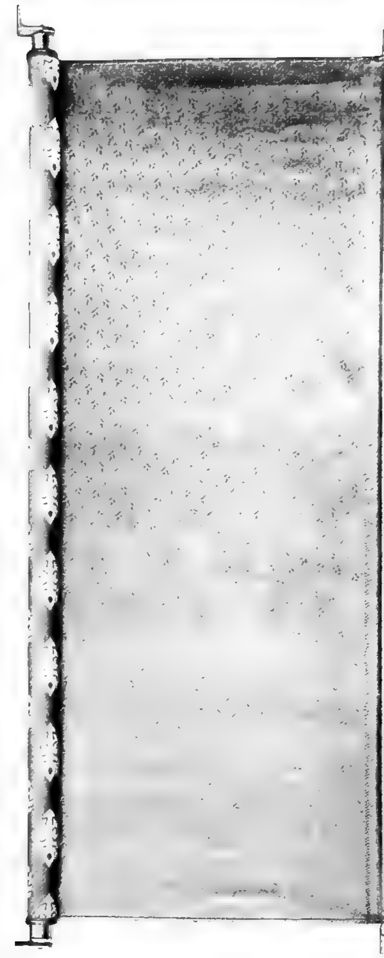


Fig. 587—Sliding Door Curtain. Railway Supply & Curtain Company.

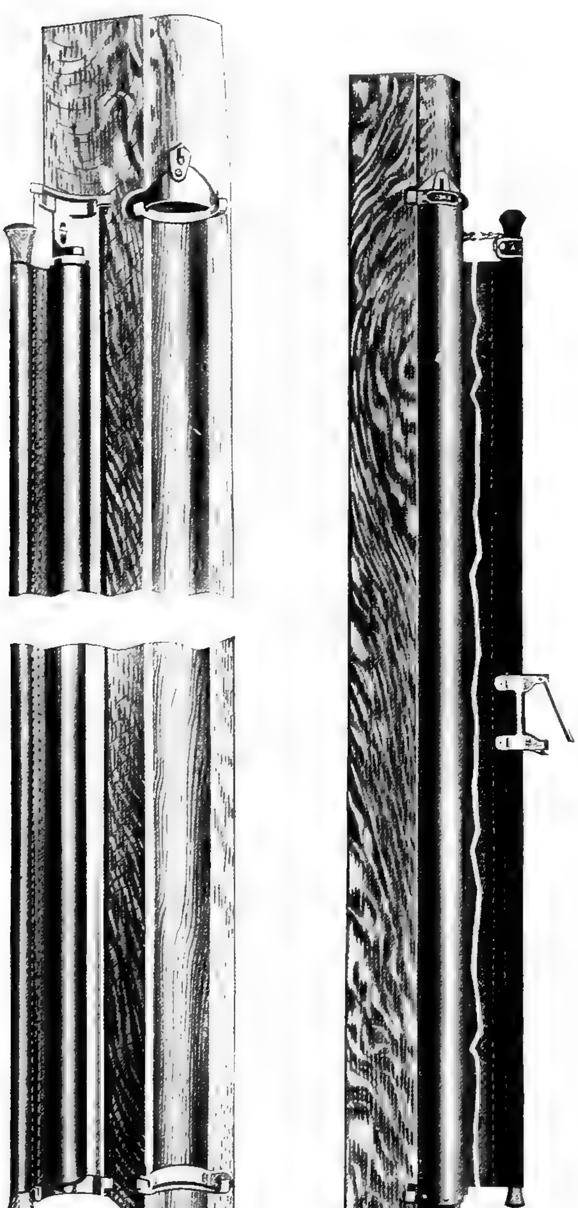


Fig. 588—Ajax Adjustable Vestibule Curtain Fixtures. The Q & C Company.

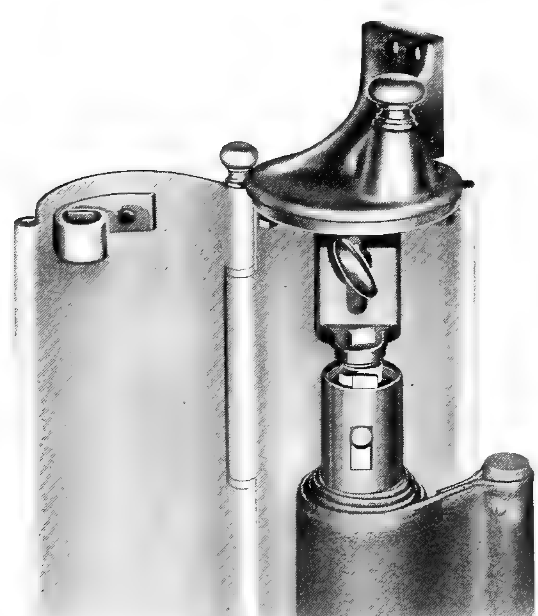


Fig. 589—Rex Opening Shield for Vestibule Curtains with Adjustable Roller Brackets. Curtain Supply Company.

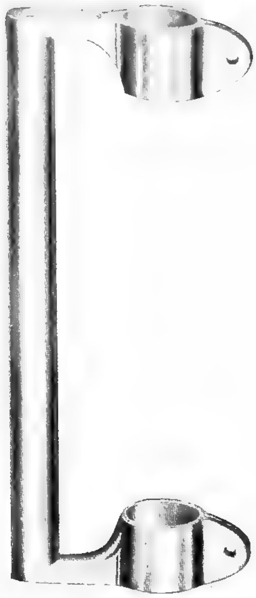


Fig. 590—Solid Handle for Vestibule Curtains.

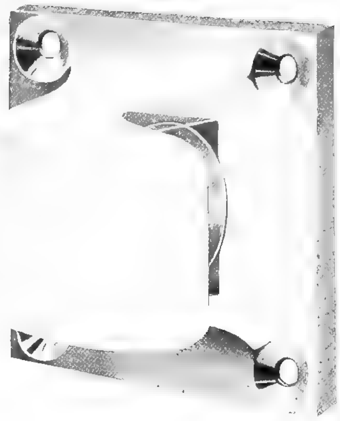


Fig. 591—Vestibule Curtain Hook for Steel Posts.

Fig. 592—Vestibule Curtain Hook for Wood Posts.

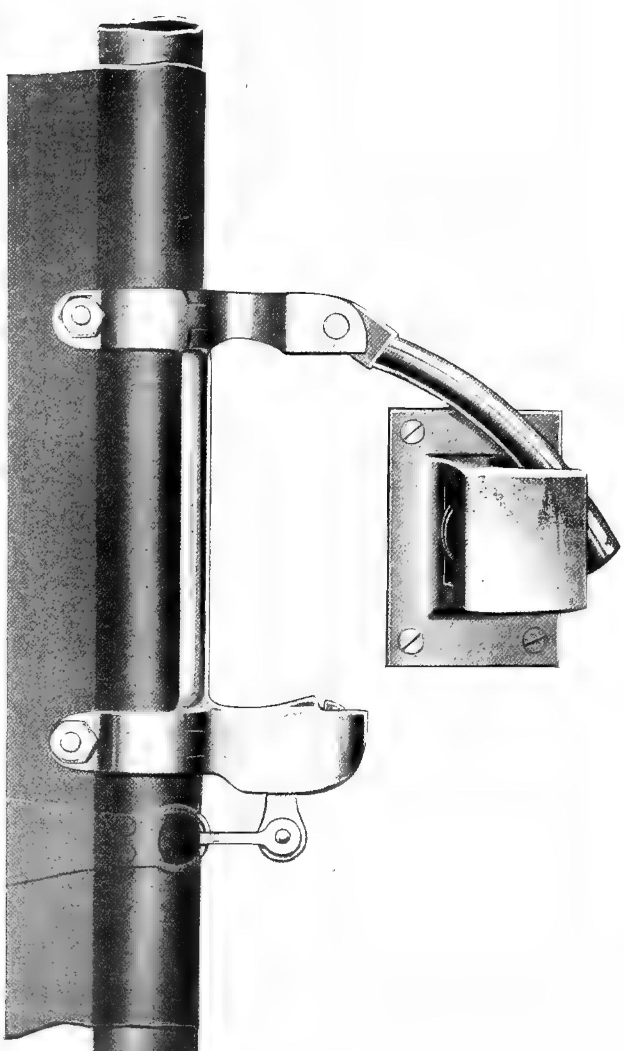


Fig. 593—Rex Automatic Release Handle for Vestibule Curtains.

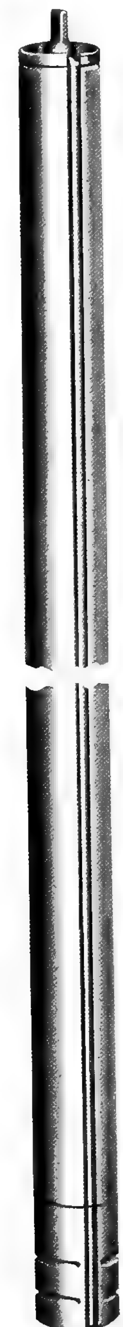


Fig. 594—Rex All - Metal Roller Reinforced for Vestibule Curtains.

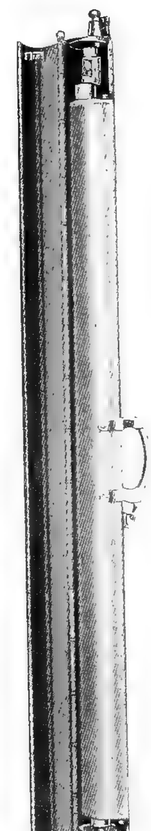


Fig. 595—Rex Opening Shield for Vestibule Curtains.

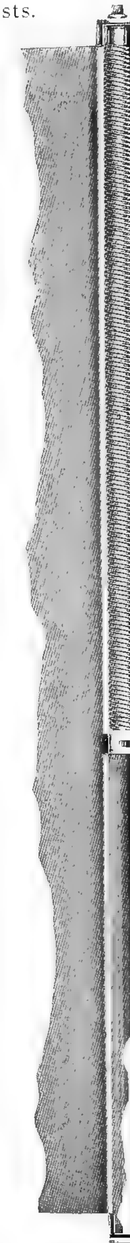


Fig. 596—Rex All - Metal Roller with Steel Barrel and Depressed Groove.

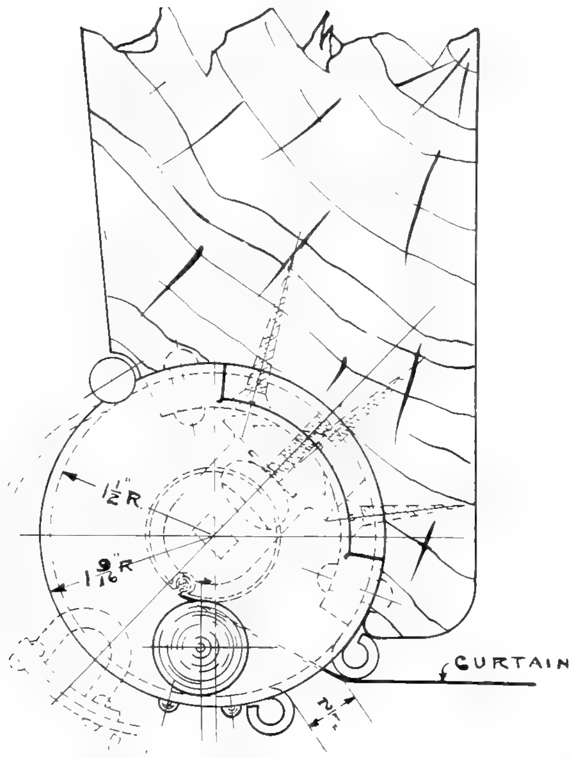


Fig. 597—Typical Application of Rex Opening Shield with Wood Posts. Curtain Supply Company.

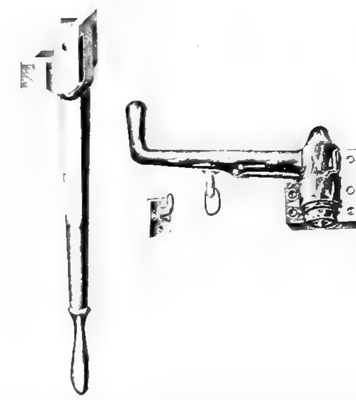


Fig. 598—Brake and Uncoupling Levers. Dayton Manufacturing Company.

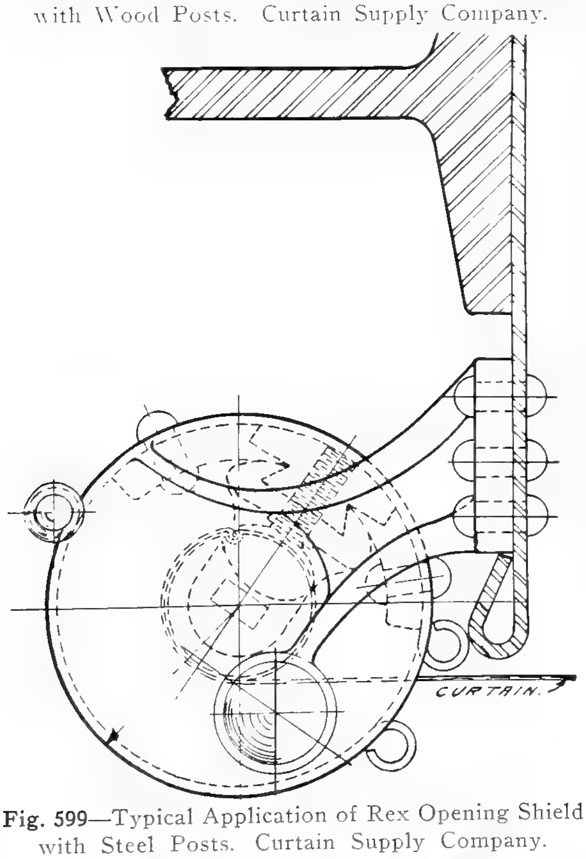


Fig. 599—Typical Application of Rex Opening Shield with Steel Posts. Curtain Supply Company.

Fig. 600 — Rex Vestibule Curtain Outfit Complete. Curtain Supply Company.

Fig. 601 — Trainman's Grab Handle. Russell & Erwin Mfg. Company.

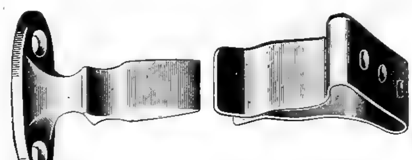


Fig. 602—Door Holder. Russell & Erwin Manufacturing Company.

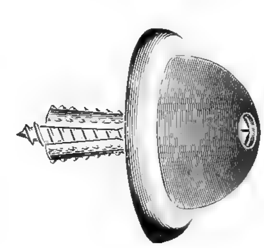


Fig. 603—Door Bumper. Russell & Erwin Manufacturing Company.

Fig. 604 — Trainman's Vestibule Step. Adams & Westlake Company.

Fig. 605 — Brake Rod Floor Plate.

Fig. 606 — Uncoupling Rod Guide.

Fig. 607 — Uncoupling Rod Foot.

Adams & Westlake Company.

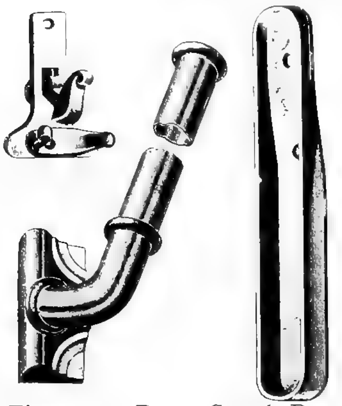


Fig. 608 — Door Guard Drop Rod Catch and Pocket. Dayton Manufacturing Company.

Fig. 609—Door Holder.

Fig. 610—Mat Hook. Adams & Westlake Company.

Fig. 611 — Inside Hand Rail.

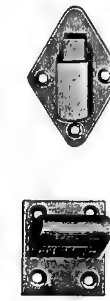


Fig. 612—Trap Door Holders.

Adams & Westlake Company.

Fig. 613—Vestibule Guard Rail and Fittings. Jas. L. Howard & Company.

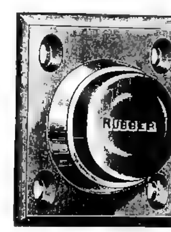


Fig. 619 — Trap Door Bumper. Dayton Manufacturing Company.

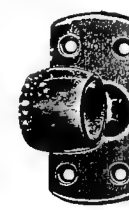


Fig. 620 — Uncoupling Rod Guide. Adams & Westlake Company.

Fig. 614 — Vestibule Guard Rail and Fittings. Adams & Westlake Company.

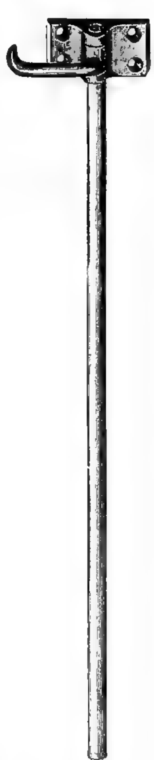


Fig. 615—Trap Door Latch Operating Rod. Dayton Manufacturing Company.

Fig. 616—Corner Post Grab Handle. Adams & Westlake Company.

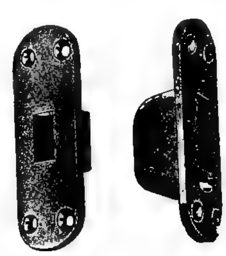


Fig. 617—Tail Gate Sockets. Adams & Westlake Company.

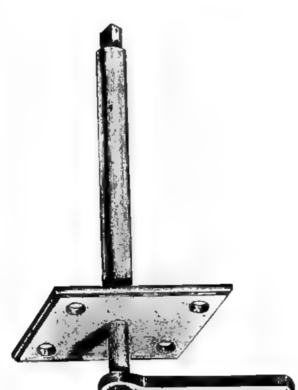


Fig. 618—Rod for Operating Trap Door Latch from Below Platform. Dayton Manufacturing Company.

Fig. 621—Corner Post Grab Handle. Adams & Westlake Company.

Fig. 622 — Trainman's Grab Handle. Adams & Westlake Company.

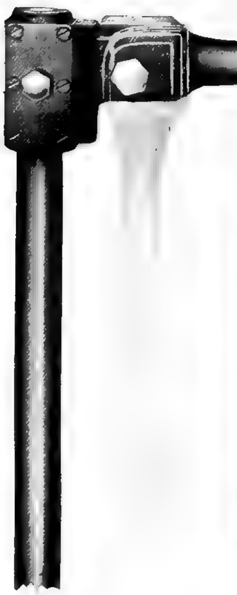


Fig. 623—Drop Brake Handle. Dayton Manufacturing Company.

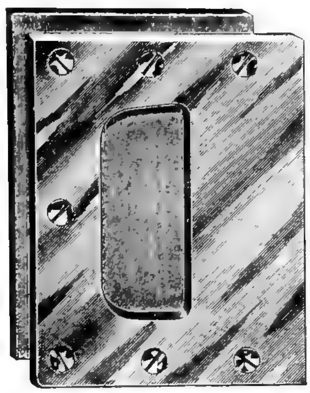


Fig. 624—Vestibule Trap Door Lift. Dayton Manufacturing Company.

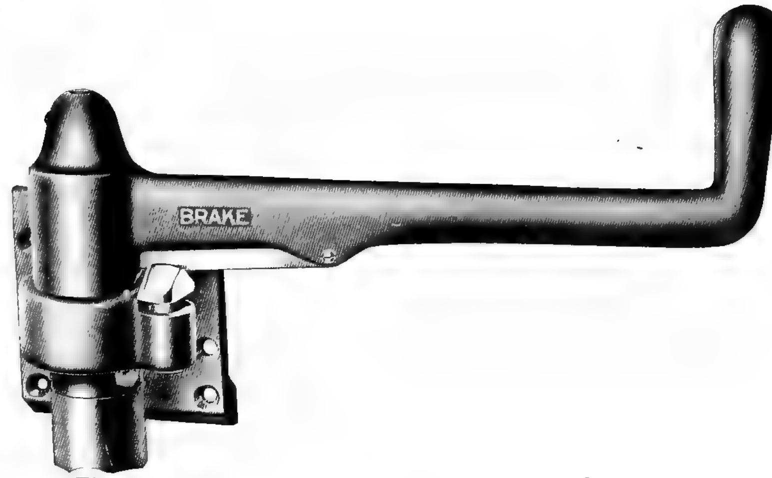


Fig. 625—Brake Handle. Adams & Westlake Company.

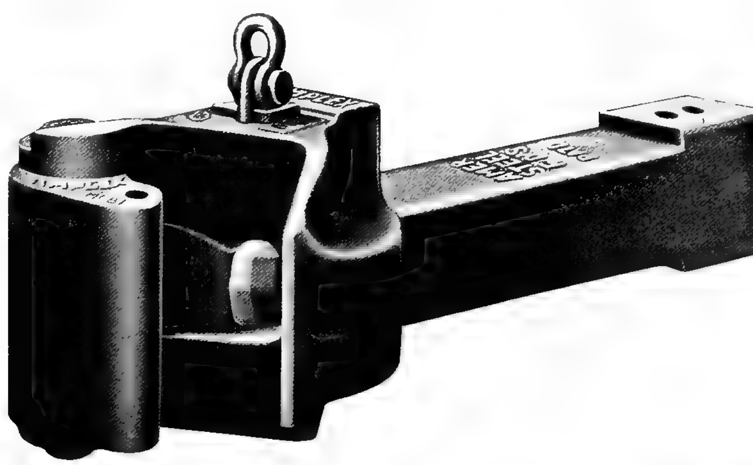


Fig. 626—Simplex Freight Coupler. American Steel Foundries.

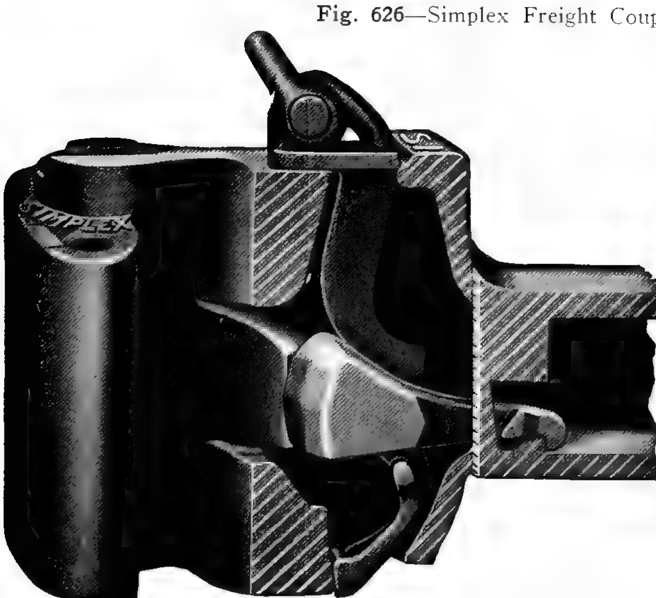


Fig. 626A—Vertical Section Through Simplex Coupler When Closed.

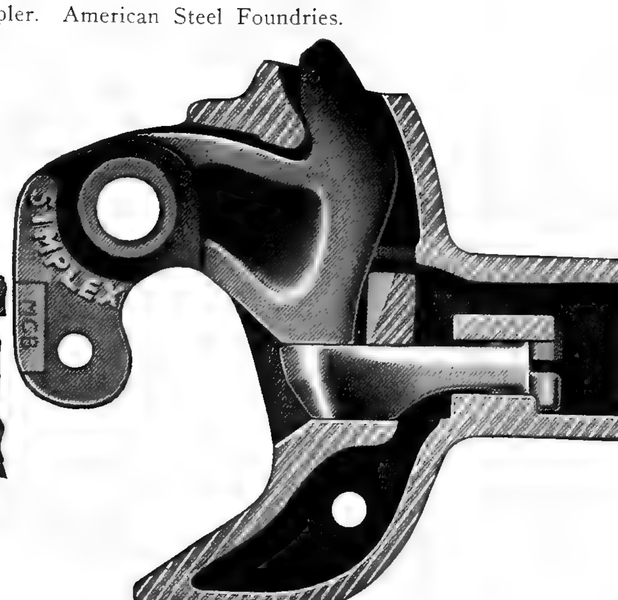


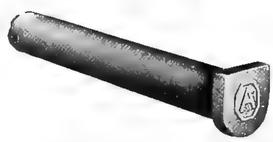
Fig. 626B—Horizontal Section Through Simplex Coupler When Closed.

American Steel Foundries.

Knuckle.

Lifter.

Lock.



Knuckle Pin.

Fig. 627—Parts of Simplex Freight Coupler. American Steel Foundries.

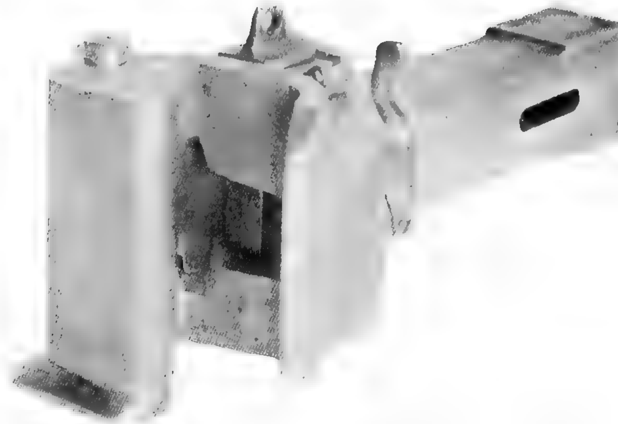
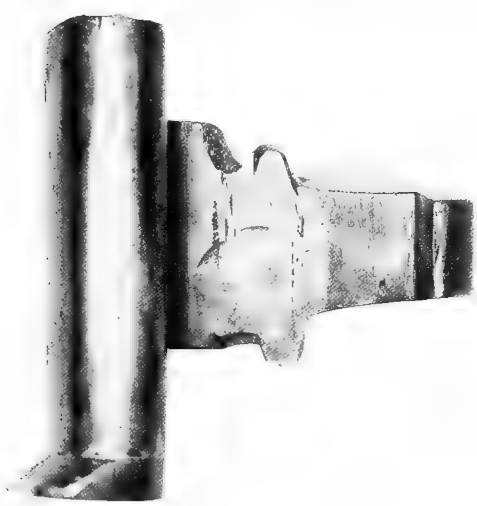


Fig. 628—Durbin Coupler with Knuckle Closed. Durbin Automatic Train Pipe Connector Company.



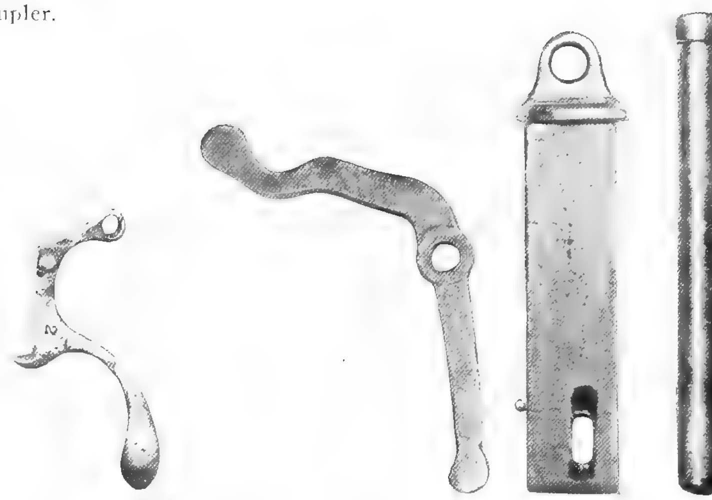


Fig. 629—Parts of Durbin Coupler.

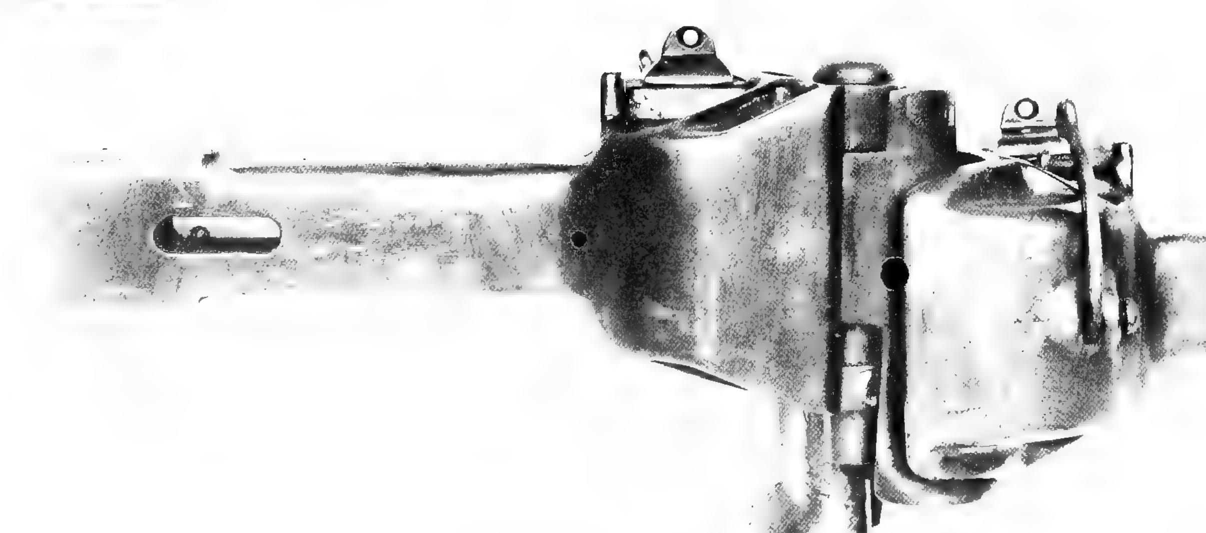


Fig. 630—Durbin Coupler with Safety Lip Carrying Another Coupler. Durbin Automatic Train Pipe Connector Company.

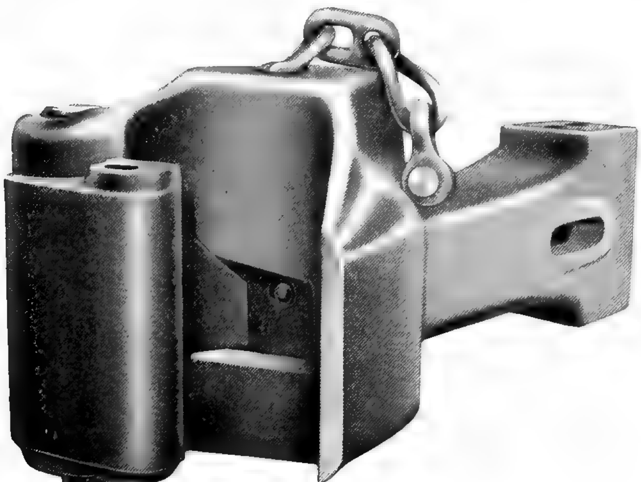


Fig. 631—Major Top Lift Freight Coupler.

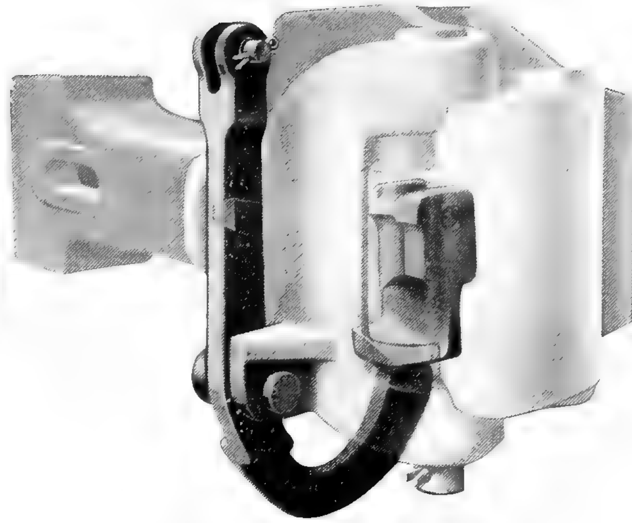


Fig. 632—Major Under Lift Freight Coupler.

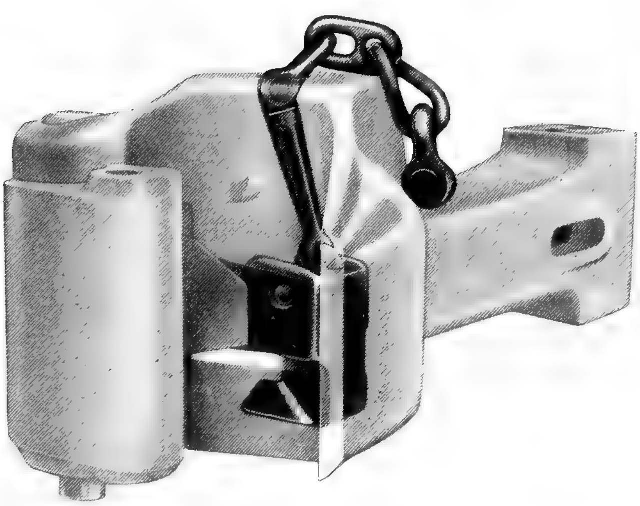


Fig. 633—Major Top Lift Coupler.

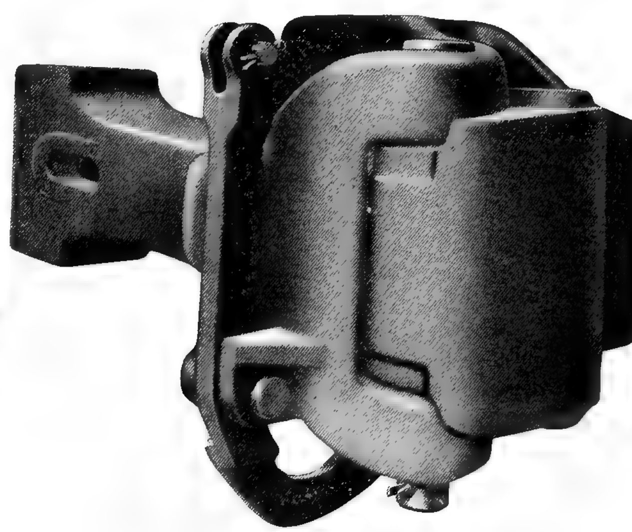
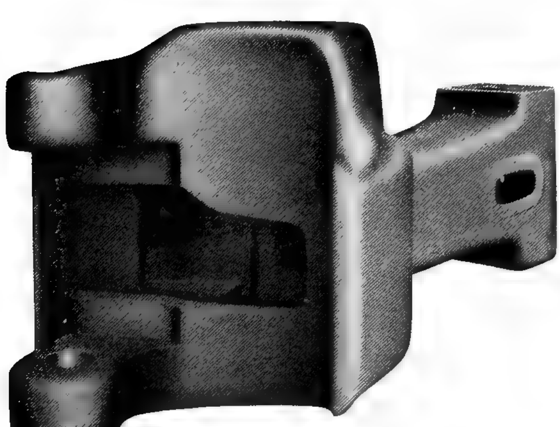


Fig. 634—Major Under Lift Coupler.



Bar.

Lock.

Knuckle.

Fig. 635—Parts of Major Coupler. Buckeye Steel Castings Company.

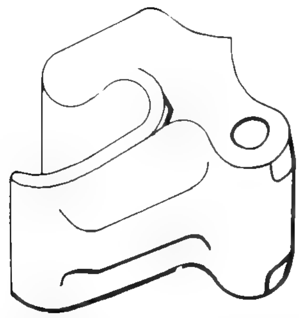


Fig. 636—Hinson Emergency Knuckle. National Car Coupler Company.

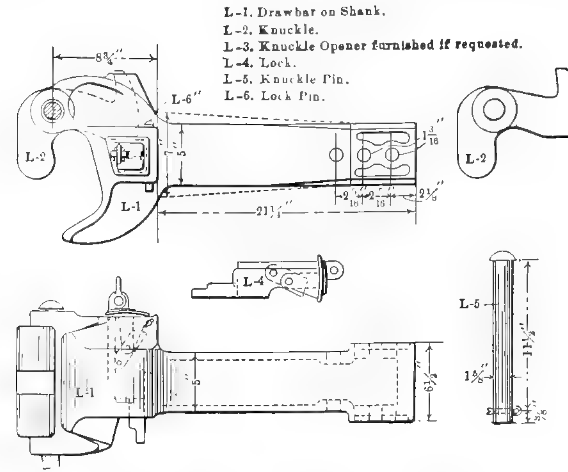


Fig. 637—National Freight Coupler and Parts. National Car Coupler Company.

Fig. 638—Gilman-Brown Emergency Knuckle and Application. The Q & C Company.

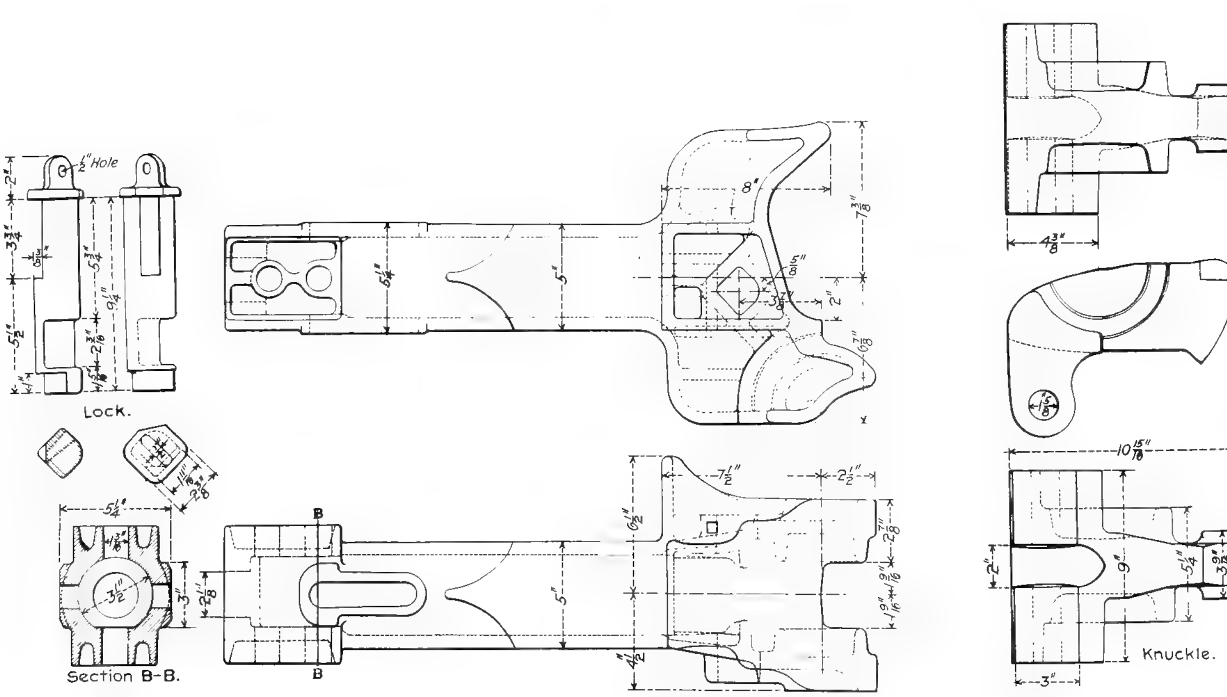


Fig. 639—Standard Freight Coupler and Parts. Standard Coupler Company.

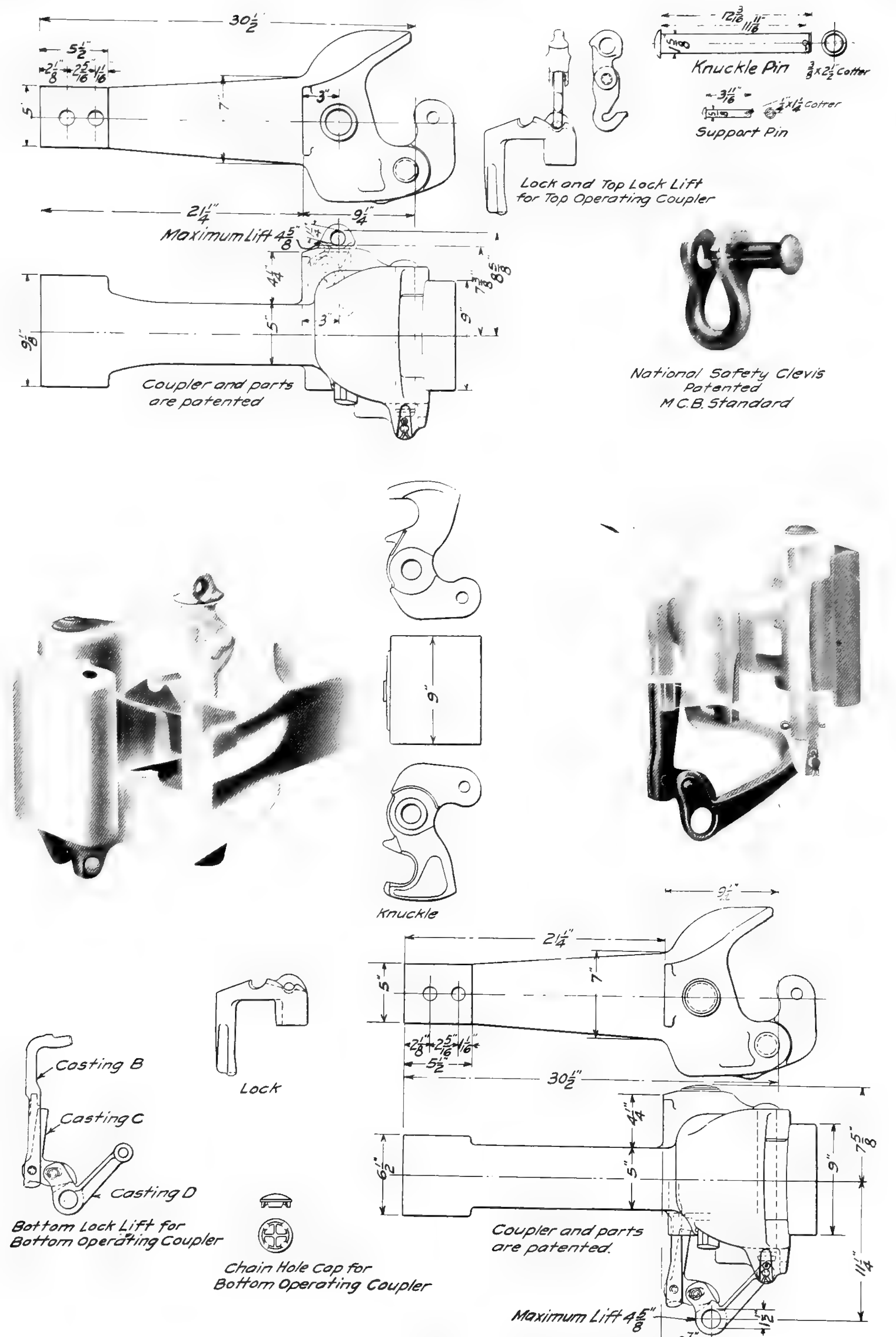


Fig. 640—Sharon Top and Bottom Operating Freight Coupler.
National Malleable Castings Company.

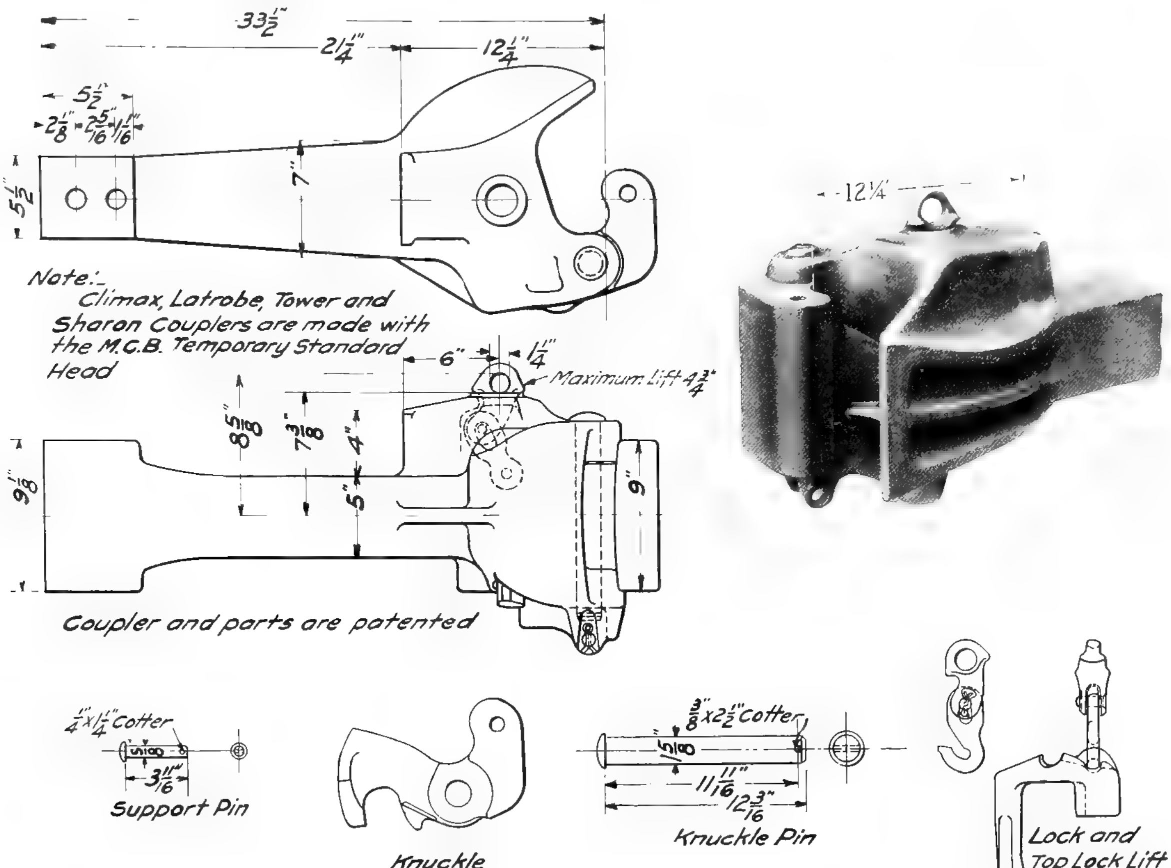


Fig. 641—Sharon M. C. B. Temporary Standard Coupler Head.

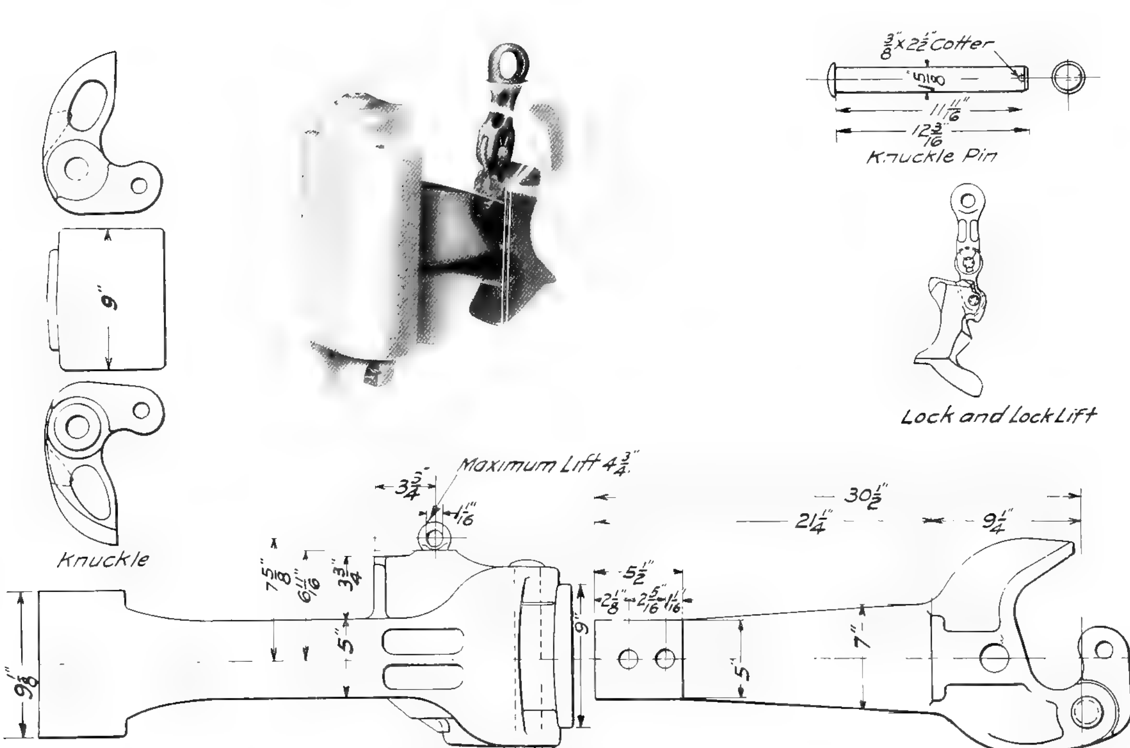


Fig. 642—Climax Freight Coupler and Parts.

National Malleable Castings Company.

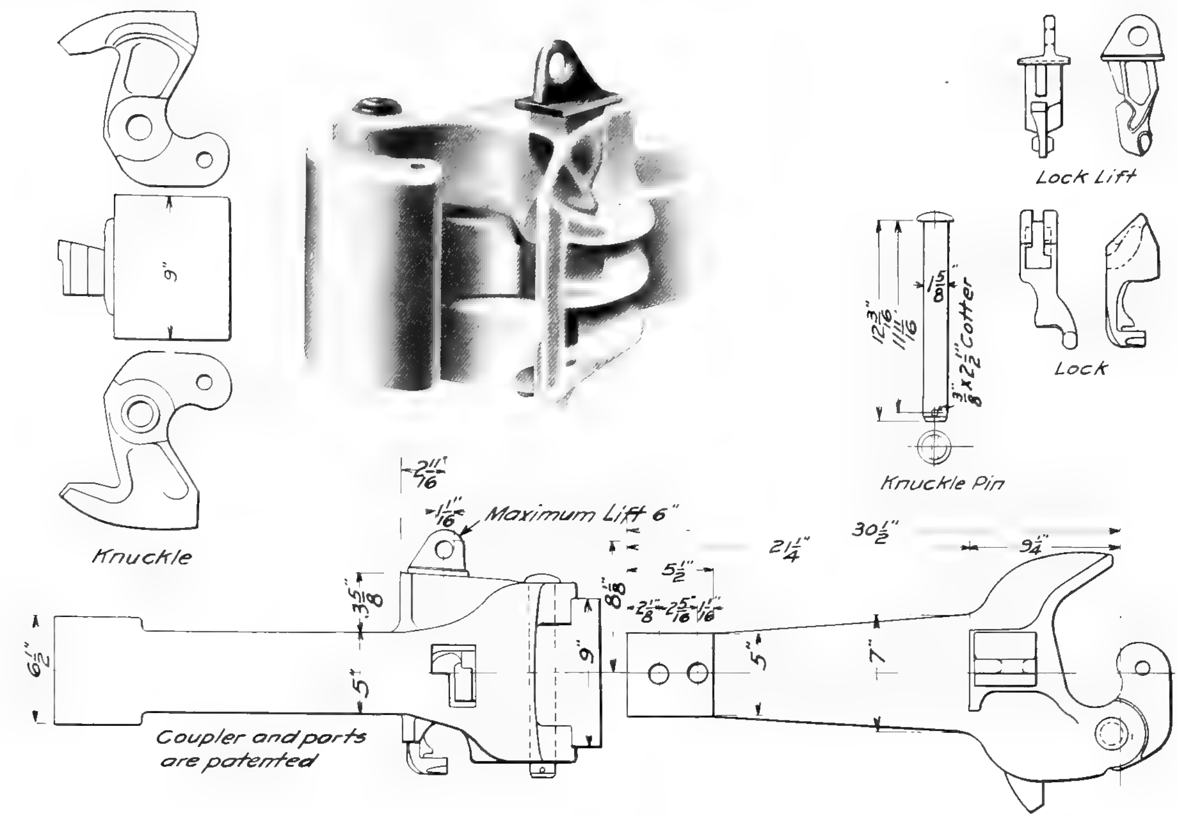


Fig. 643—Latrobe Freight Coupler and Parts.

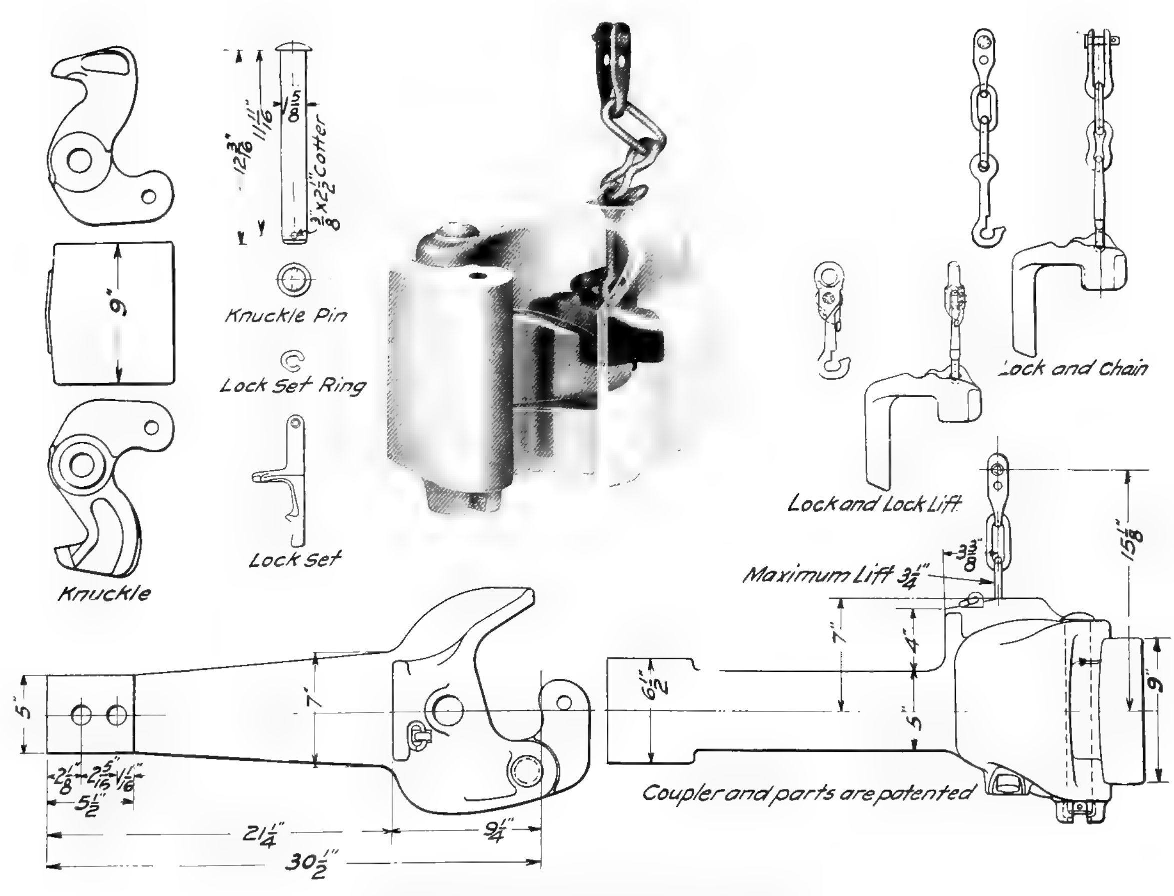


Fig. 644—Tower Freight Coupler and Parts.
National Malleable Castings Company.

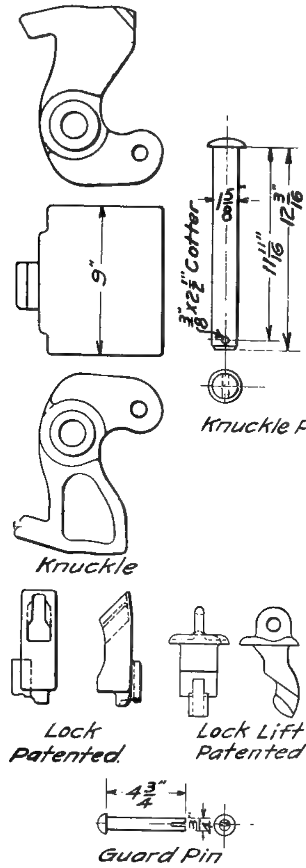


Fig. 645—Munton Freight Coupler Parts.

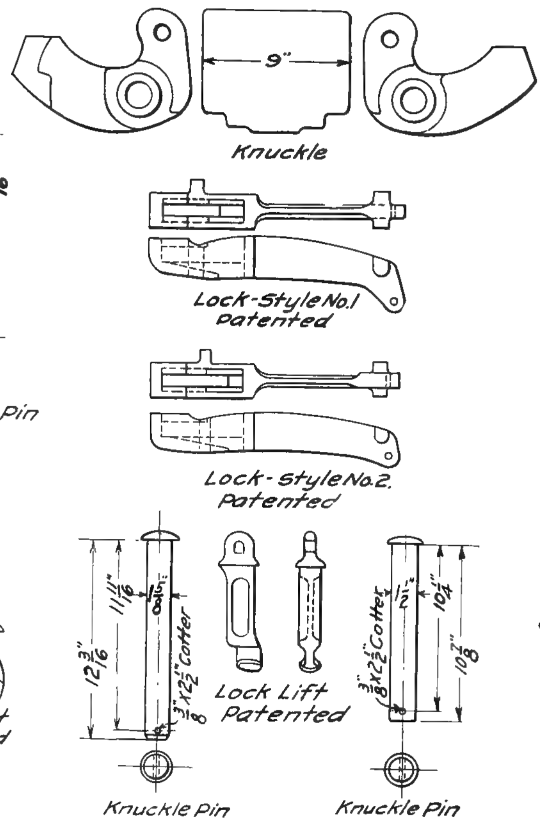


Fig. 646—Chicago Freight Coupler Parts.

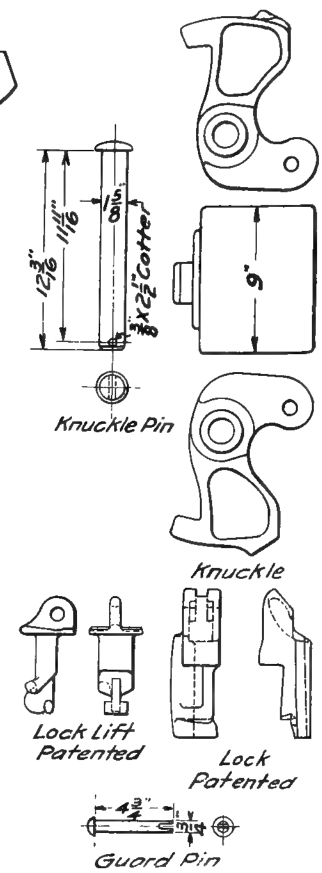


Fig. 647—Melrose Freight Coupler Parts.

National Malleable Castings Company.

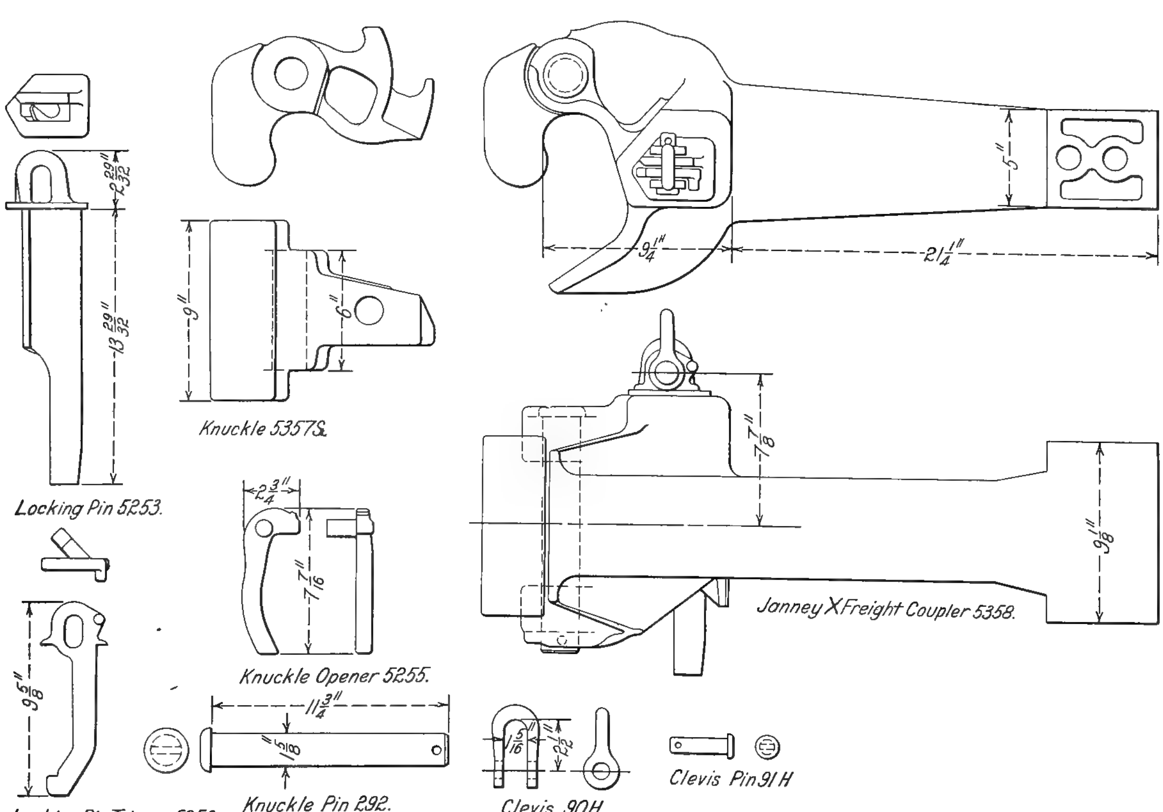


Fig. 648—Janney X Freight Coupler and Parts. McConway & Torley Company.

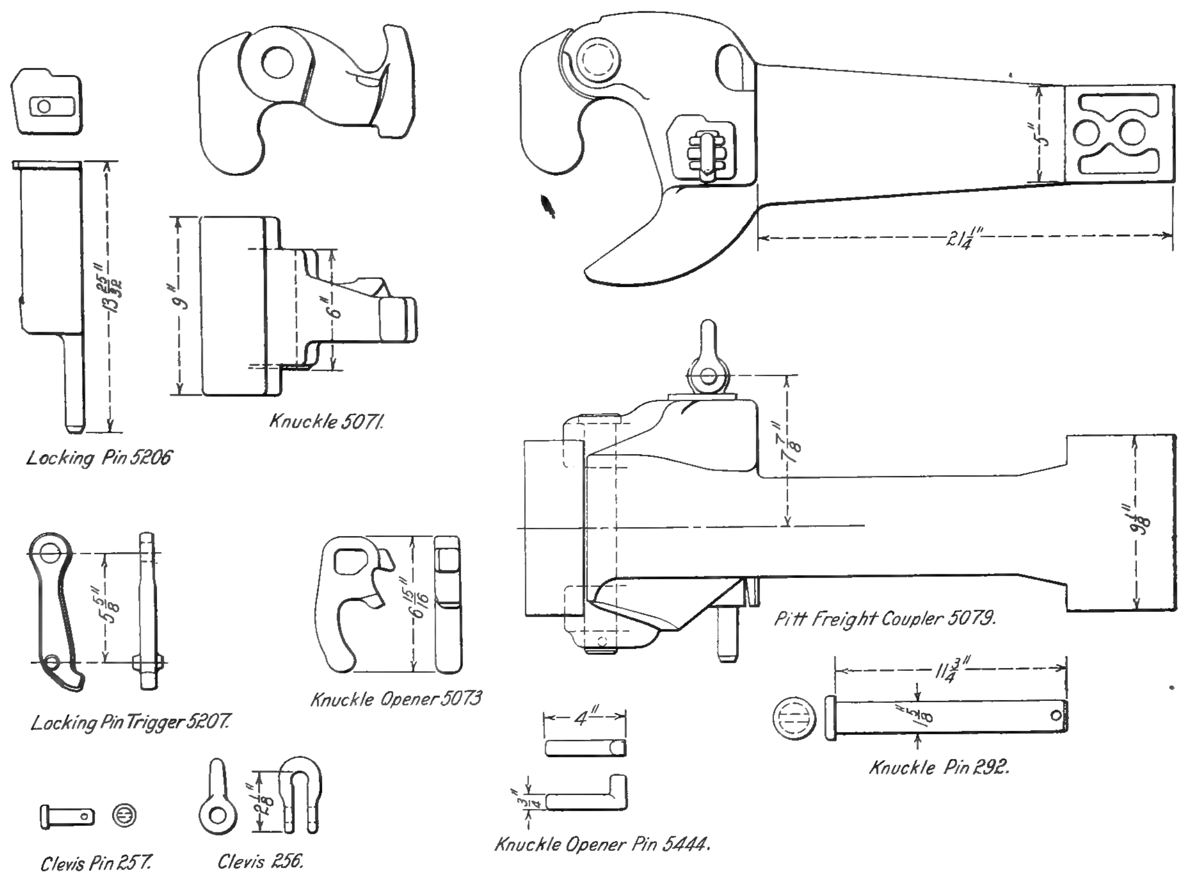


Fig. 649—Pitt Freight Coupler and Parts. McConway & Torley Company.

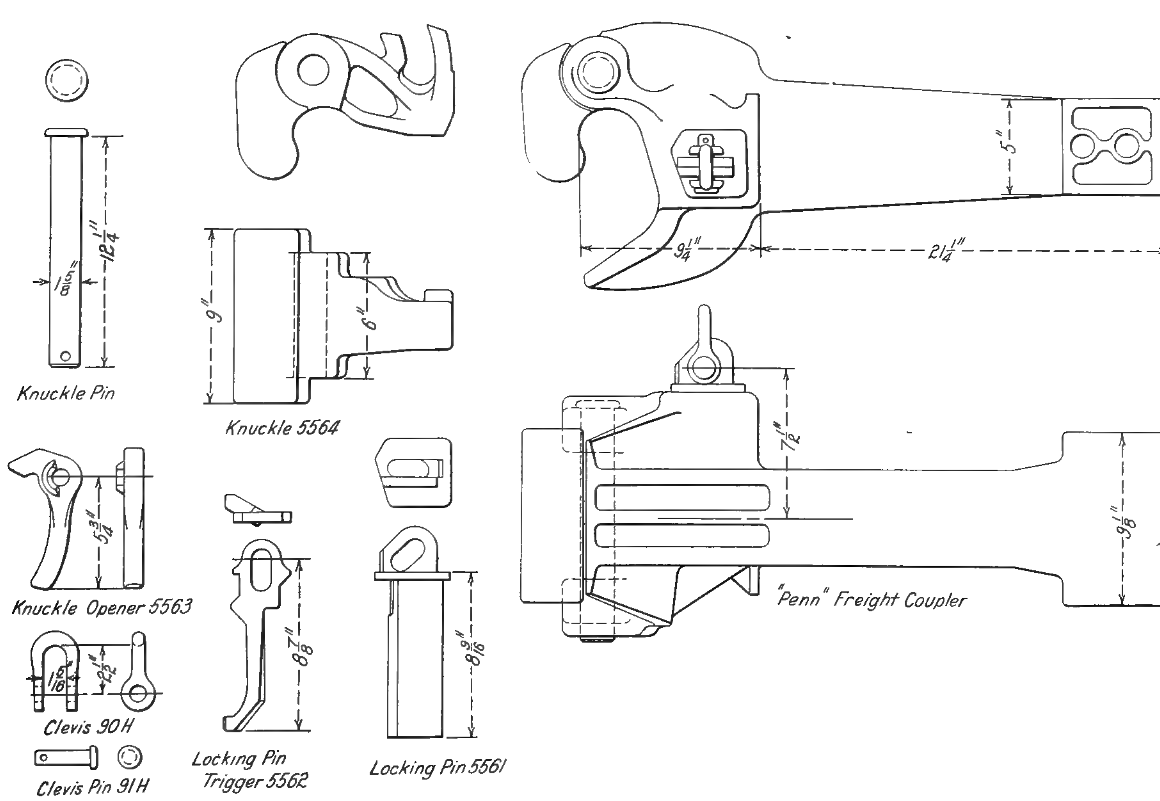


Fig. 650—Penn Freight Coupler and Parts. McConway & Torley Company.

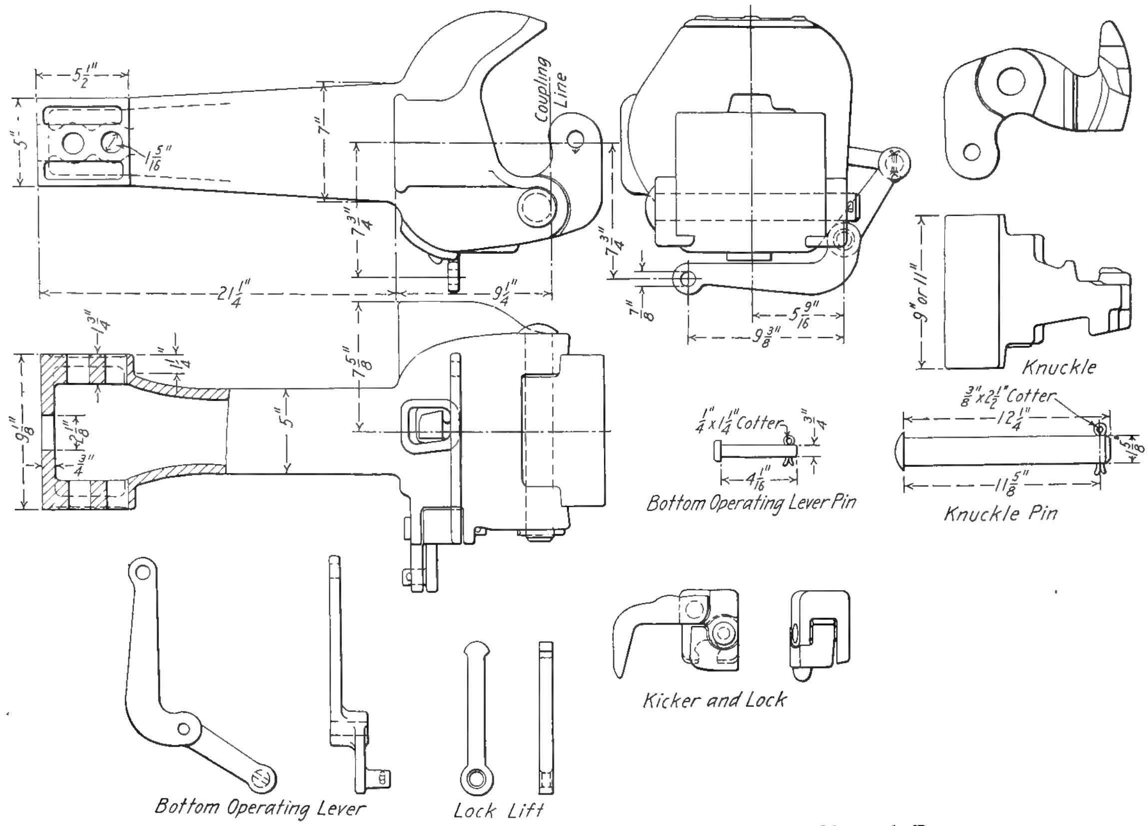


Fig. 651—Gould Bottom Operating Freight Coupler BZ-201, and Parts.
Gould Coupler Company.

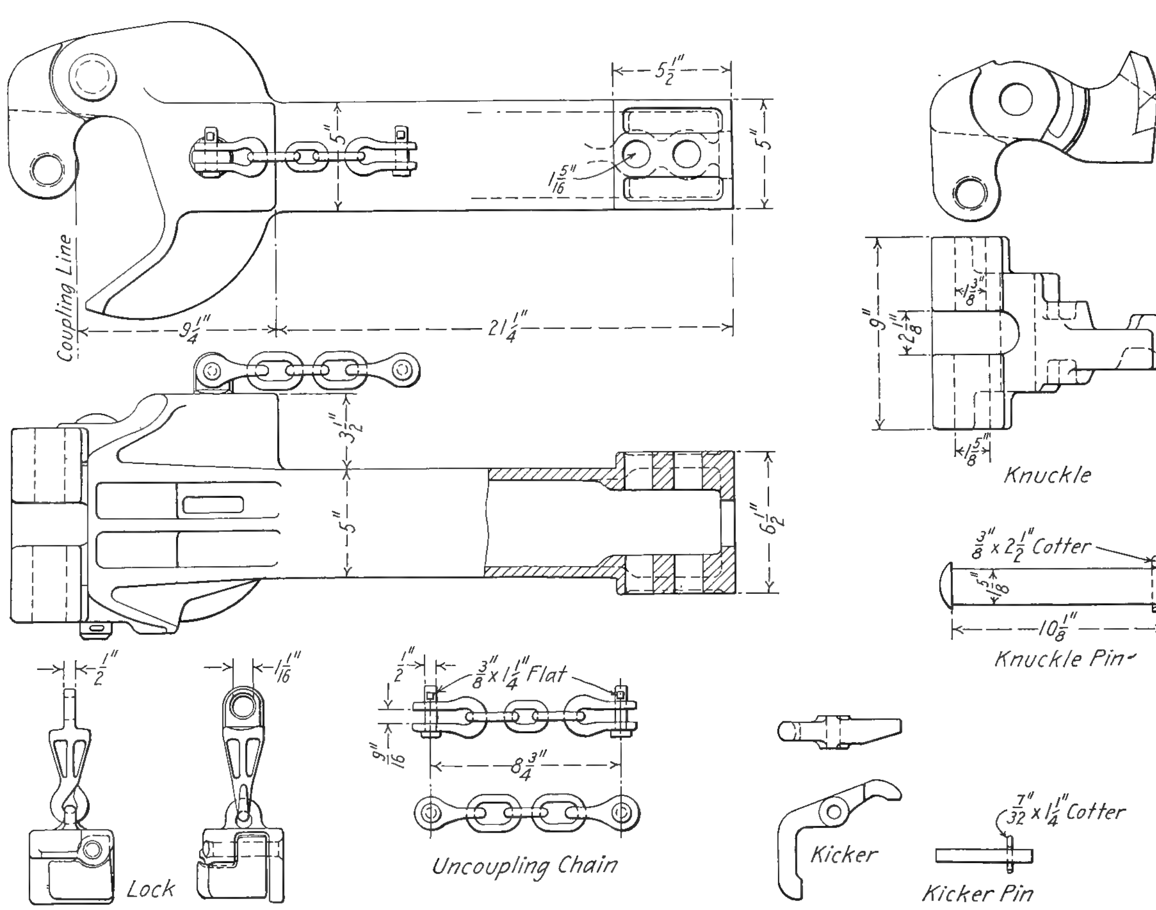


Fig. 652—Gould Top Operative Medium Type Freight Coupler, V-101, and Parts.
Gould Coupler Company.

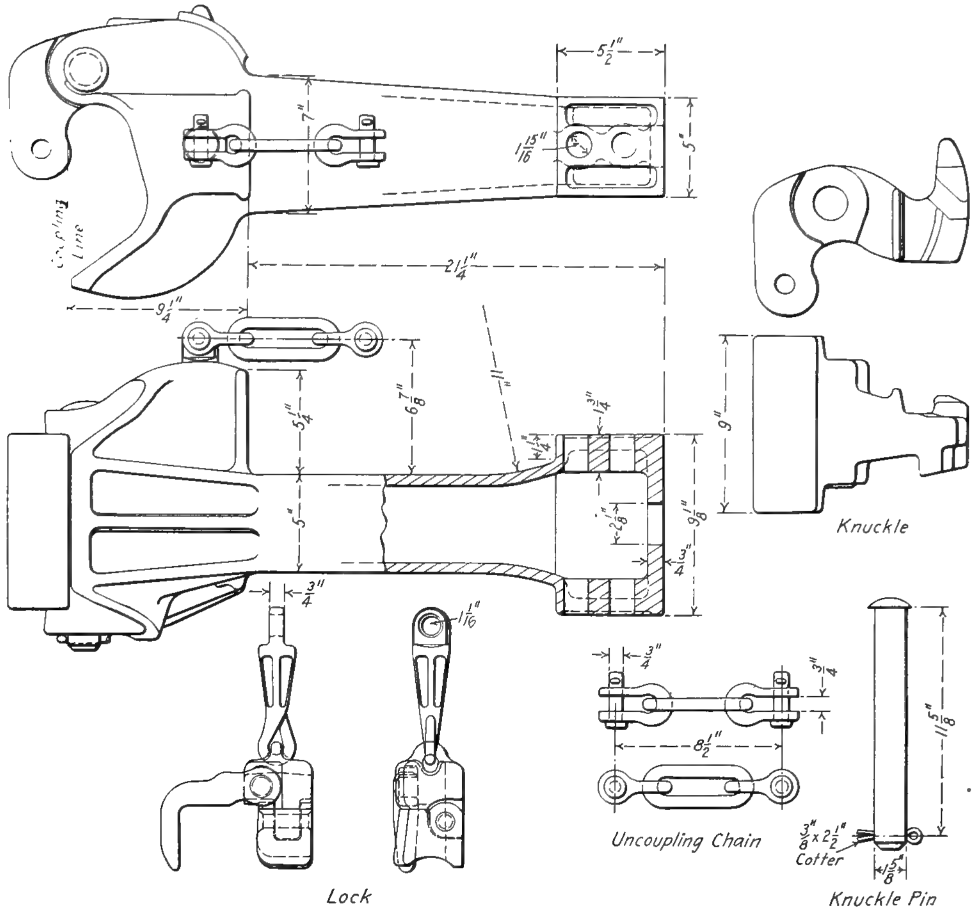


Fig. 653—Gould Freight Coupler Z201, and Parts.
Gould Coupler Company.

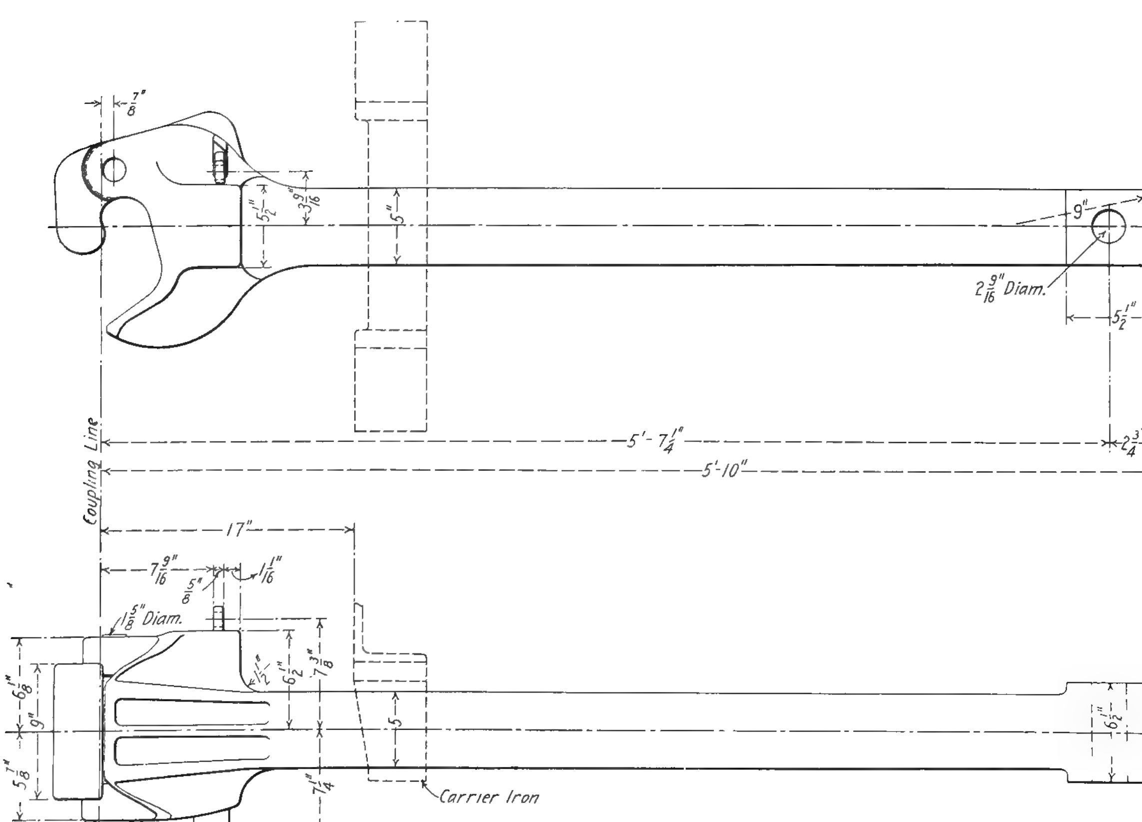


Fig. 654—Gould PIC Type Coupler with Integral Head.
Gould Coupler Company.

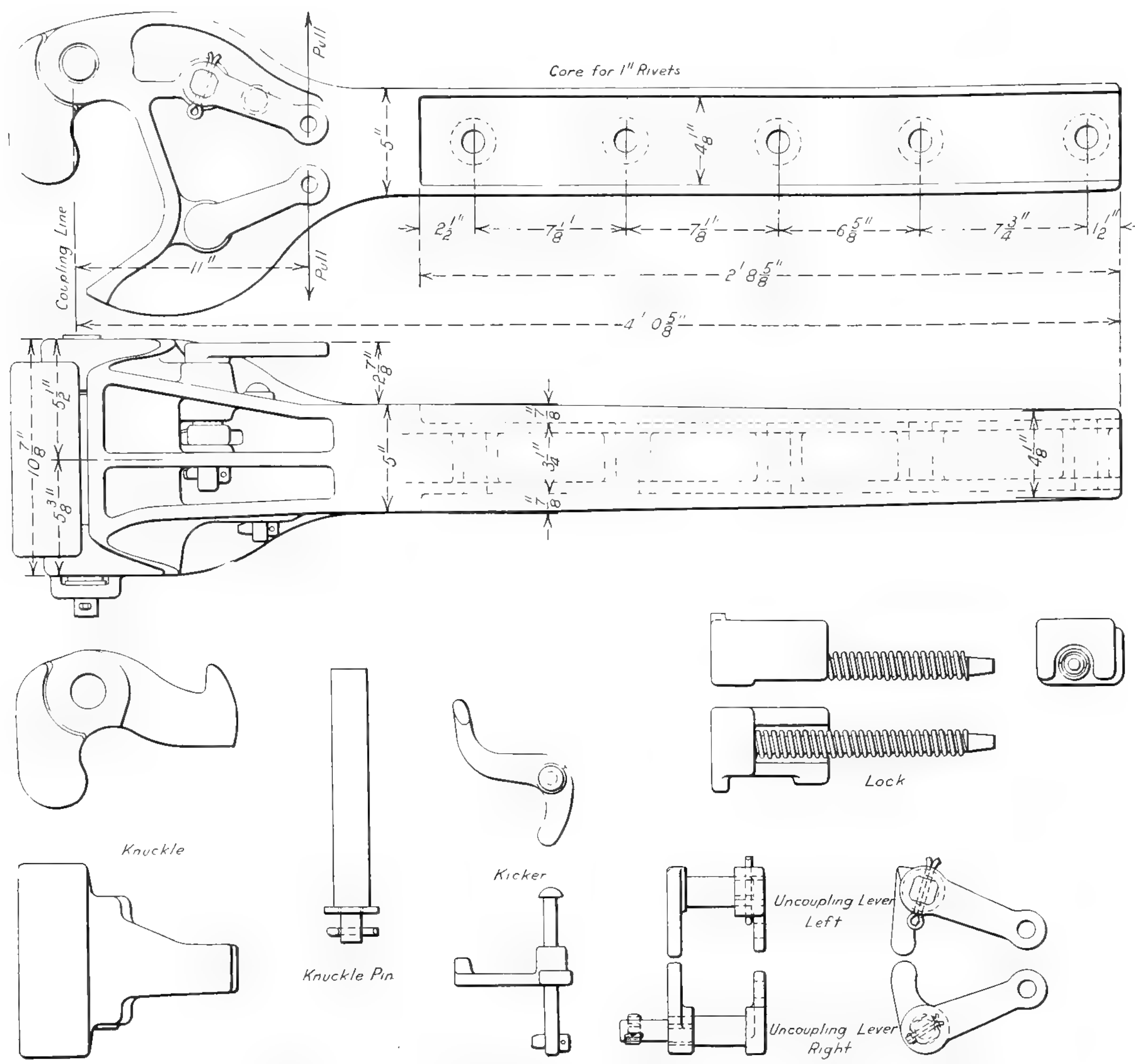


Fig. 655—Double Top Operated Passenger Coupler. Gould Coupler Company.

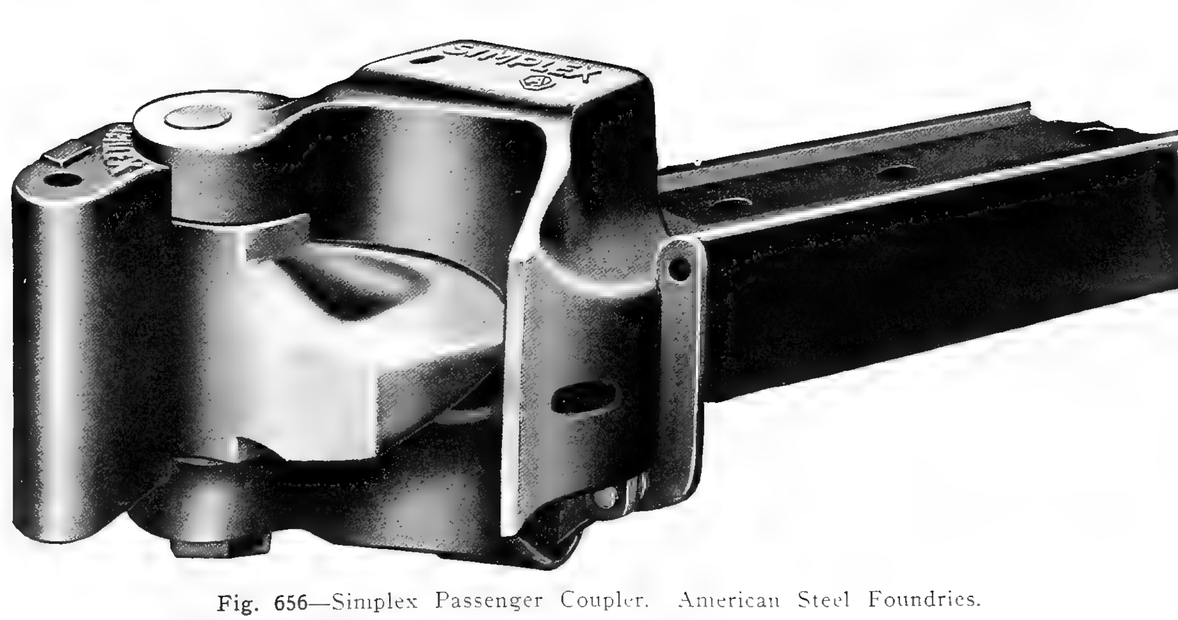


Fig. 656—Simplex Passenger Coupler. American Steel Foundries.

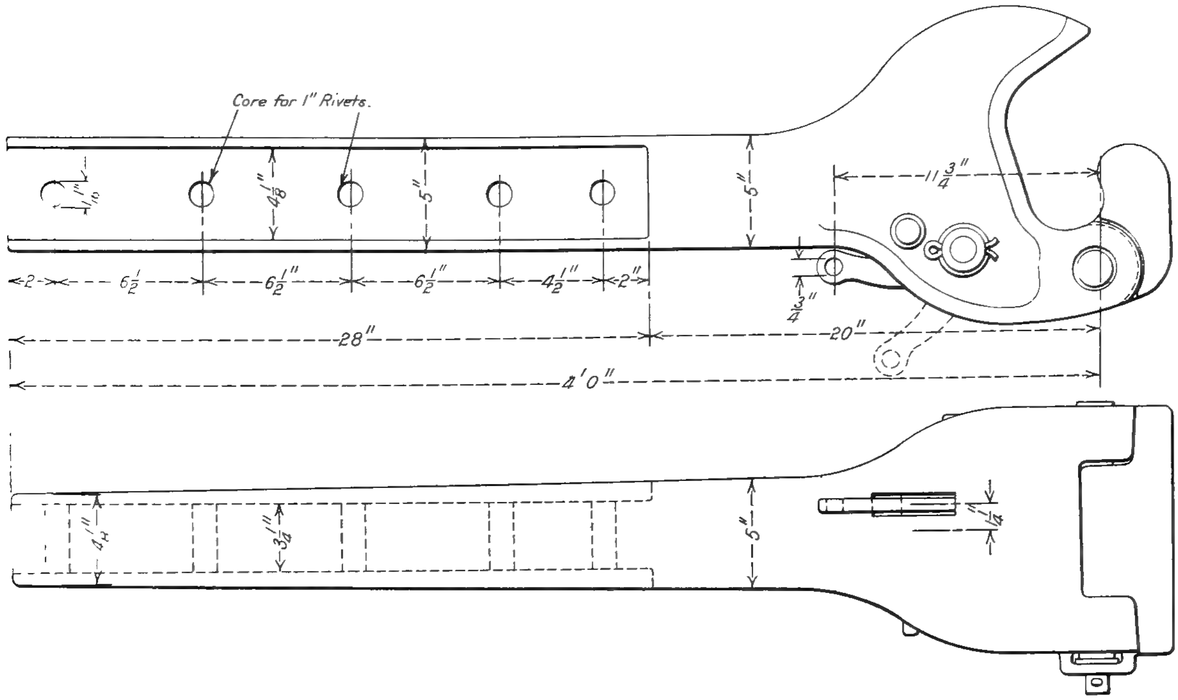


Fig. 657—Passenger Coupler with Single Side Operation. Gould Coupler Company.

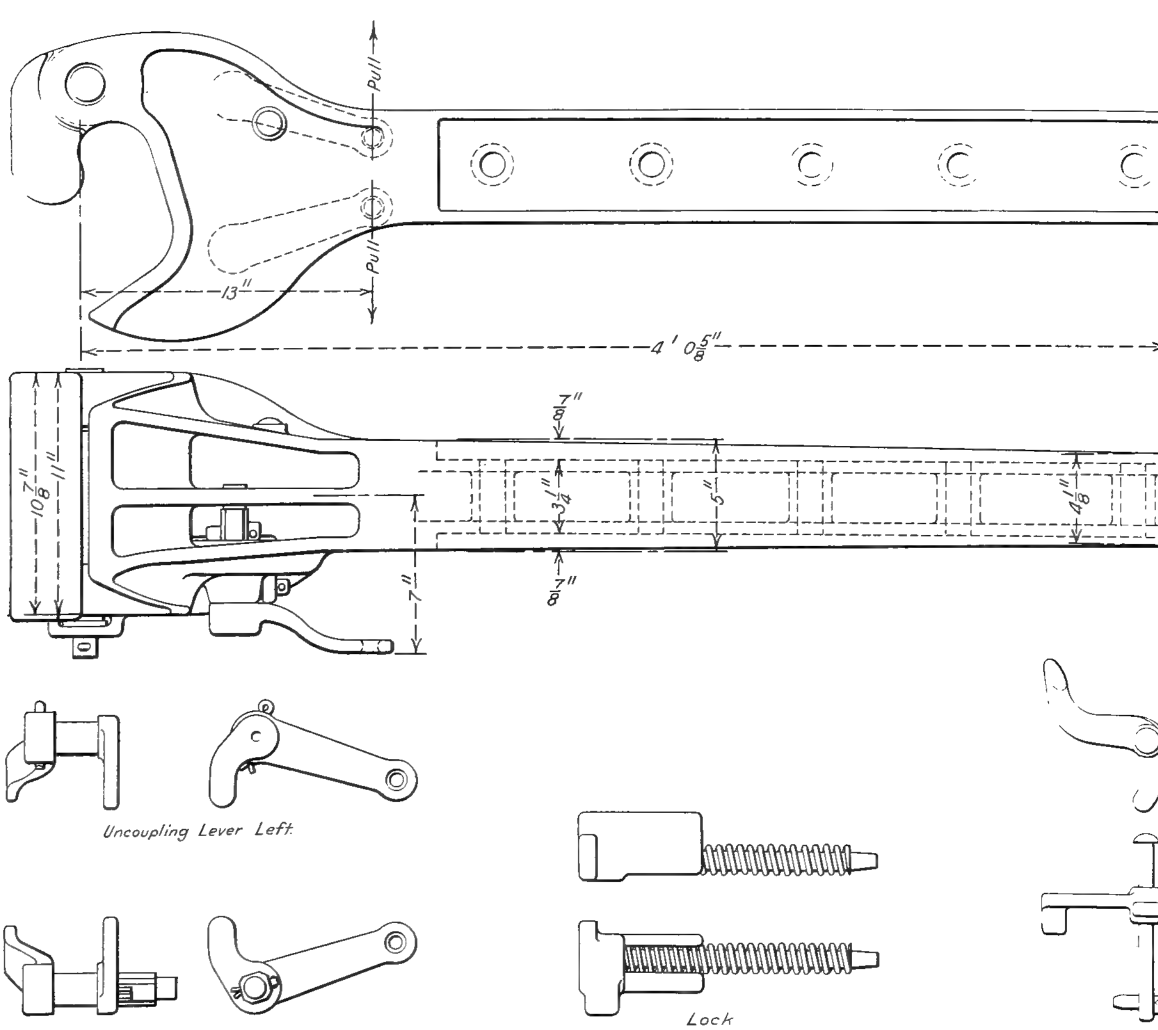


Fig. 658—Double Bottom Operated Passenger Coupler. Gould Coupler Company.

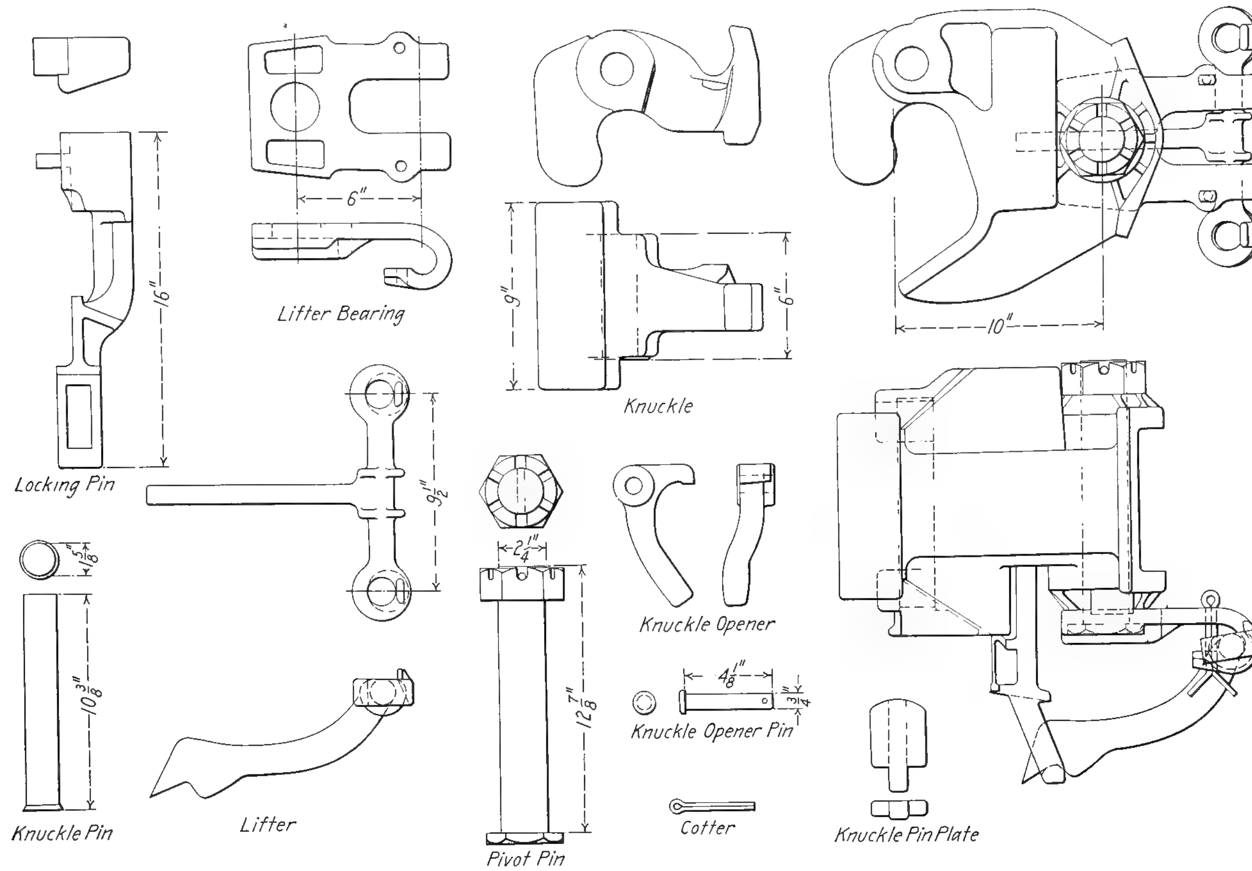


Fig. 659—Pitt Passenger Coupler, No. 255, with Underneath Release. McConway & Torley Company.

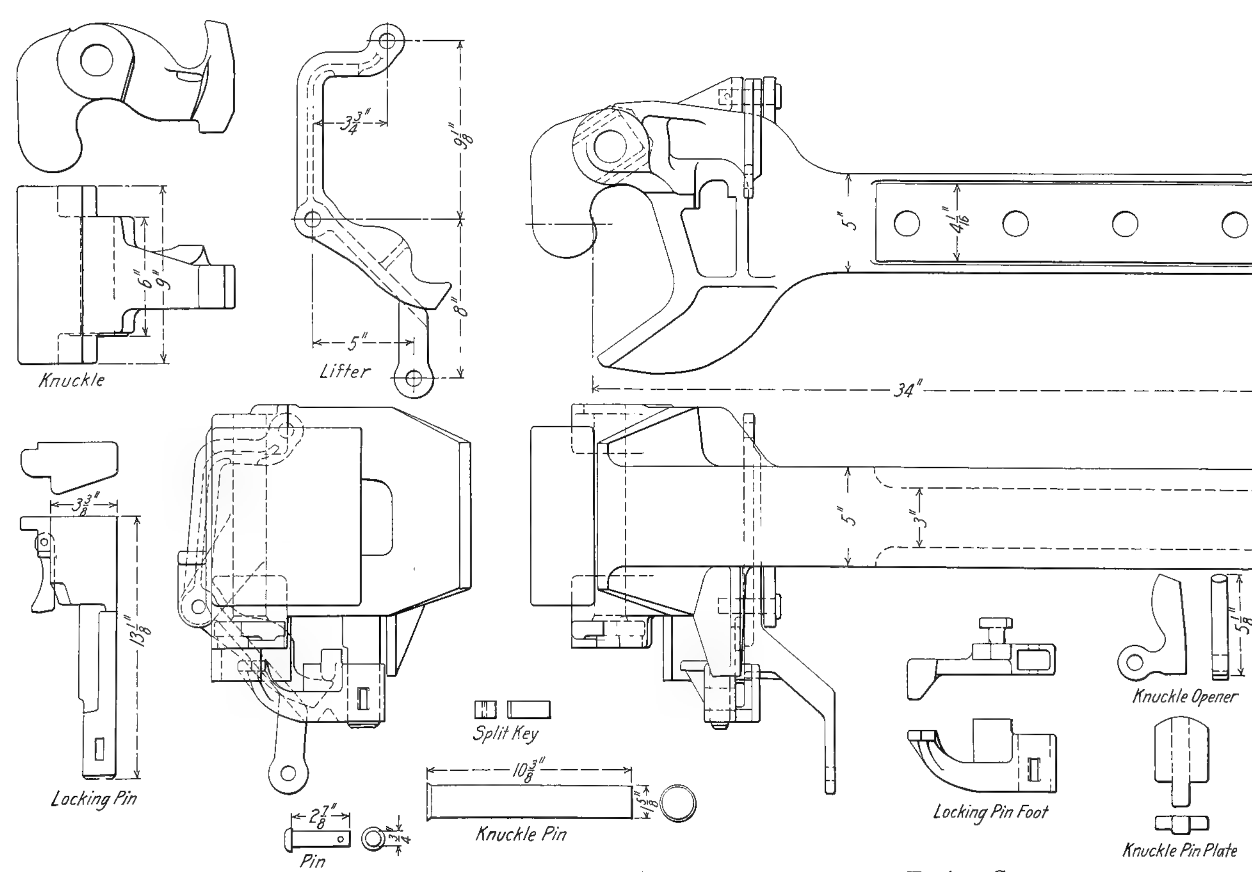


Fig. 660—Pitt Passenger Coupler, No. 171—SP2. McConway & Torley Company.

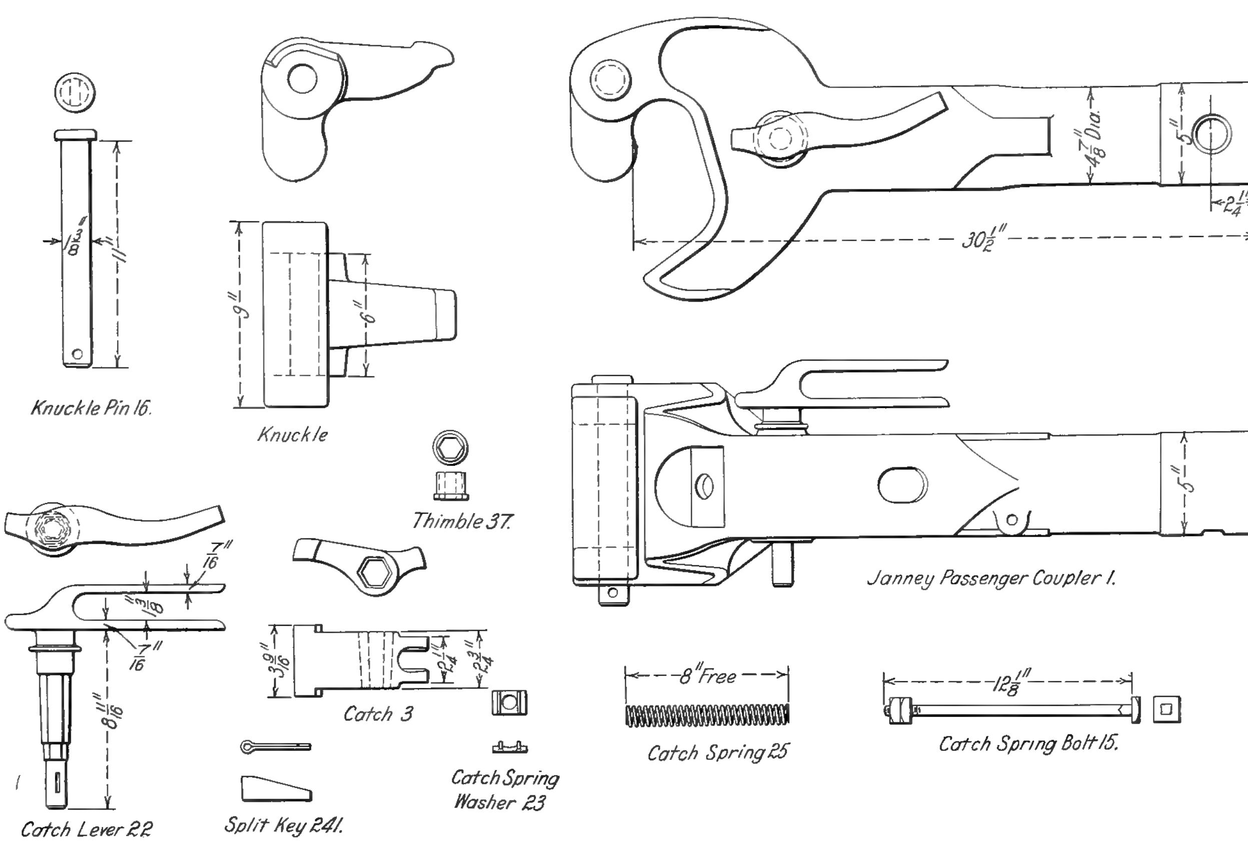


Fig. 661—Janney Passenger Coupler No. 1 and Parts. McConway & Torley Company.

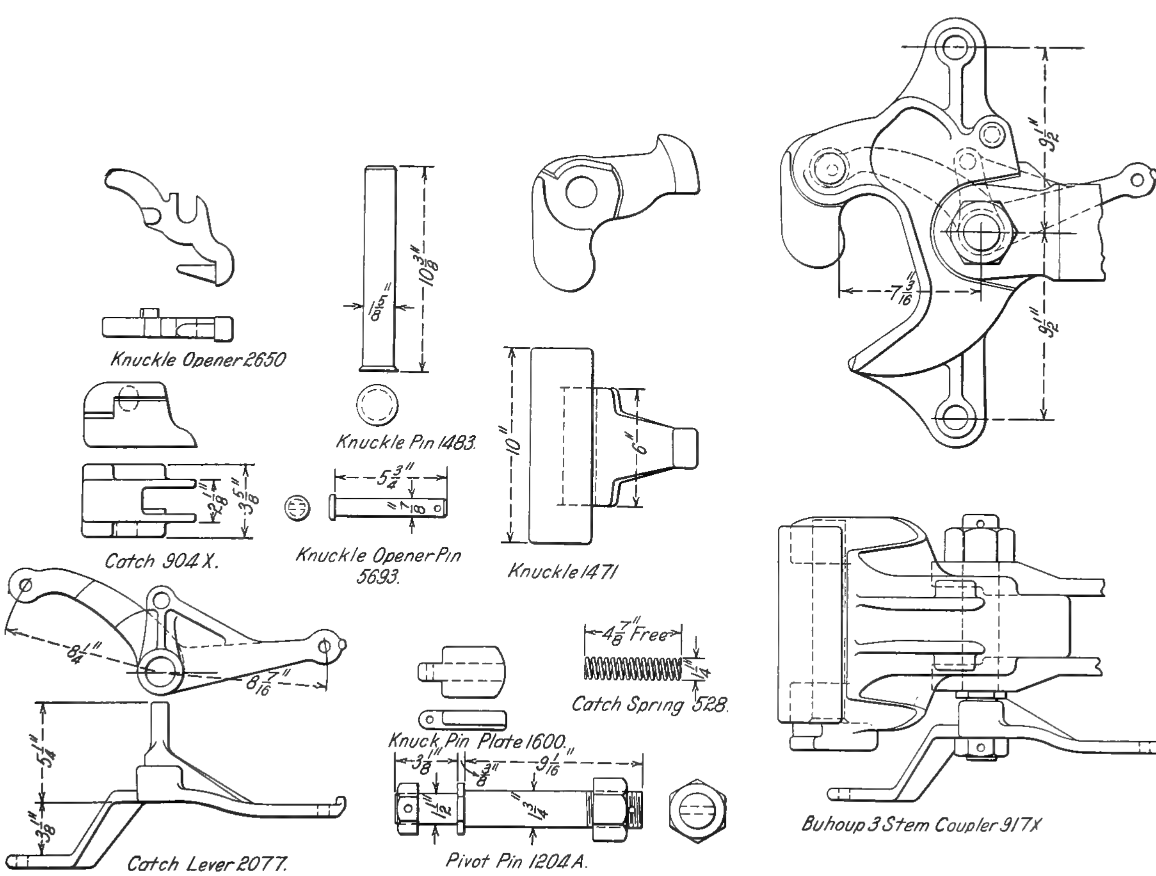


Fig. 662—Buhoup Three-Stem Passenger Coupler and Parts. McConway & Torley Company.

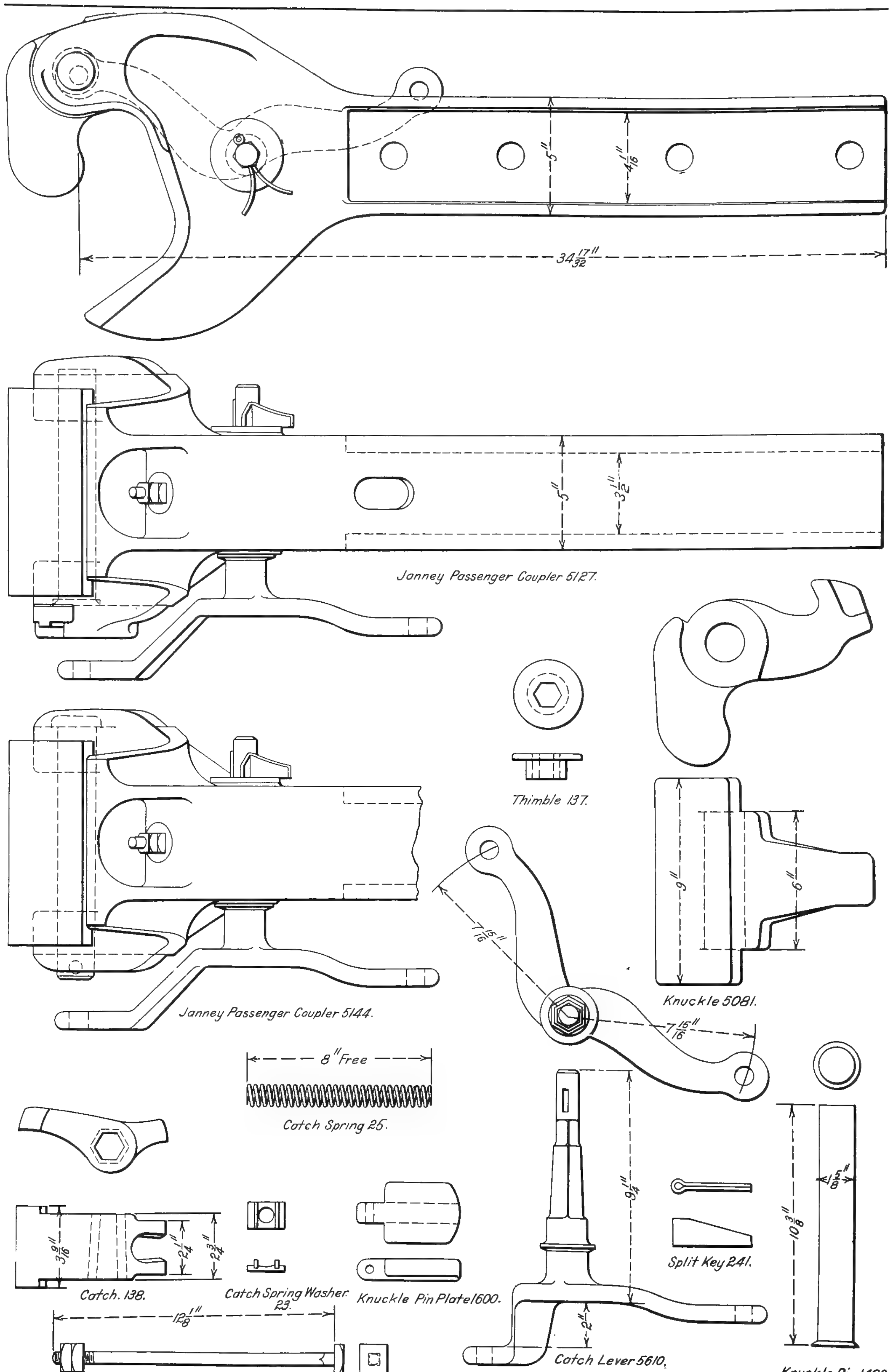


Fig. 663—Janney Passenger Couplers and Parts. McConway & Torley Company.

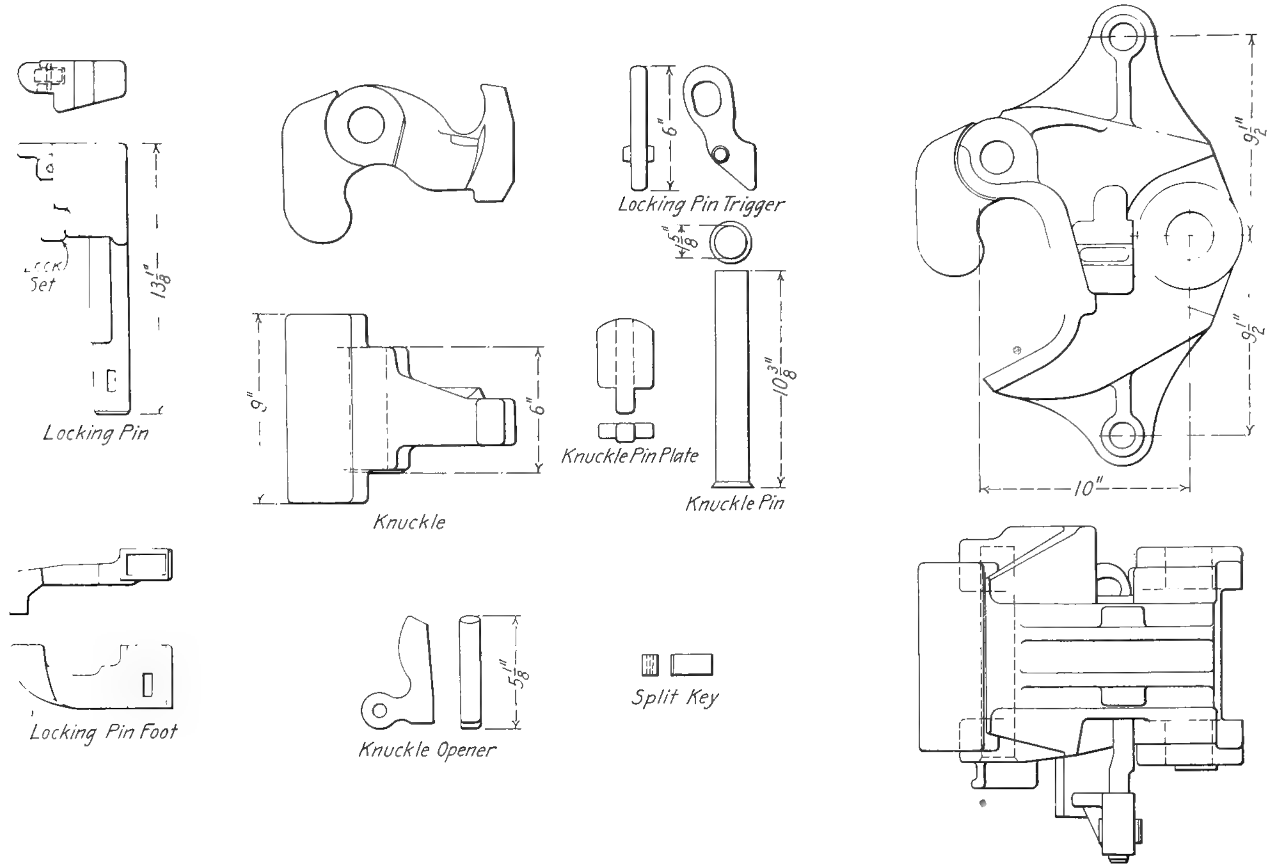


Fig. 664—Pitt Three-Stem Coupler No. 919. McConway & Torley Company.

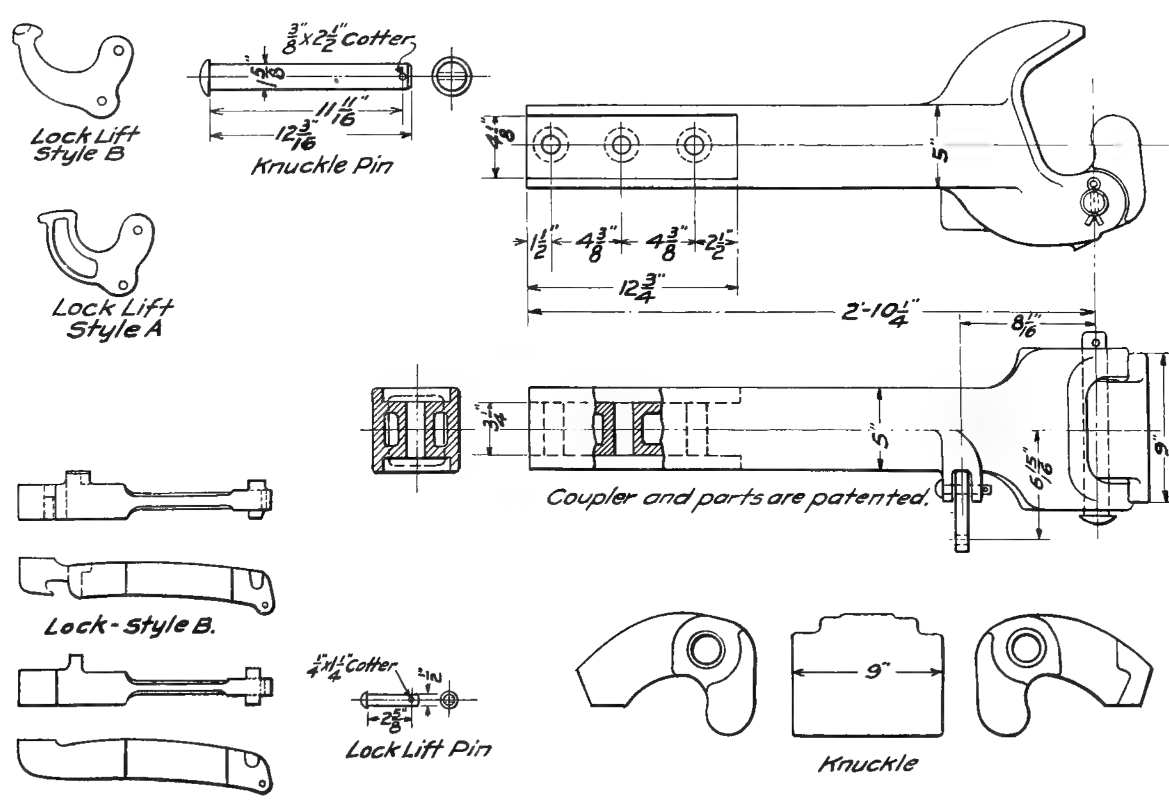


Fig. 665—Chicago Passenger Coupler and Parts. National Malleable Castings Company.

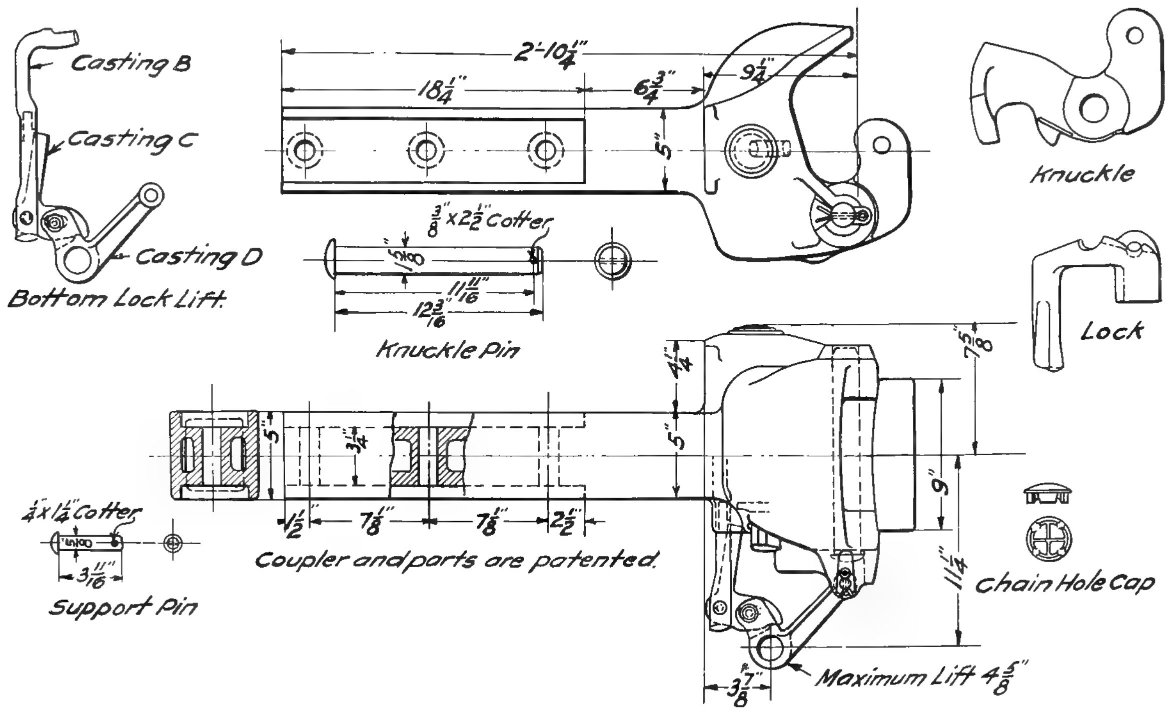


Fig. 666—Sharon Bottom Operating Passenger Coupler and Parts. National Malleable Castings Company.

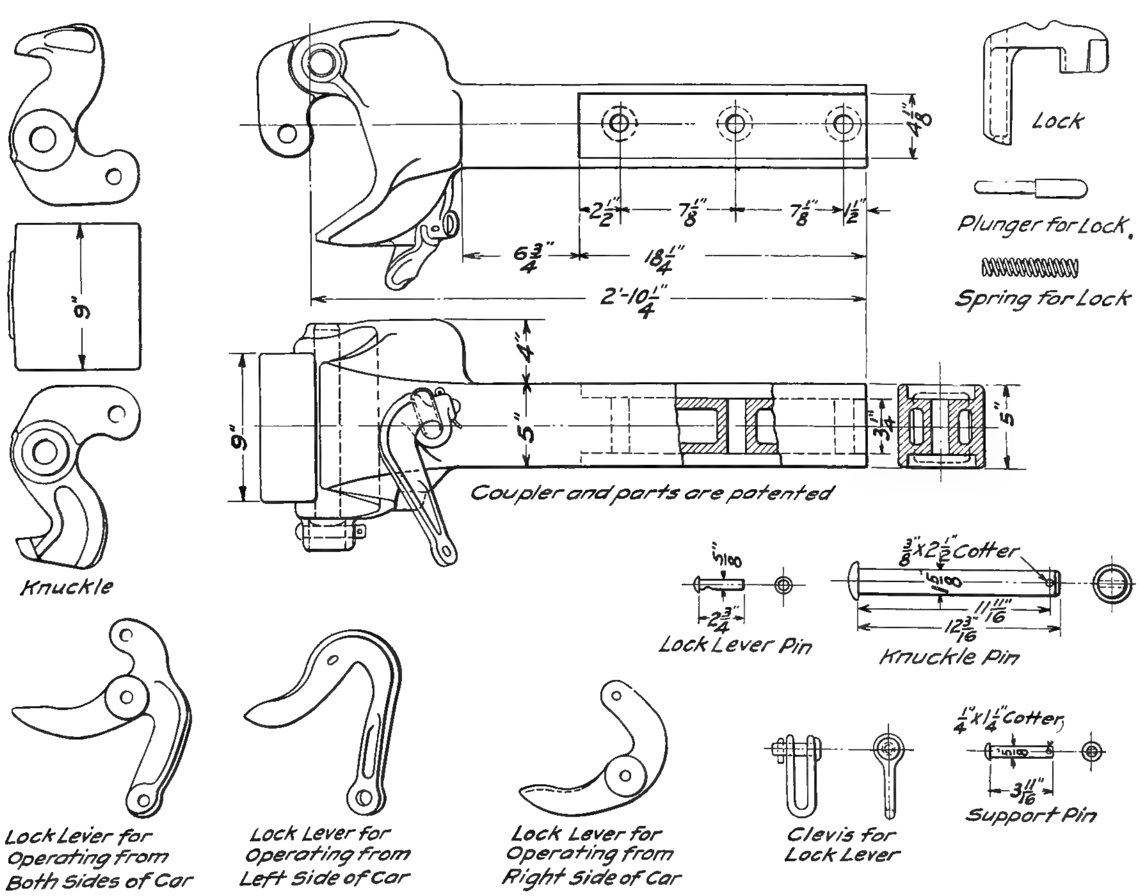


Fig. 667—Tower Passenger Coupler and Parts. National Malleable Castings Company.

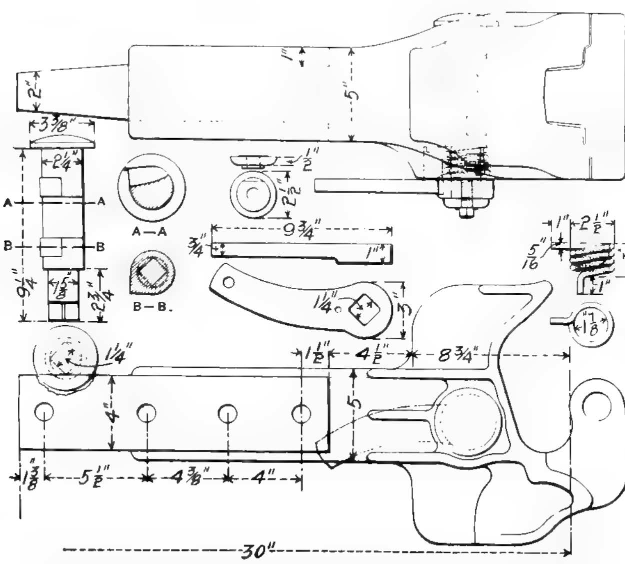


Fig. 668—Standard Passenger Coupler and Parts. Standard Coupler Company.

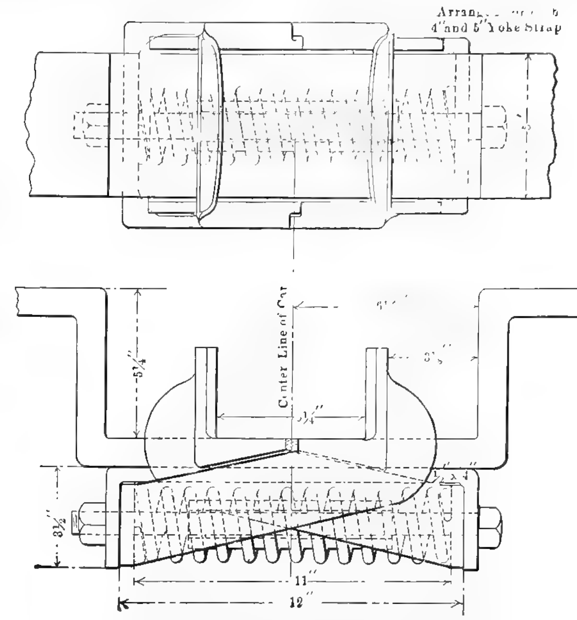


Fig. 669—National Drawbar Centering Yoke. National Car Coupler Company.

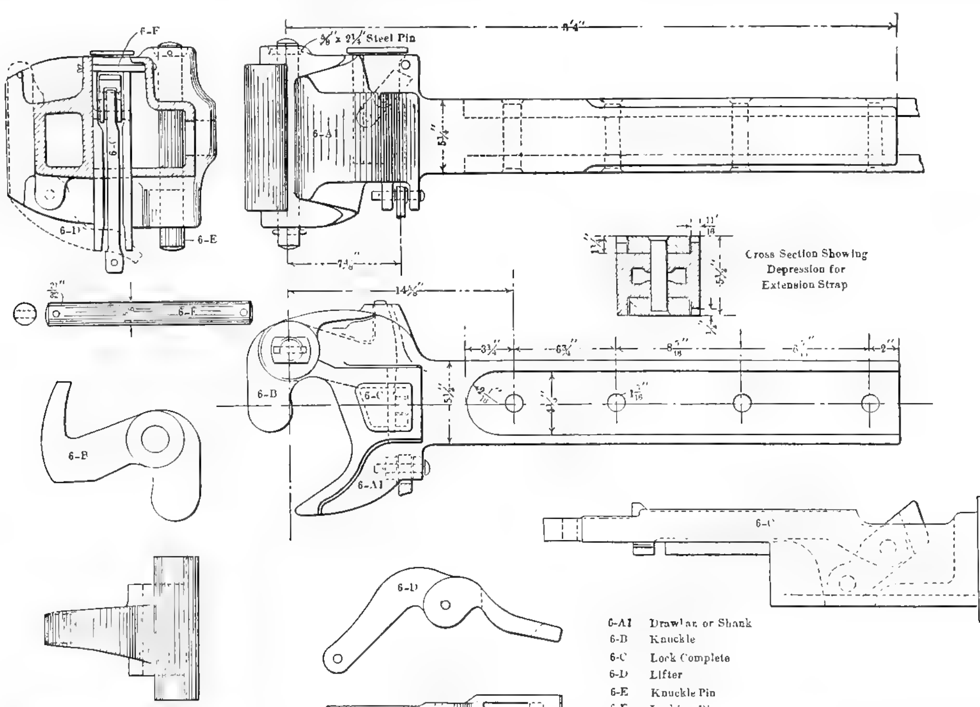


Fig. 670—National Passenger Coupler No. 6A1 and Parts. National Car Coupler Company.

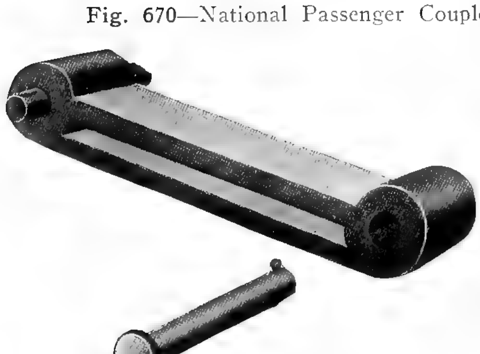


Fig. 671—Flory Cast Steel Reversible Carry Iron for Freight Couplers.

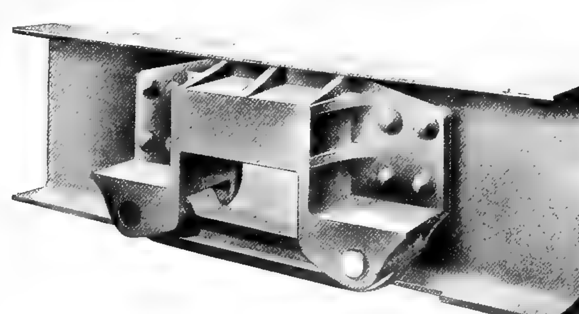


Fig. 671A—Flory Cast Steel Reversible Carry Iron and Striking Plate for Steel Freight Cars.

Commonwealth Steel Company.

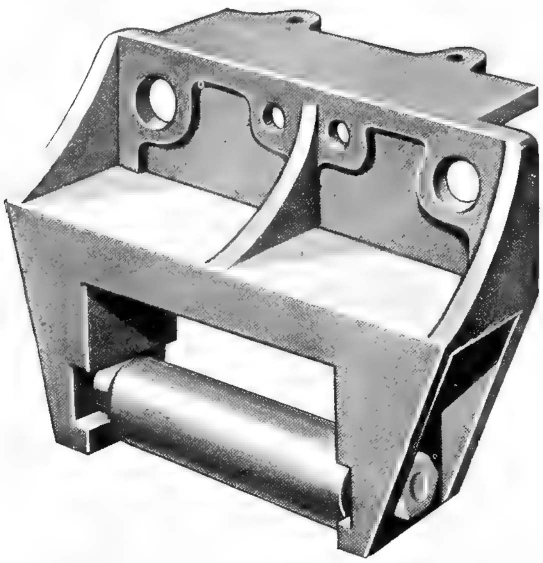


Fig. 672—Flory Carry Iron for Wooden Cars.

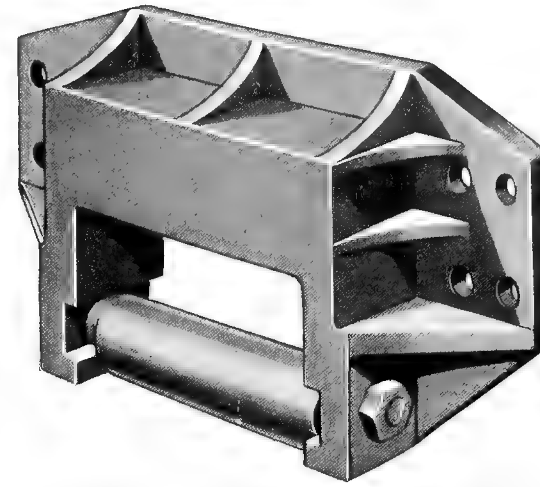


Fig. 673—Flory Carry Iron for Steel Cars.

Commonwealth Steel Company.

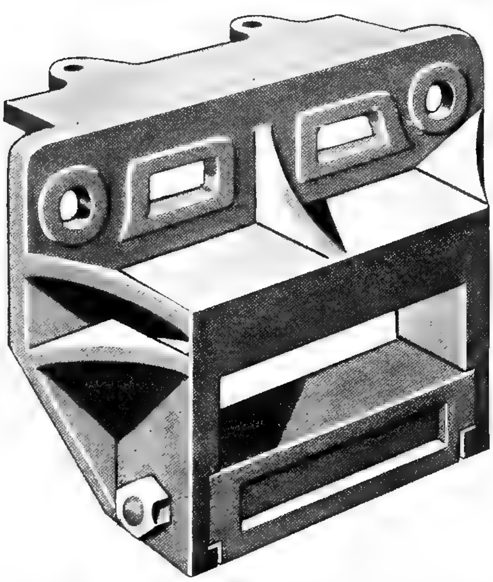


Fig. 674—Lug-Supported Carry Iron for Wooden Cars.
Commonwealth Steel Company.

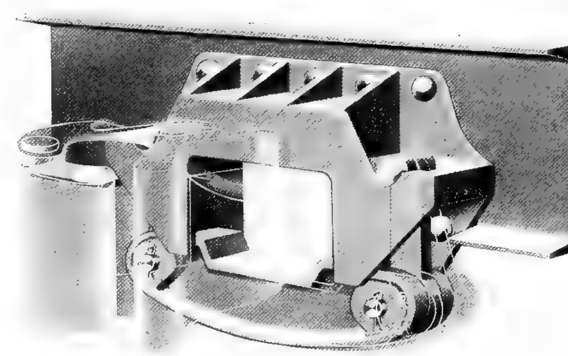


Fig. 675—Imperial Centering Device.
Imperial Appliance Company.

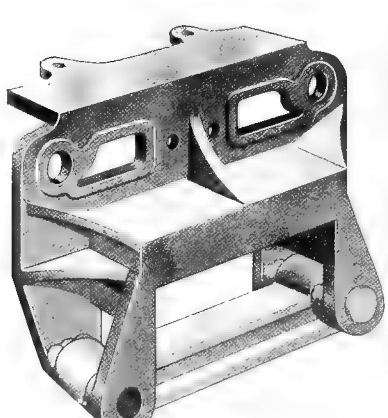


Fig. 676—Flory Cast Steel Reversible Carry Iron and Striking Plate for Wooden Freight Cars.
Commonwealth Steel Company.

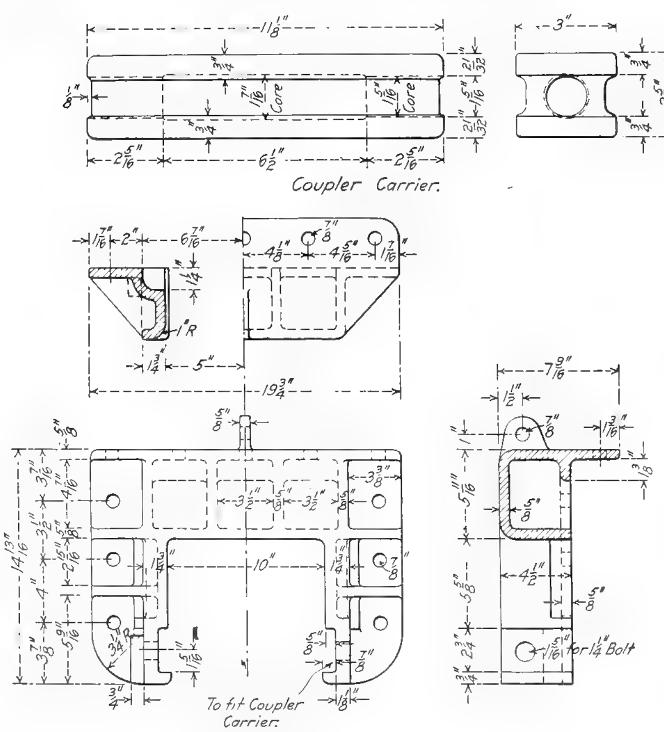


Fig. 677—Coupler Carry Iron and Striking Plate for Central of New Jersey Ice Car.

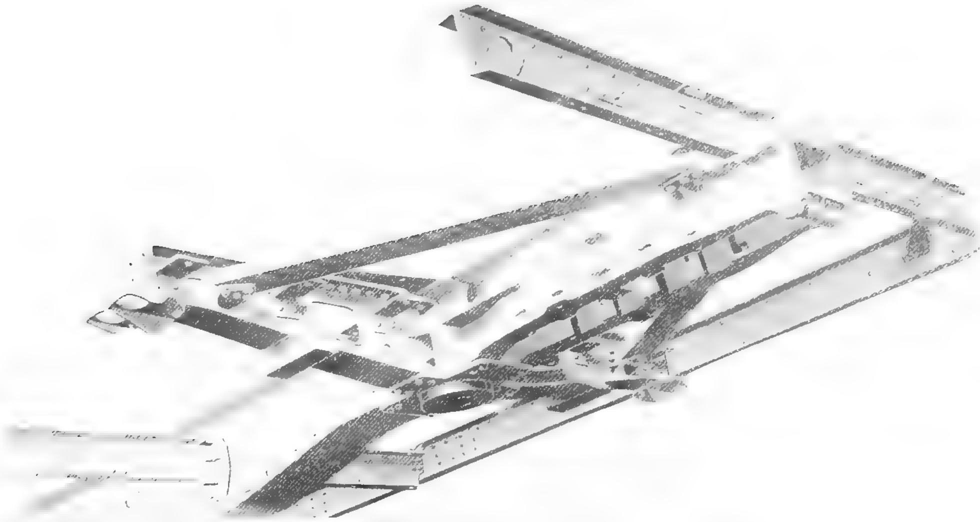


Fig. 678—End Construction of Bettendorf Single Center Sill Underframe, Showing Arrangements for Draft Gear. The Bettendorf Company.

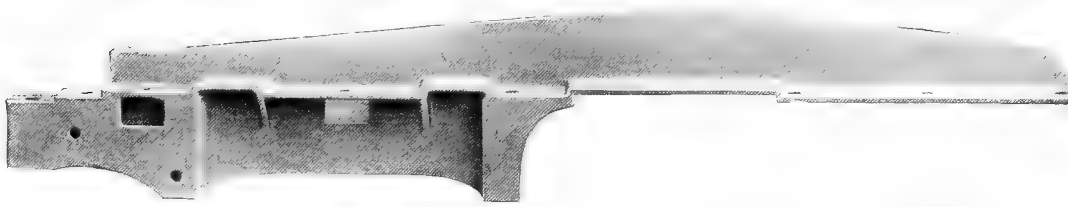


Fig. 679—Inside View of Economy Draft Arm, Showing Draft Gear Lugs or Stops. American Steel Foundries.

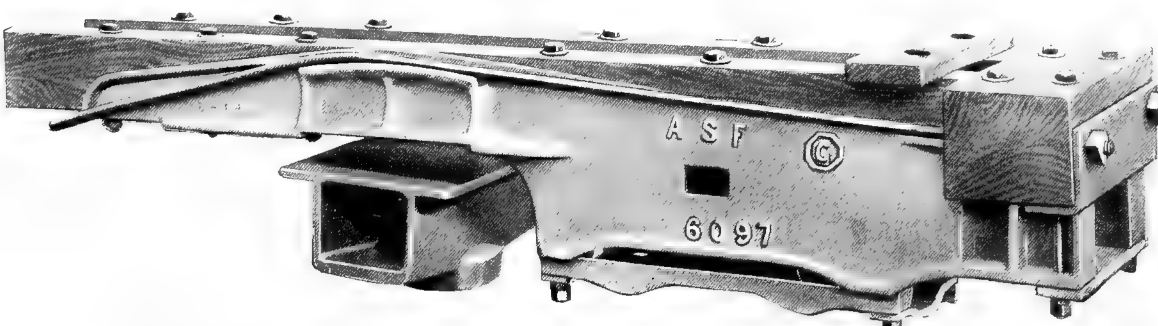


Fig. 680—Economy Draft Arms Applied to Center Sills. The Body Bolster is Dropped to Show the Recess. American Steel Foundries.

Fig. 681—Economy Draft Arms for Strengthening Wooden Freight Cars. American Steel Foundries.

Fig. 682—Economy Draft Arms for Strengthening Wooden Freight Cars. American Steel Foundries.

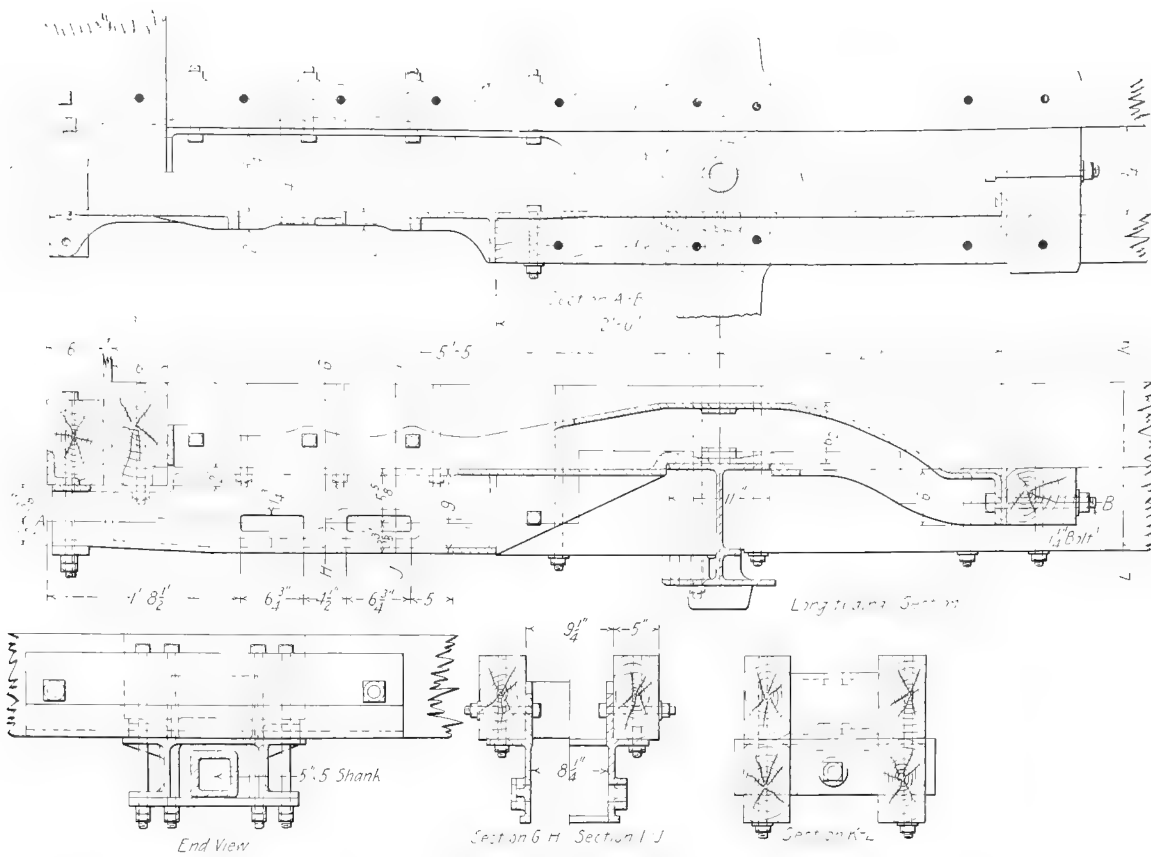


Fig. 683—Cast Steel Draft Arms Applied to Chicago Great Western Box Car. Chicago Steel Car Company.

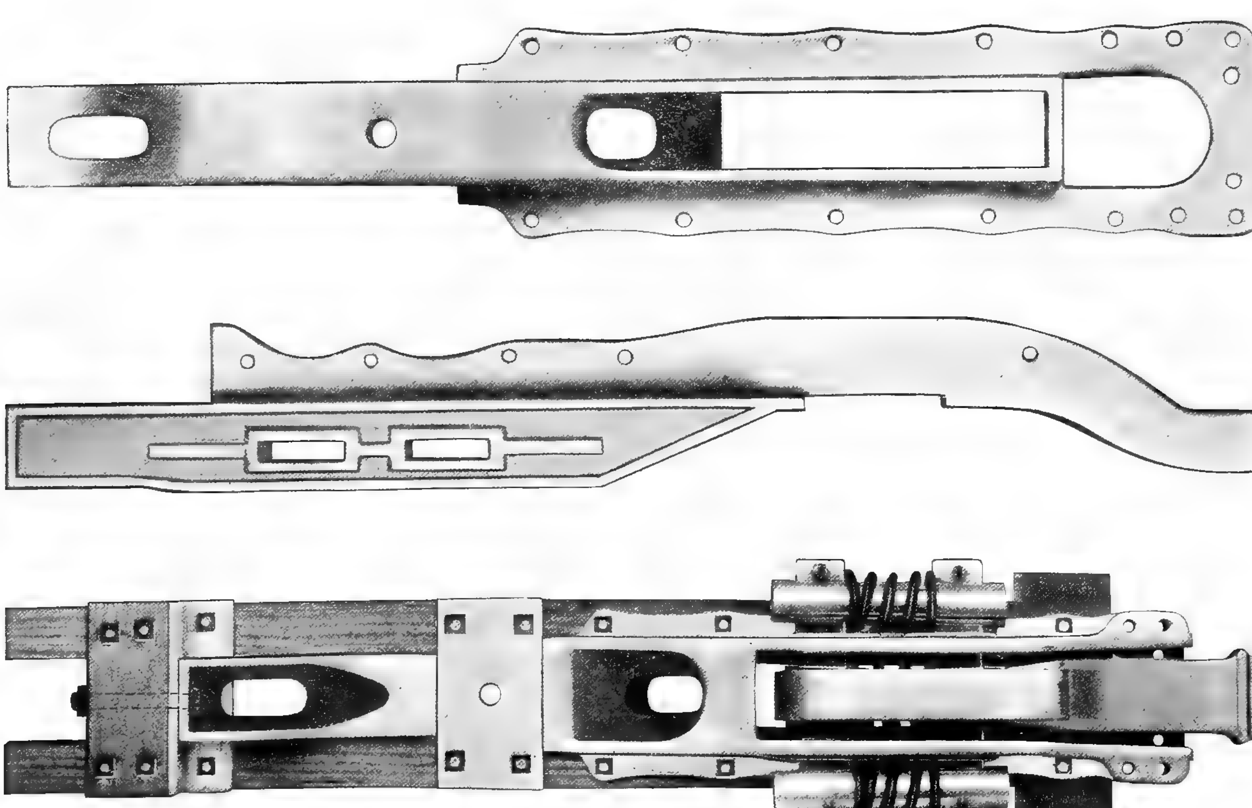


Fig. 684—Cast Steel Draft Arms. Chicago Steel Car Company.

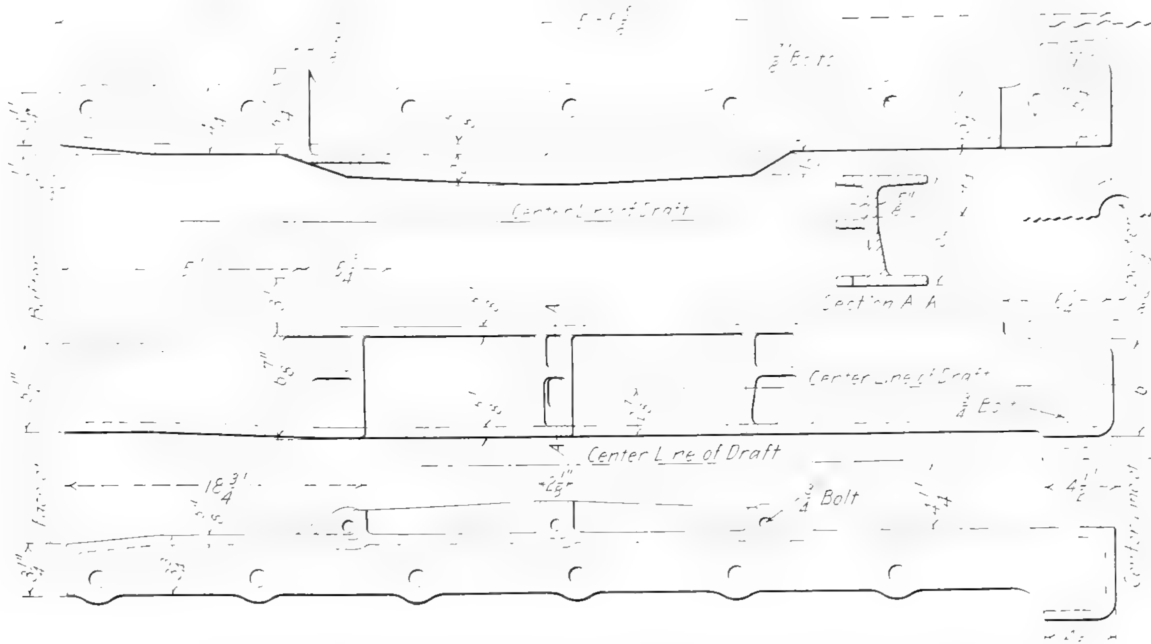


Fig. 685—Cast Steel Draft Arm. Pittsburgh Steel Foundry Company.

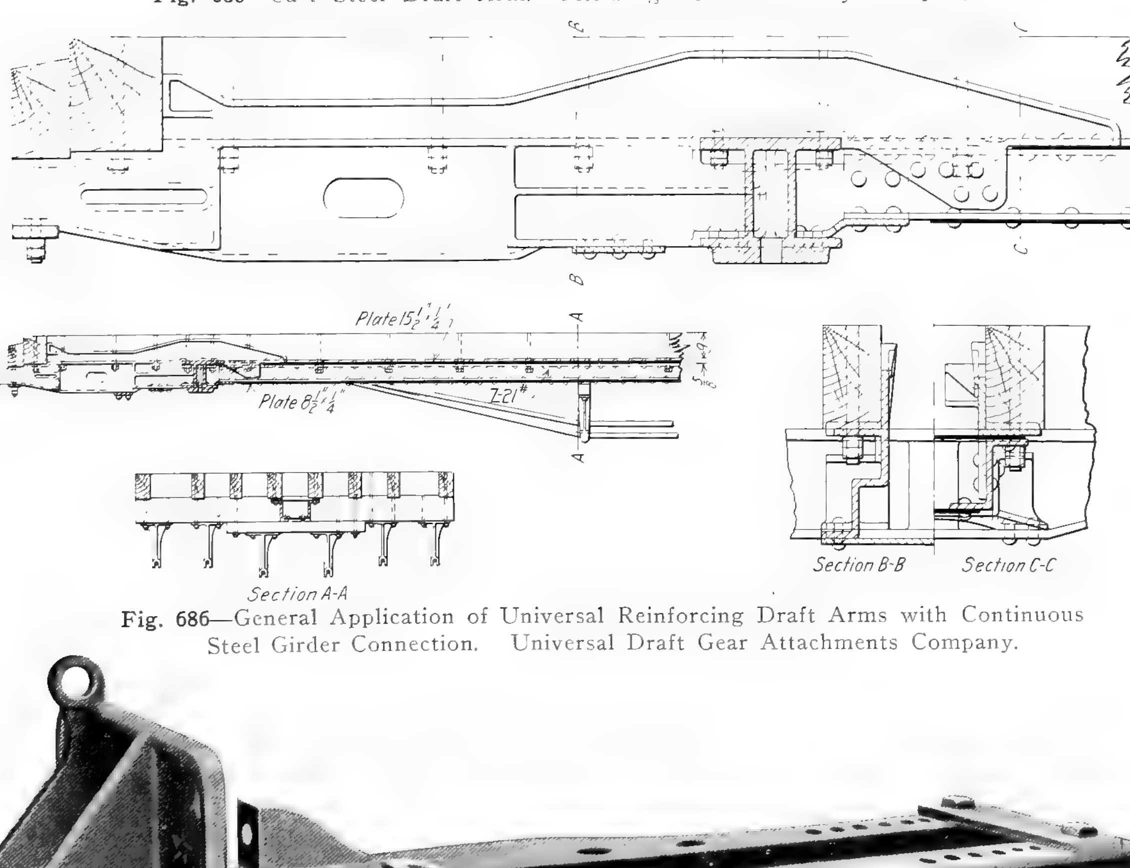


Fig. 686—General Application of Universal Reinforcing Draft Arms with Continuous Steel Girder Connection. Universal Draft Gear Attachments Company.

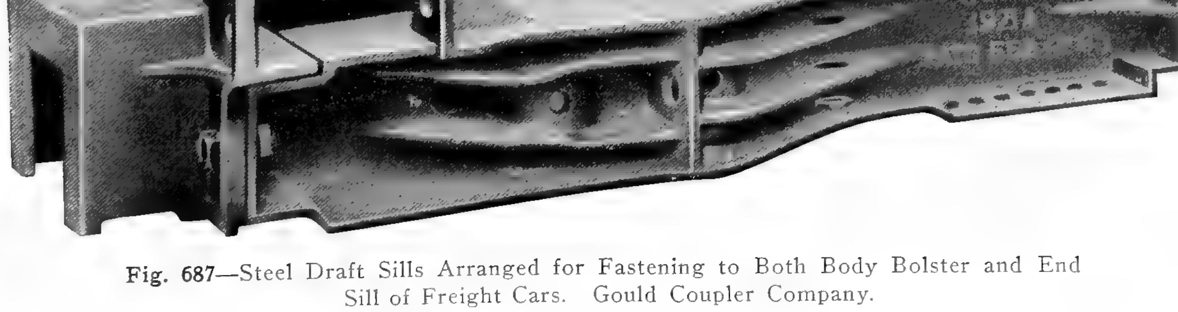


Fig. 687—Steel Draft Sills Arranged for Fastening to Both Body Bolster and End Sill of Freight Cars. Gould Coupler Company.

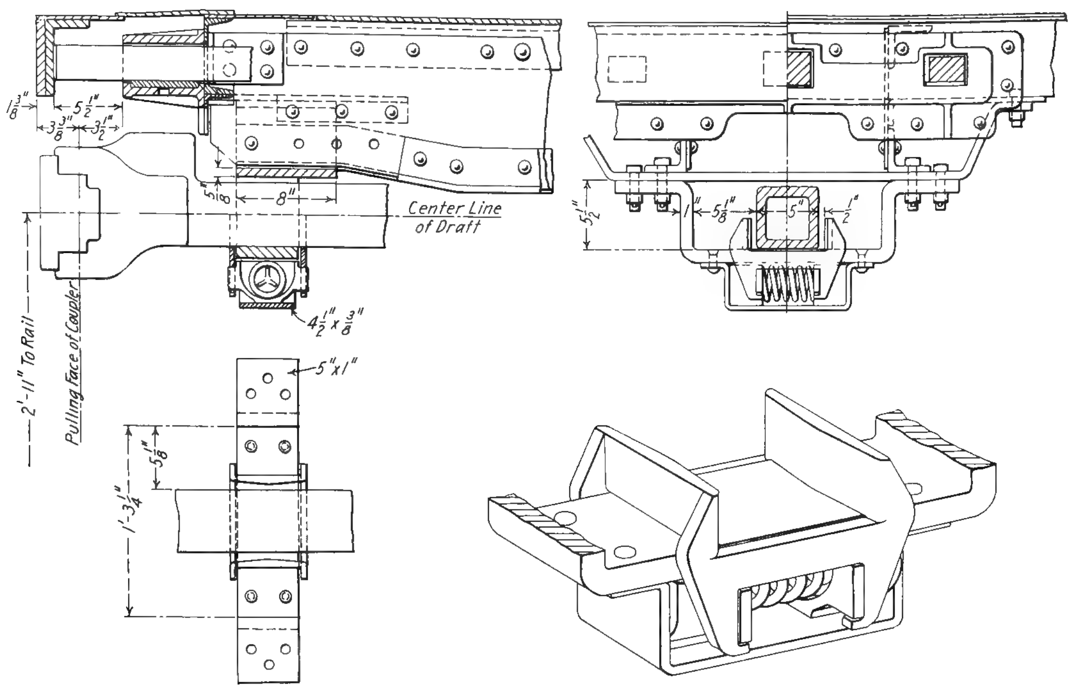


Fig. 688—Miner Coupler Centering Device as Applied to Passenger Equipment.
W. H. Miner.

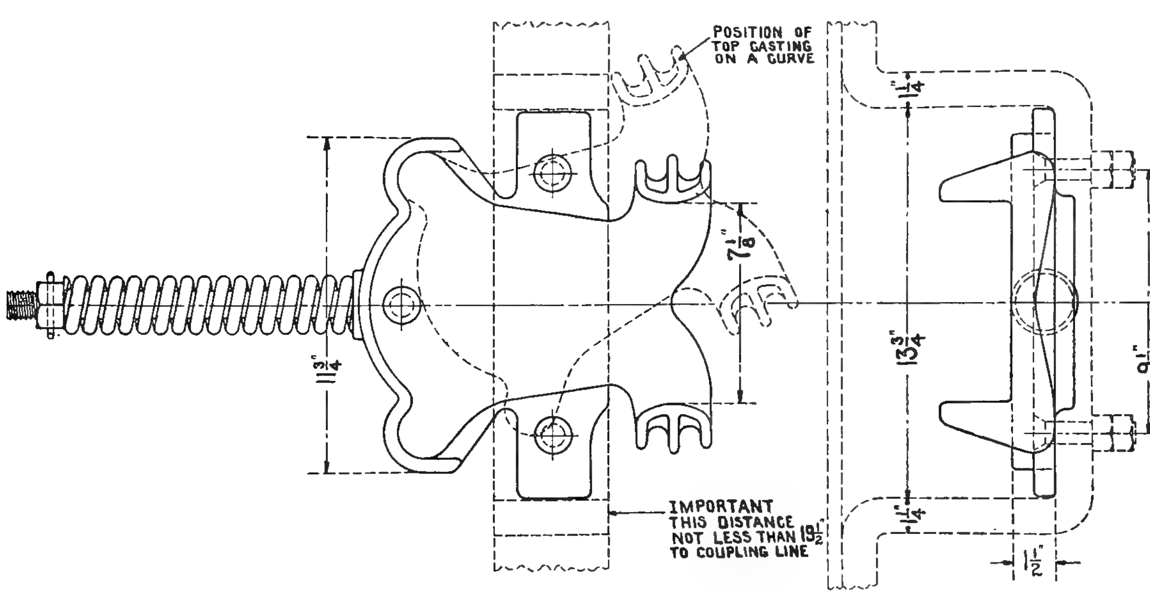


Fig. 689—Chaffee Centering Device. Waugh Draft Gear Company.

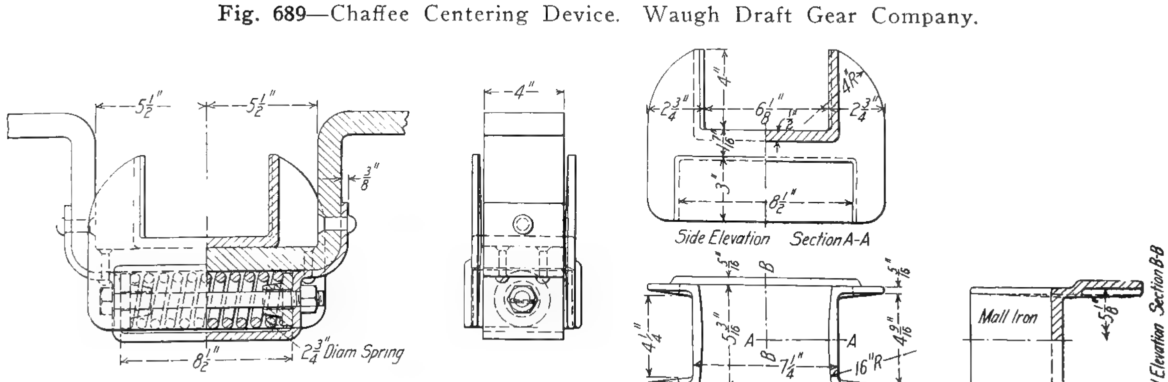


Fig. 690—Yerk Centering Device. Waugh Draft Gear Company.

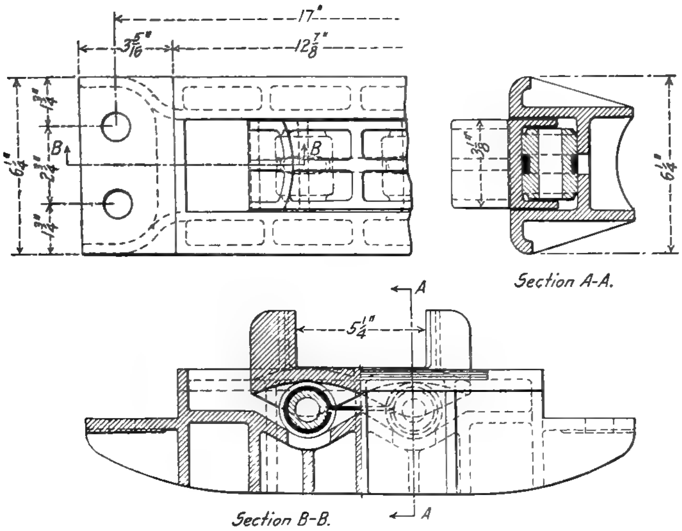


Fig. 691—Powers Gravity Centering Device for Freight Couplers.

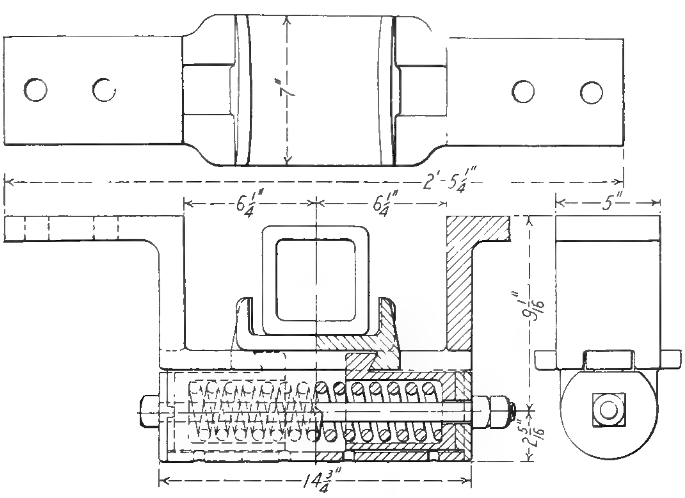


Fig. 692—Combination Coupler Carrier and Rightener. Gould Coupler Company.

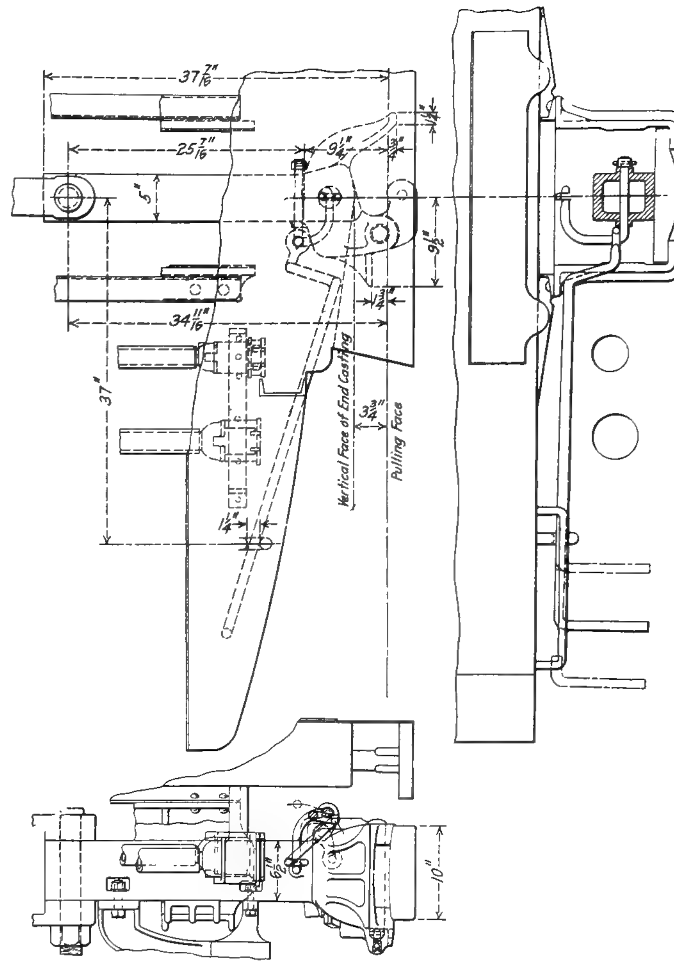


Fig. 693—Sharon Coupler with Centering Lug on Side of Head, for Long Island Railroad Cars.

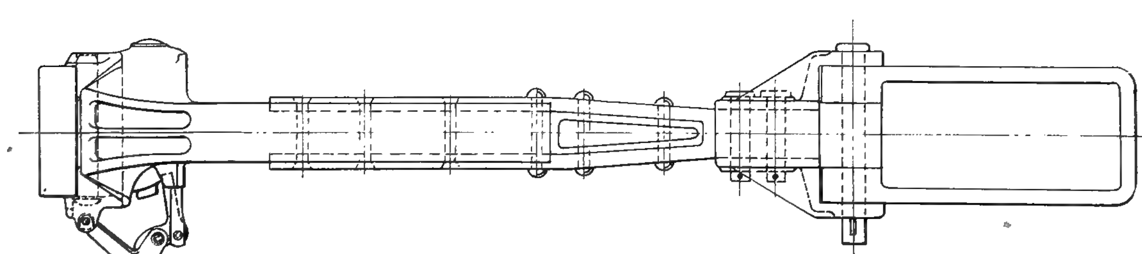


Fig. 694—Cast Steel Connection Between Wrought Shank and Yoke for Quadruple Shear Pivot Pin. National Malleable Castings Company.

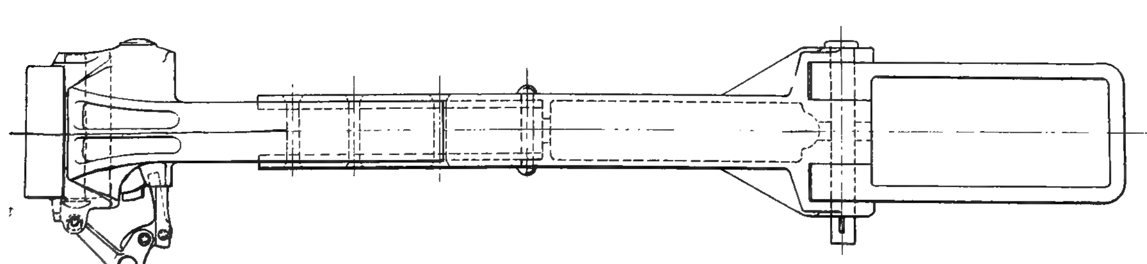


Fig. 695—Cast Steel Extended Shank and Yoke Connection for Quadruple Shear Pivot Pin. National Malleable Castings Company.

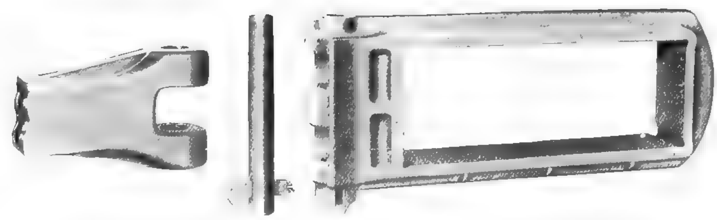


Fig. 696—Cast Steel Yoke with Quadruple Shear Pivot Pin. National Malleable Castings Company.

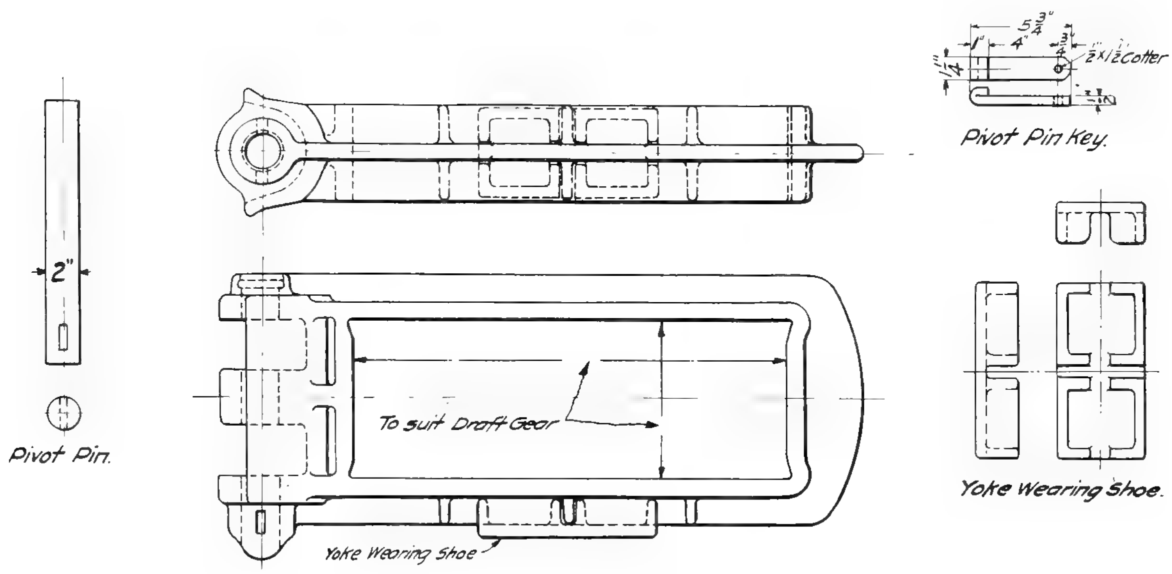


Fig. 697—Cast Steel Yoke with Quadruple Shear Pivot Pin. National Malleable Castings Company.

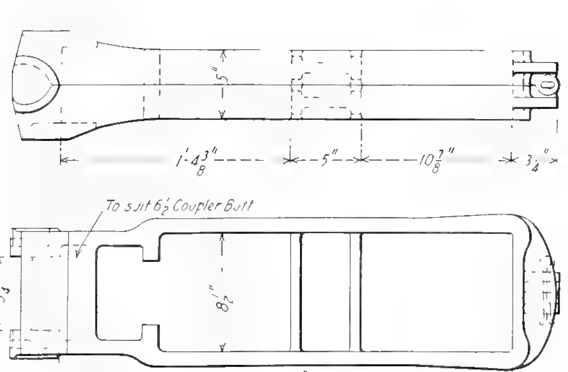


Fig. 698—Miner Two-Part Cast Steel Keyless Yoke for Tandem Rigging. W. H. Miner.

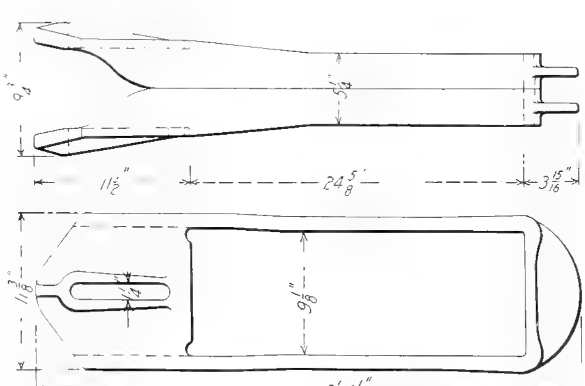


Fig. 699—Miner Two-Part Cast Steel Yoke for Friction Draft Gear Arranged for Key Connection to Coupler. W. H. Miner.

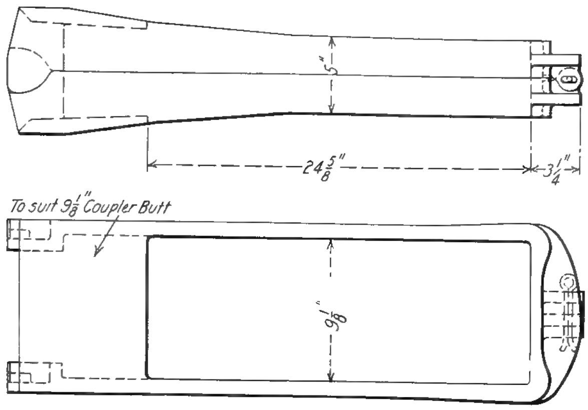


Fig. 699A—Miner Two-Part Cast Steel Keyless Yoke for Friction Draft Gear. W. H. Miner.

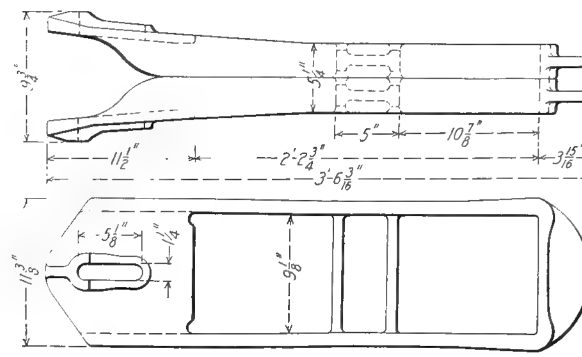


Fig. 699B—Miner Two-Part Cast Steel Yoke for Tandem Gear Arranged for Key Connection to Coupler. W. H. Miner.

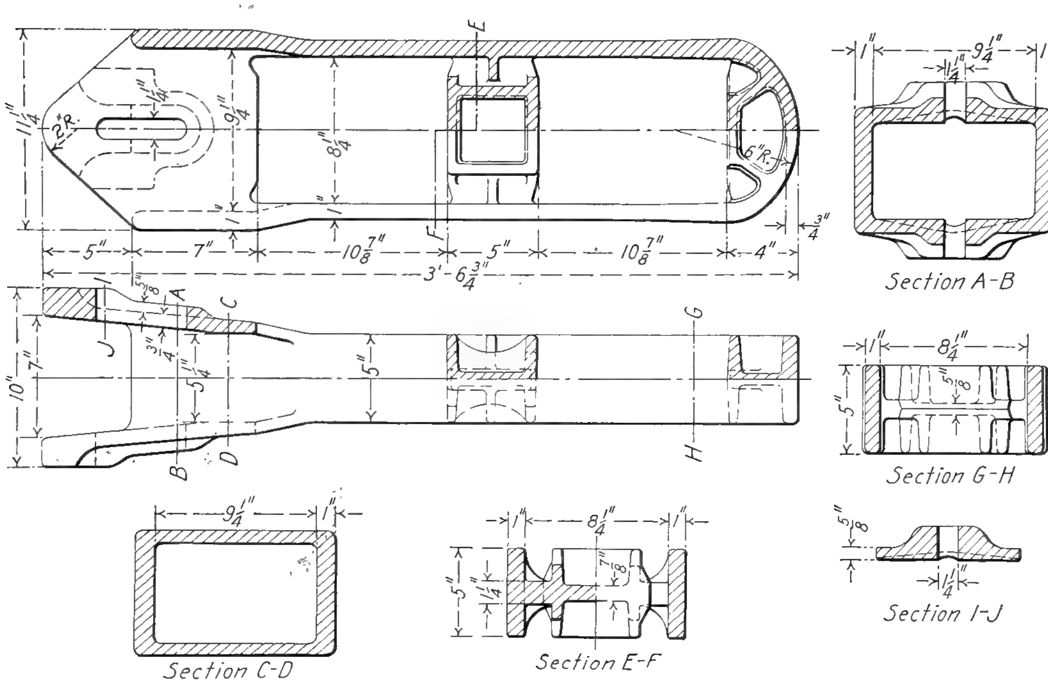


Fig. 700—Buckeye Yoke for 8 in. by 8 in. Tandem Gear. Buckeye Steel Castings Company.

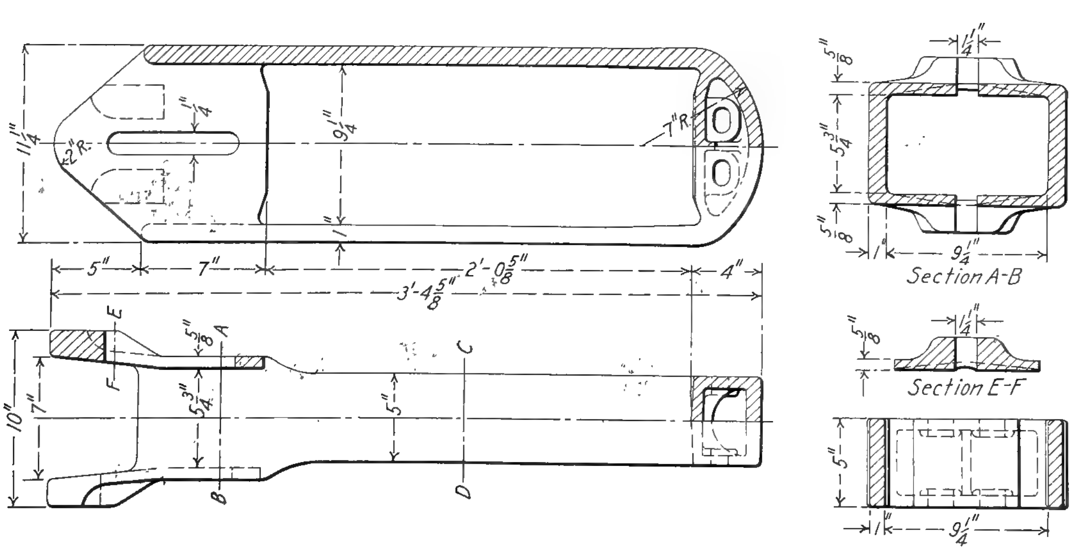


Fig. 701—Buckeye Yoke for Friction Gear. Buckeye Steel Castings Company.

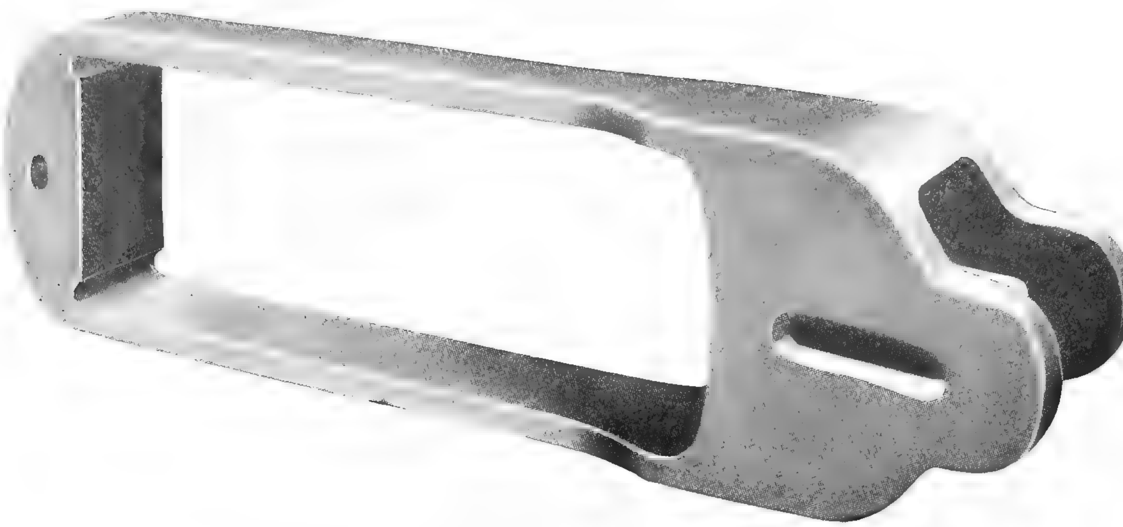


Fig. 702—Buckeye Cast Steel Keyed Yoke for Friction Gears.
Buckeye Steel Castings Company.

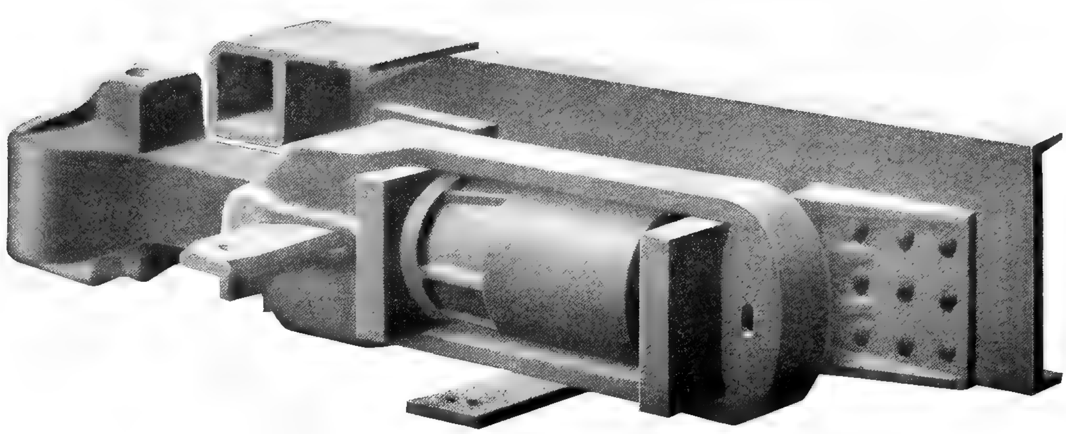


Fig. 703—Buckeye Cast Steel Keyed Yoke for Friction Gears.
Buckeye Steel Castings Company.

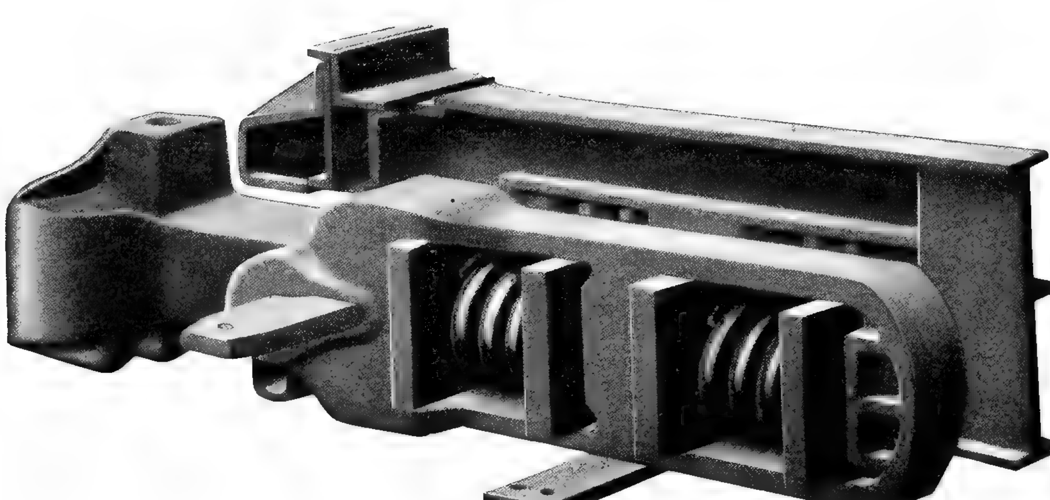


Fig. 704—Application of Buckeye Cast Steel Keyed Yoke for Tandem Gears.
Buckeye Steel Castings Company.

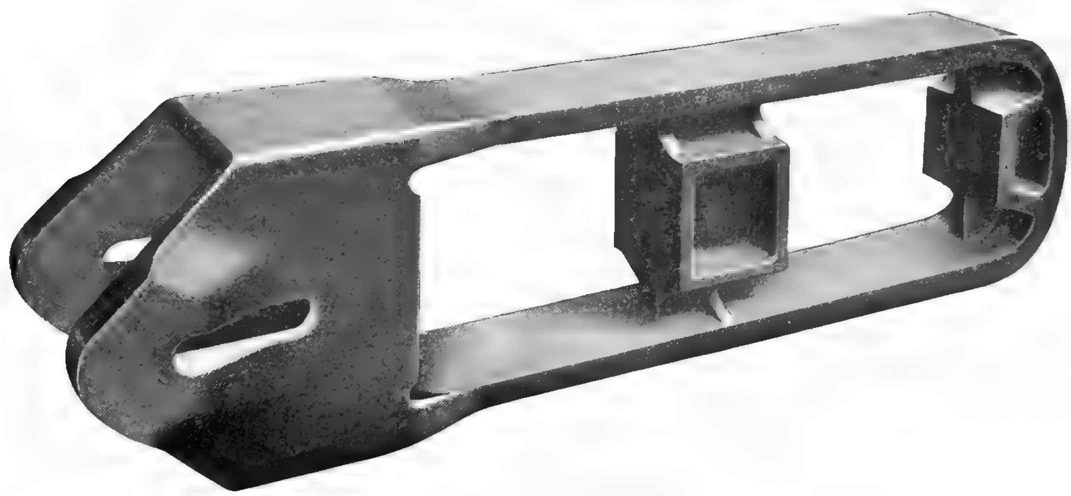


Fig. 705—Buckeye Cast Steel Keyed Yoke for Tandem Gears.
Buckeye Steel Castings Company.

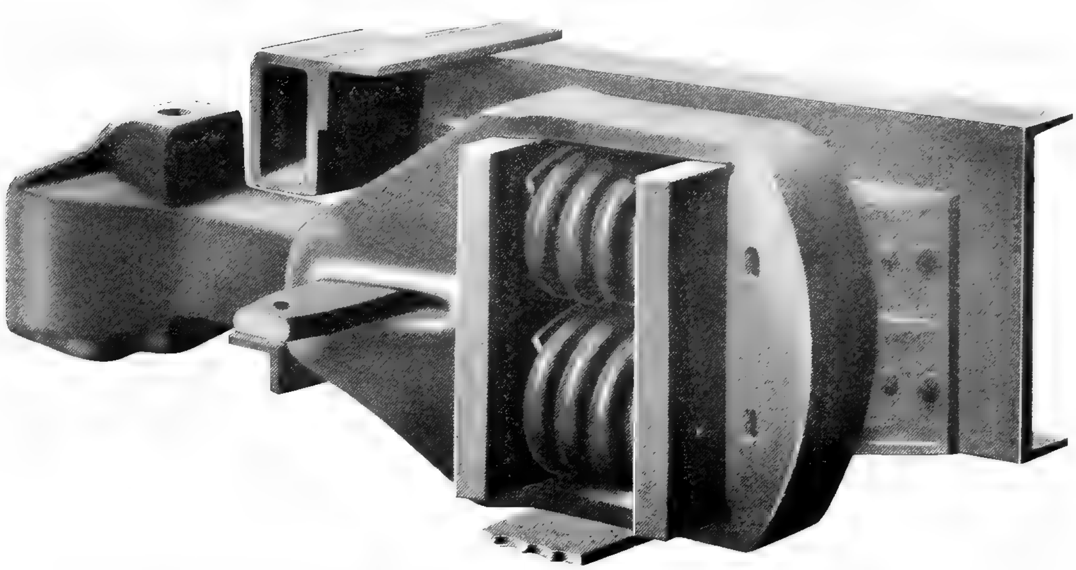


Fig. 706—Application of Buckeye Cast Steel Keyed Yoke for Twin Spring Gears.
Buckeye Steel Castings Company.

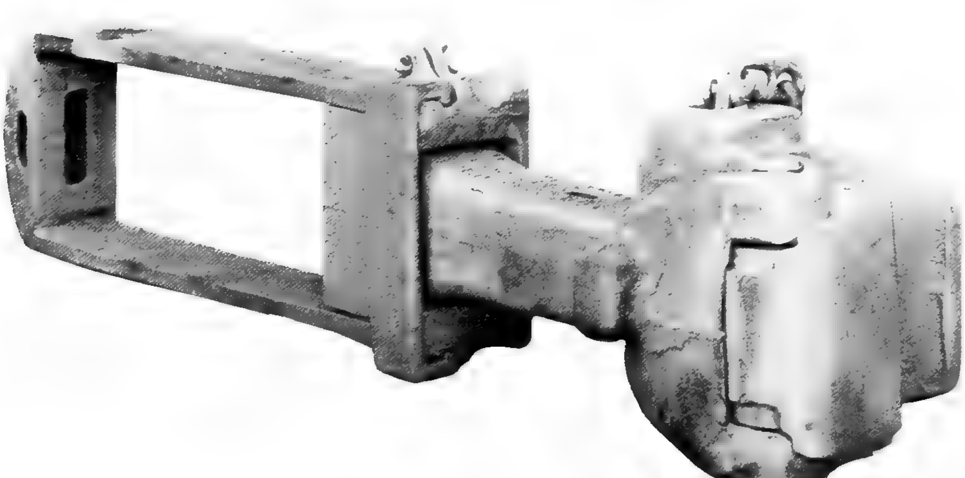


Fig. 707—Eclipse Cast Steel Coupler Yoke. National Car Equipment Company.

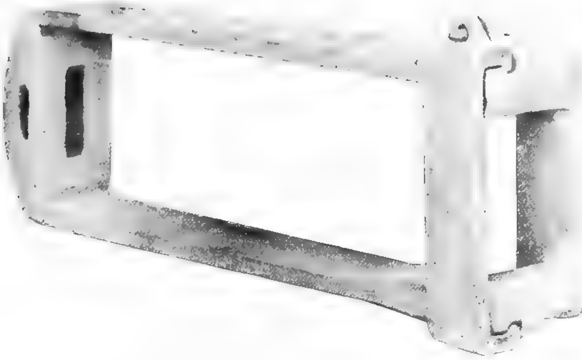


Fig. 708—Eclipse Cast Steel Coupler Yoke National Car Equipment Company.

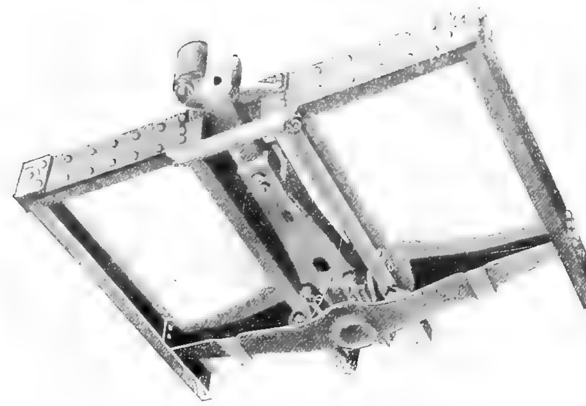


Fig. 709—Commonwealth Cast Steel Transom Draft Gear for Steel Cars. Commonwealth Steel Company.

Fig. 710—Universal Rivles Yoke for Tandem Spring Gear.

Fig. 711—Universal Keyed Yoke for Friction Draft Gear.

Fig. 712—Universal Rivles Yoke for Friction Draft Gear.

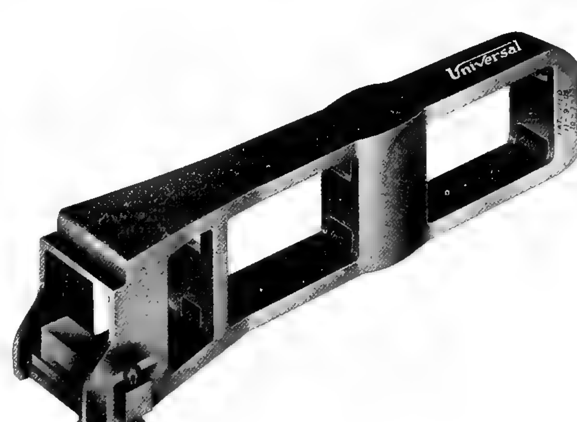


Fig. 713—Universal Lock Yoke for Tandem Spring Gear.

Universal Draft Gear Attachment Company.

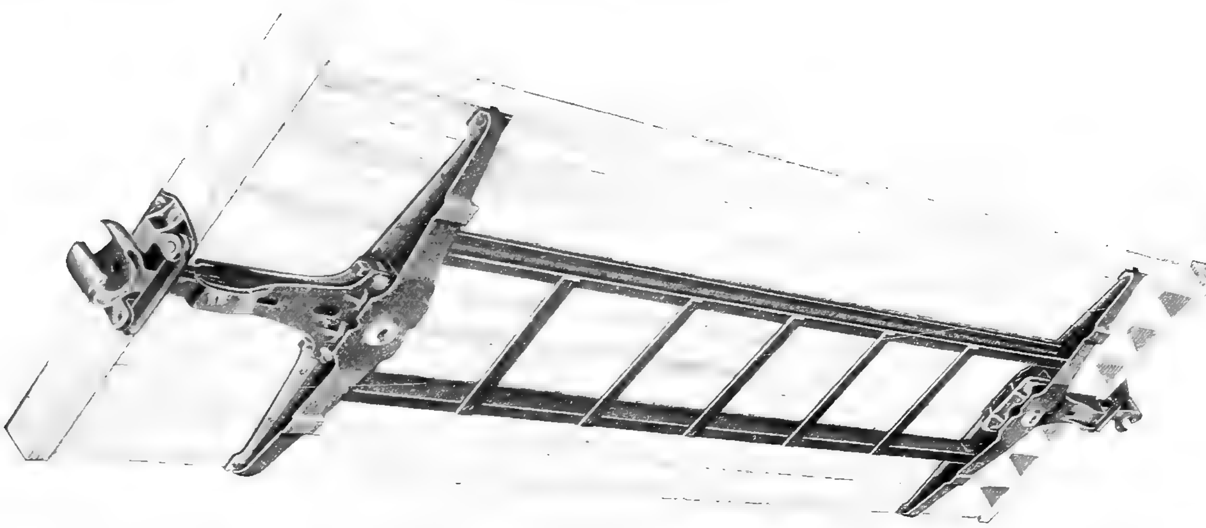


Fig. 714—Application of Cast Steel Transom Draft Gear with Reinforcements for Old Cars. Commonwealth Steel Company.

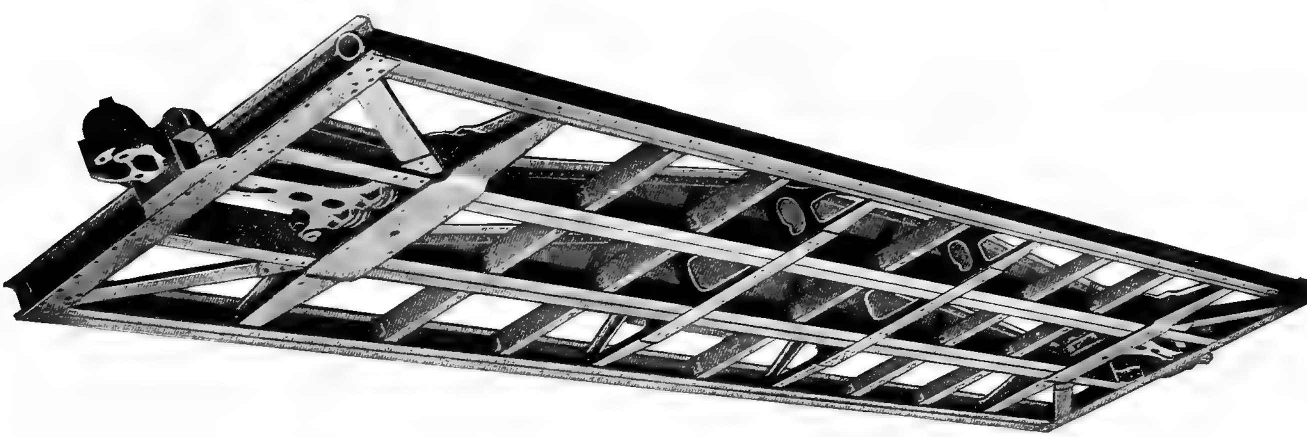


Fig. 715—Cast Steel Transom Draft Gear Applied to Steel Underframe. Commonwealth Steel Company.

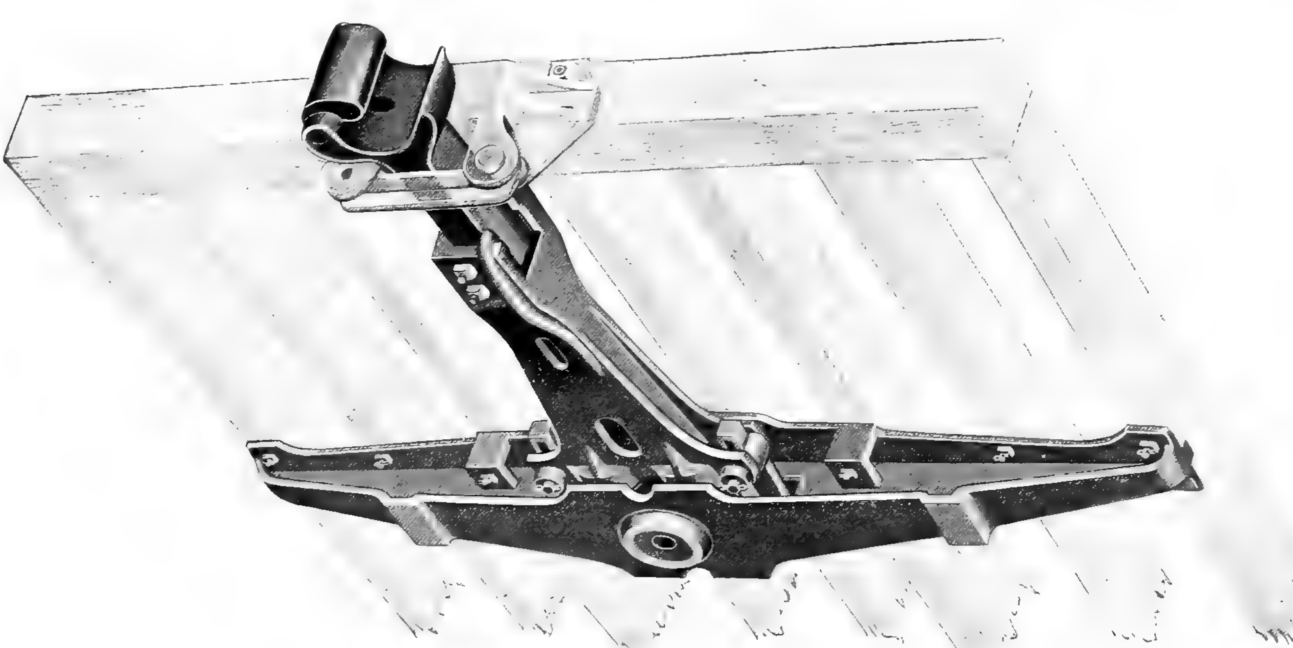


Fig. 716— Commonwealth Cast Steel Transom Draft Gear. Commonwealth Steel Company.

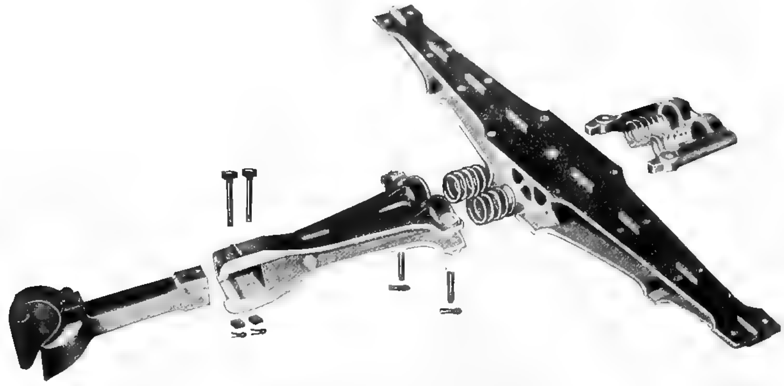


Fig. 717—Parts of Commonwealth Cast Steel Transom Draft Gear for Wooden Cars. Commonwealth Steel Company.

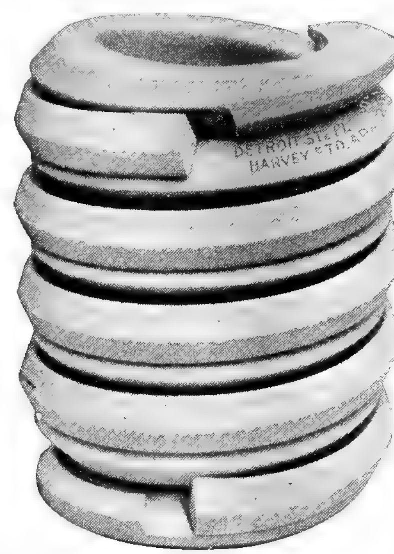


Fig. 718—Harvey Friction Spring Gear. Frost Railway Supply Company.

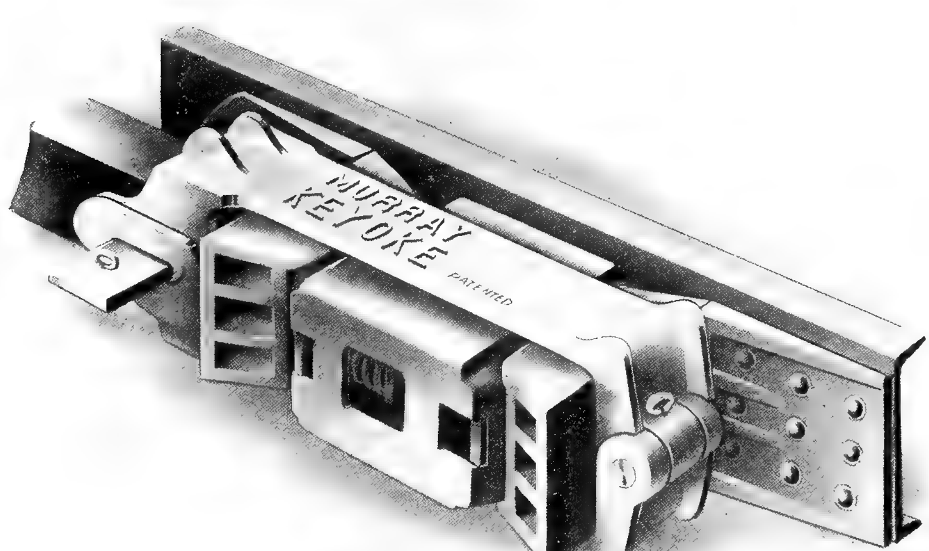


Fig. 719—Murray All Cast Steel Friction Draft Gear and Murray Cast Steel Keyoke Applied to Steel Center Sills. Keyoke Railway Equipment Company.

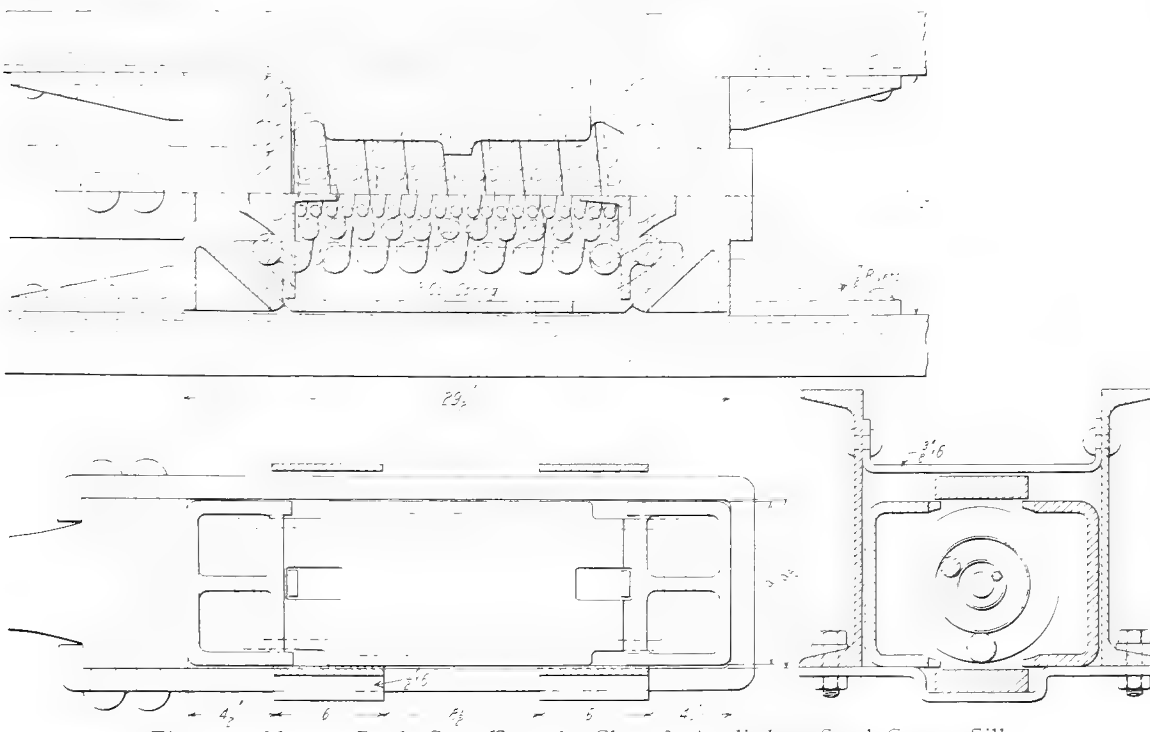


Fig. 720—Murray Draft Gear Type K, Class 3, Applied to Steel Center Sills. Keyoke Railway Equipment Company

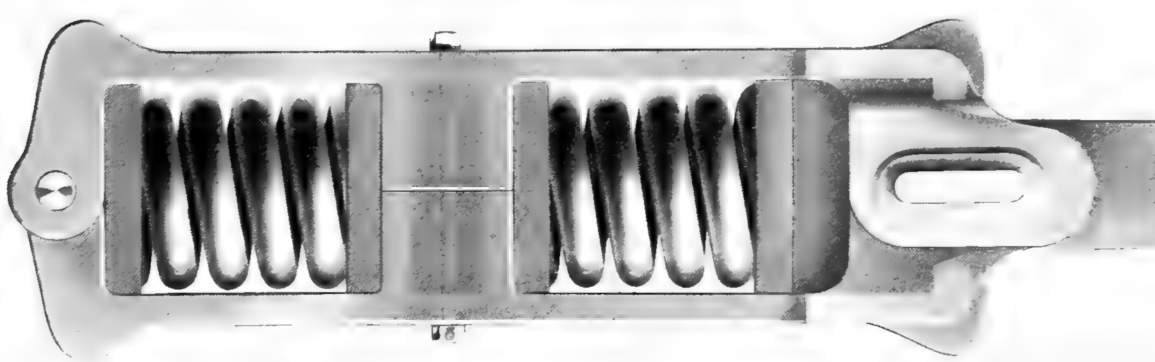


Fig. 721—Murray Keyoke for Use with Tandem Spring Draft Gear. Keyoke Railway Equipment Company.

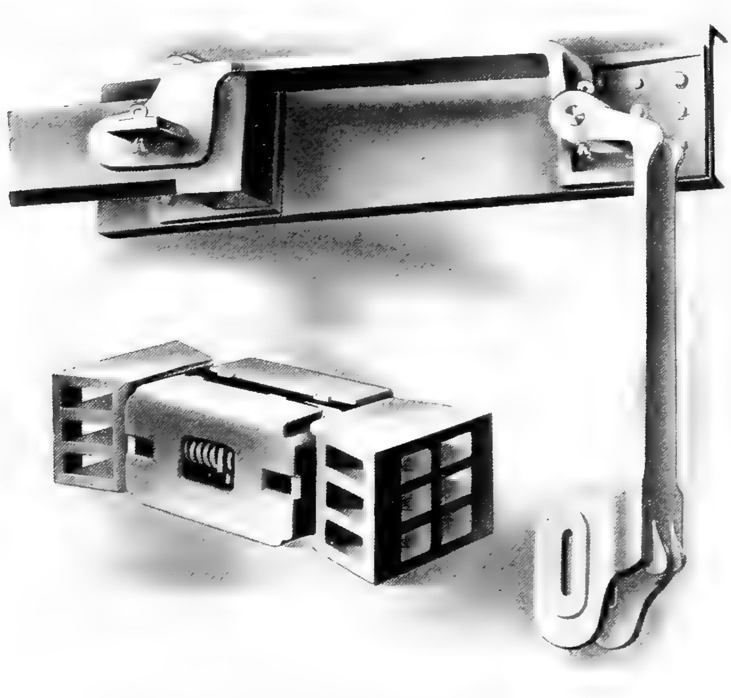
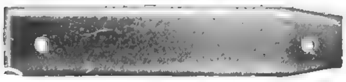
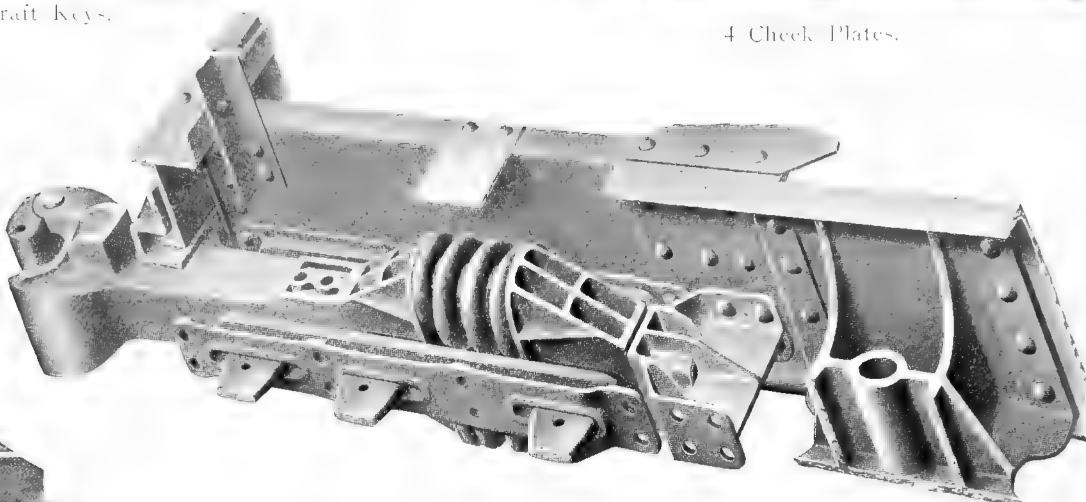


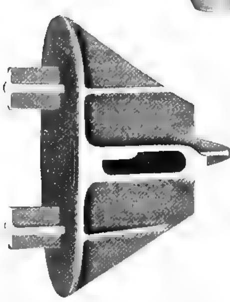
Fig. 722—Murray Keyoke with Lower Casting Dropped for Application of New Draft Gear. Keyoke Railway Equipment Company.



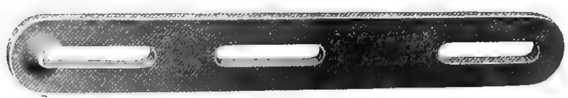
6 Draft Keys.

4 Cheek Plates.





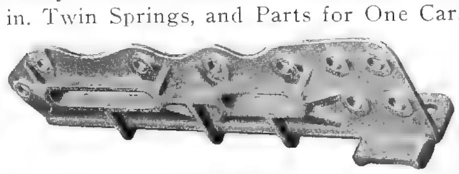
4 Follower Blocks.



4 Side Links.

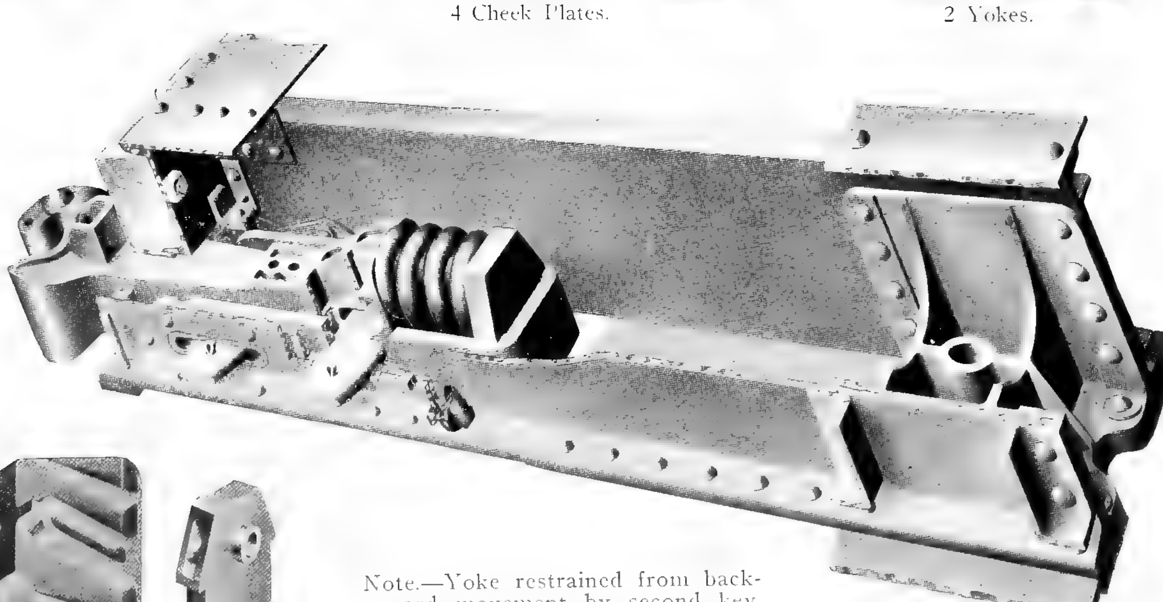
Fig. 723—Farlow Three-Key Draft Attachment for Use with M. C. B., Class G, 8 in. by 7⅞ in. Twin Springs, and Parts for One Car.

4 Draft Keys.

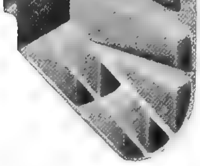


4 Cheek Plates.

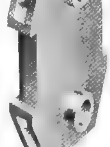
2 Yokes.



Note.—Yoke restrained from backward movement by second key, which is stationary. Front follower block, under buffing shocks, slides on second key, but its limited travel protects the springs from jamming solid.



2 Front Follower Blocks.



2 Rear Followers.

Fig. 724—Farlow Two-Key Draft Attachment for Use with M. C. B., Class G, 8 in. by 7⅞ in. Twin Springs, and Parts for One Car.
T. H. Symington Company.

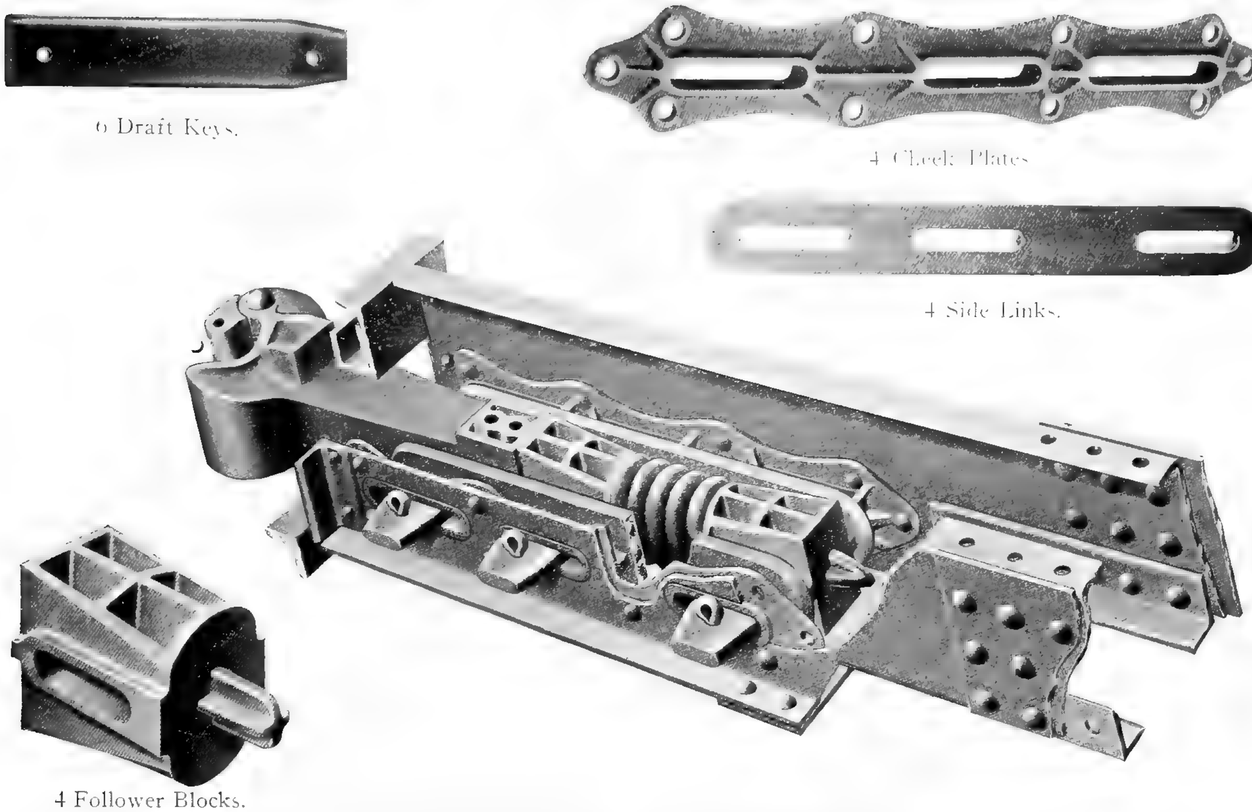


Fig. 726—Farlow Three-Key Draft Attachment for Use with M. C. B. 6¼ in. by 8 in. Single Spring, and Parts for One Car, as applied to Light Capacity Cars for Export.

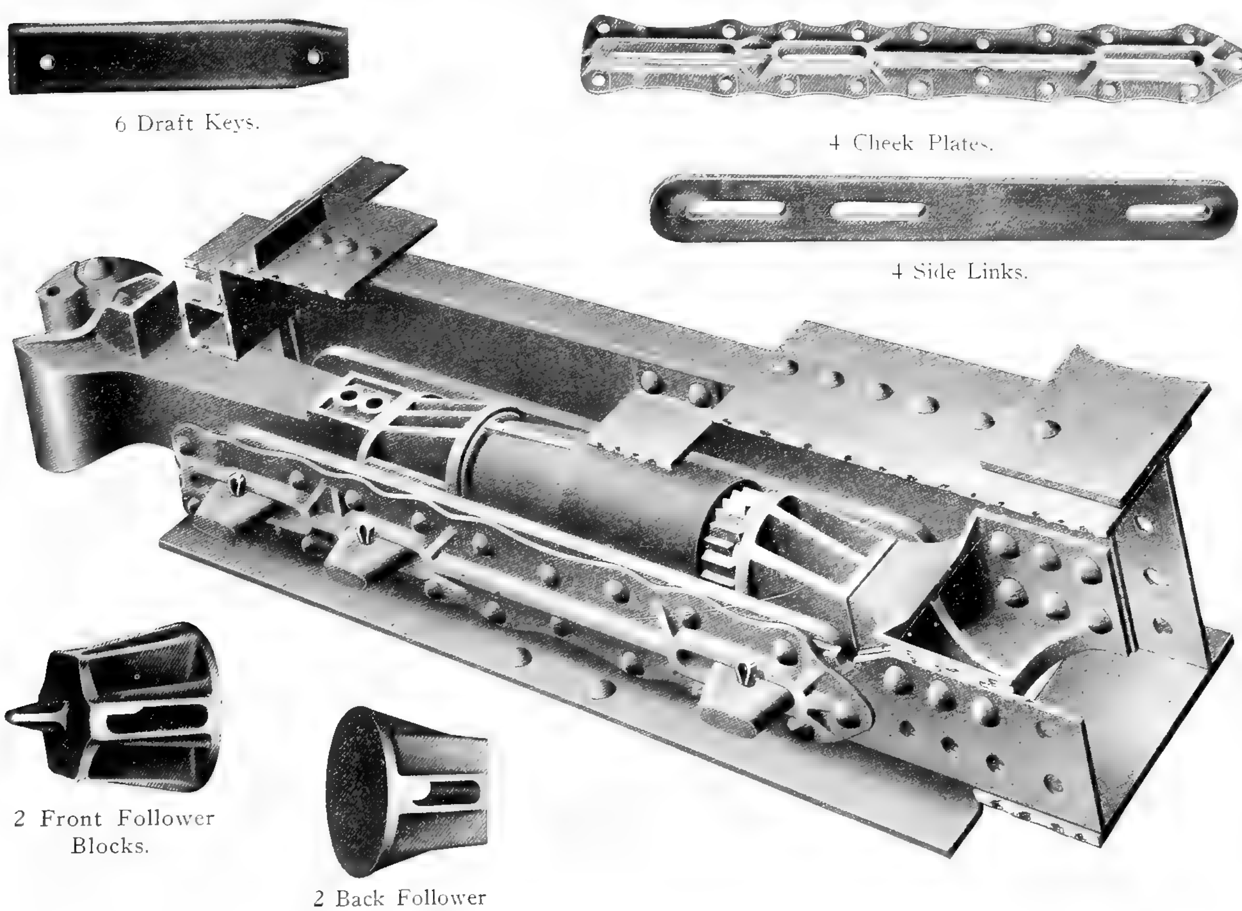
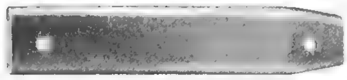
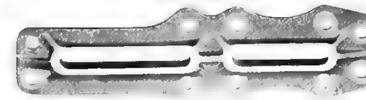


Fig. 727—Farlow Three-Key Draft Attachments for Use with Westinghouse or Any Other Type of Friction Draft Gear, and Parts for One Car.
T. H. Symington Company.

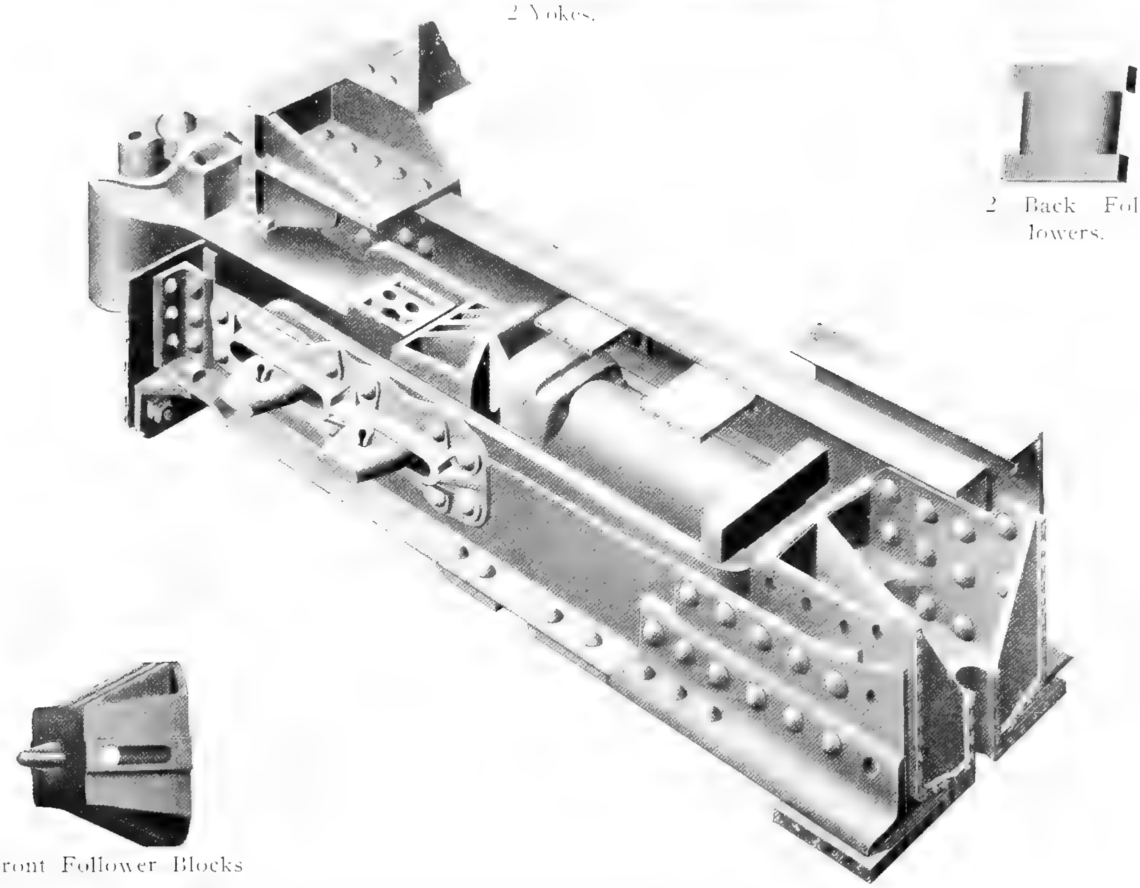


4 Drift Keys.



4 Check Plates.

2 Yokes.



2 Back Followers.

2 Front Follower Blocks

Fig. 728—Farlow Two-Key Draft Attachment for Use with Sessions or Any Other Type of Friction Draft Gear, and Parts for One Car. T. H. Symington Company.

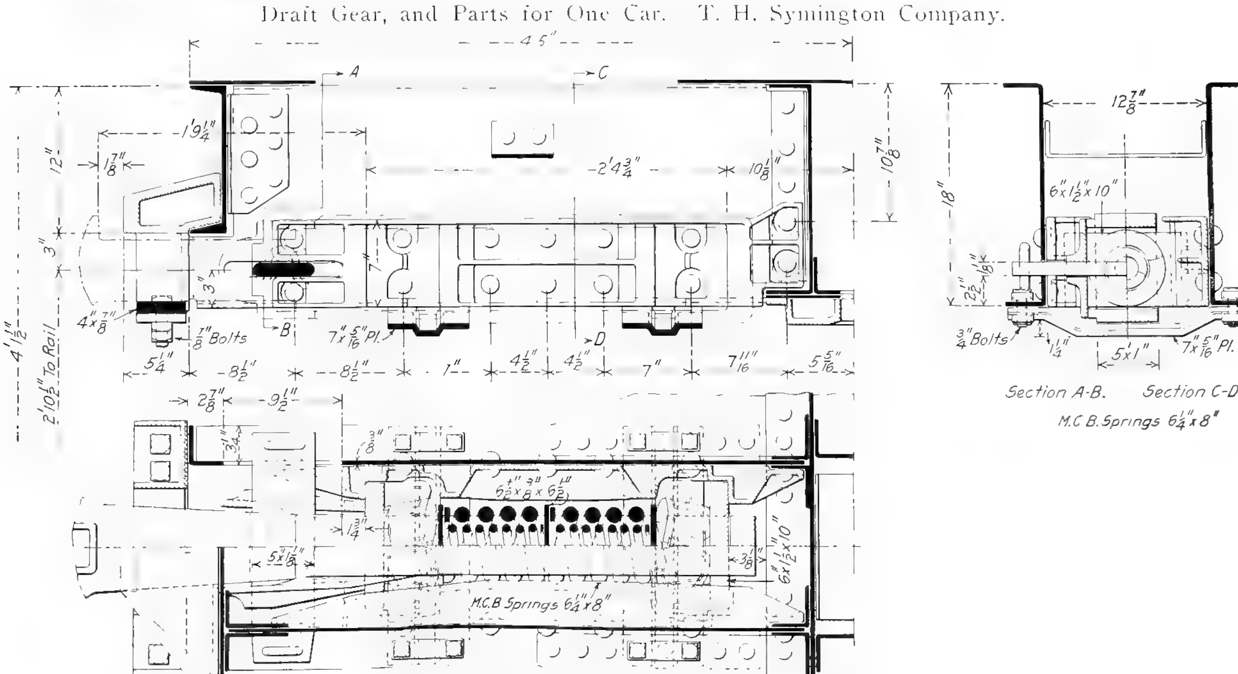


Fig. 729—Yost Draft Gear Applied to Steel Underframe Car. Hart-Otis Car Company, Limited.

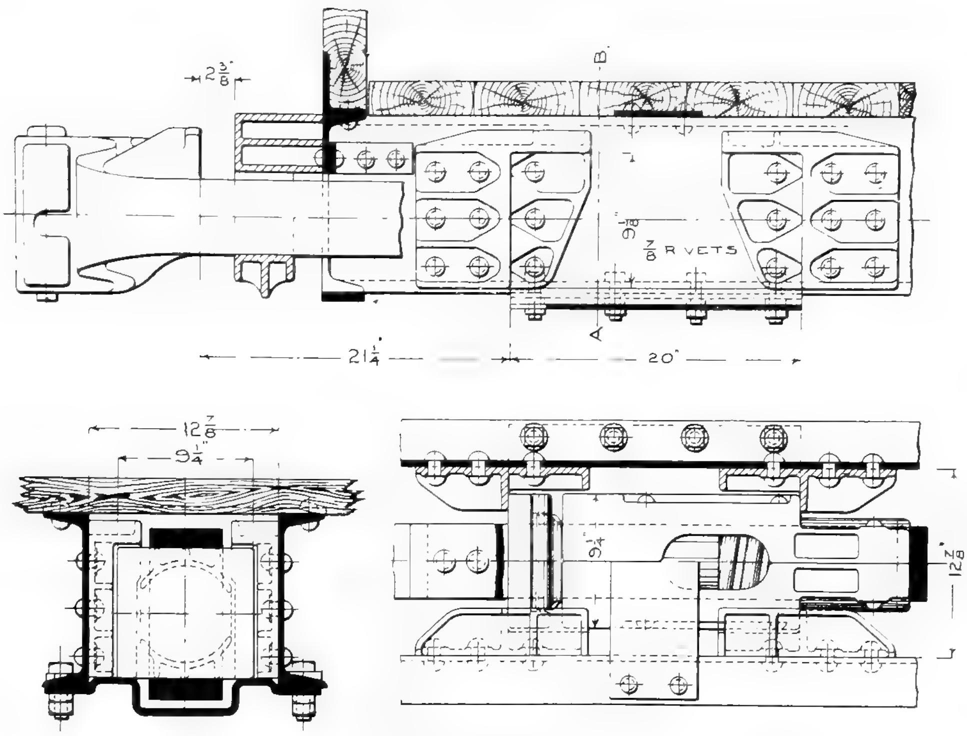


Fig. 730—McCord Draft Gear, Type D, for Steel Underframe Freight Cars. McCord & Company.

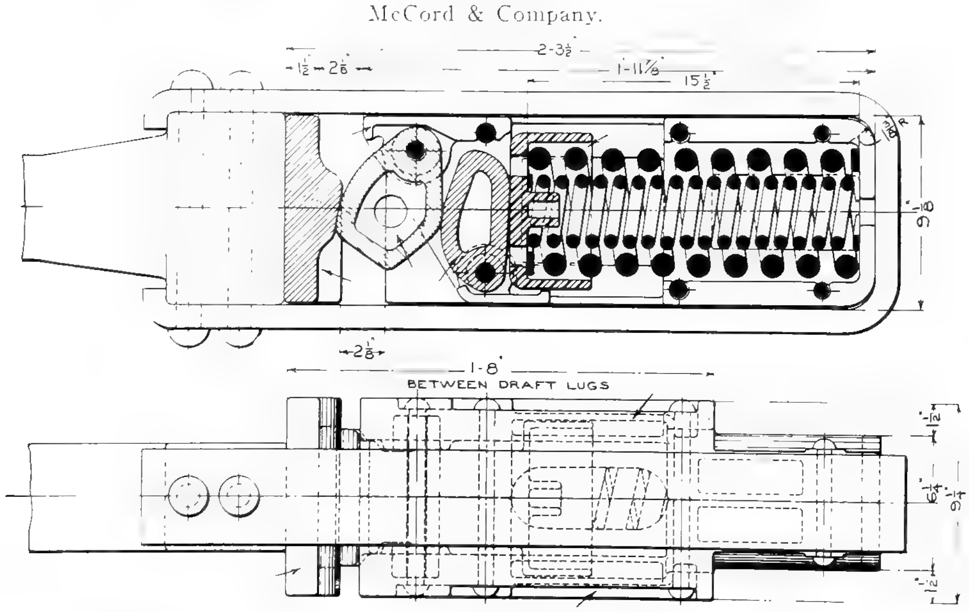


Fig. 731—General Arrangement of McCord Draft Gear, Type D. McCord & Company.

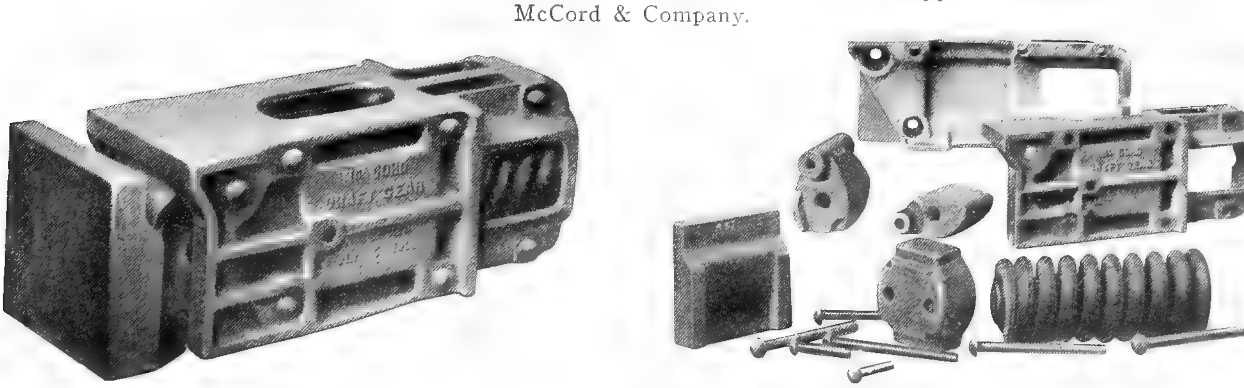


Fig. 732—McCord Draft Gear, Type D. McCord & Company.

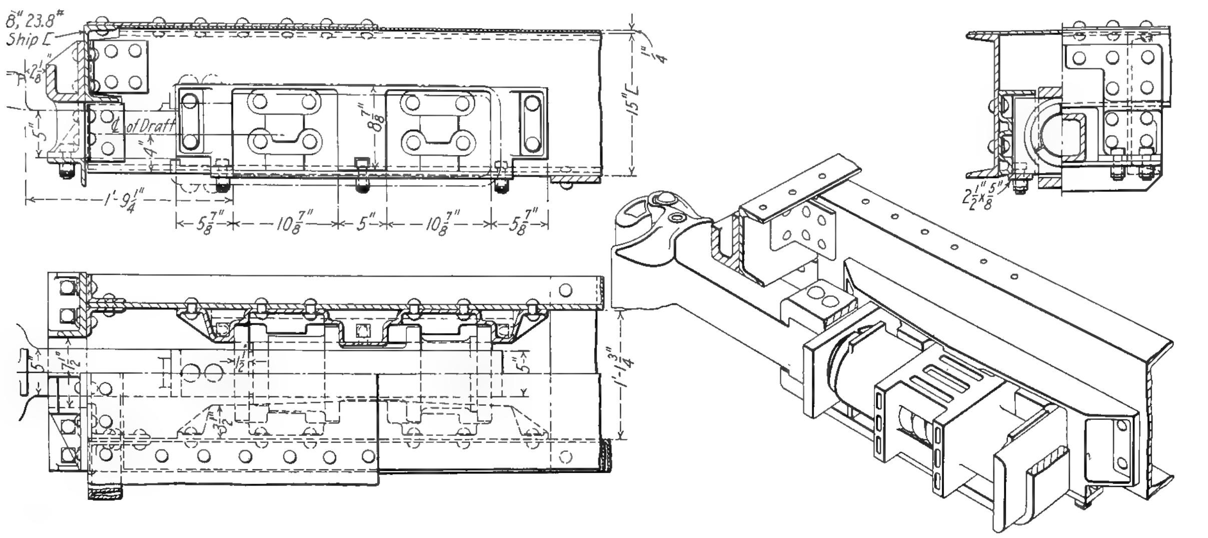


Fig. 733—Miner Friction Draft Gear for Atchison, Topeka & Santa Fe Ore Cars.
W. H. Miner.

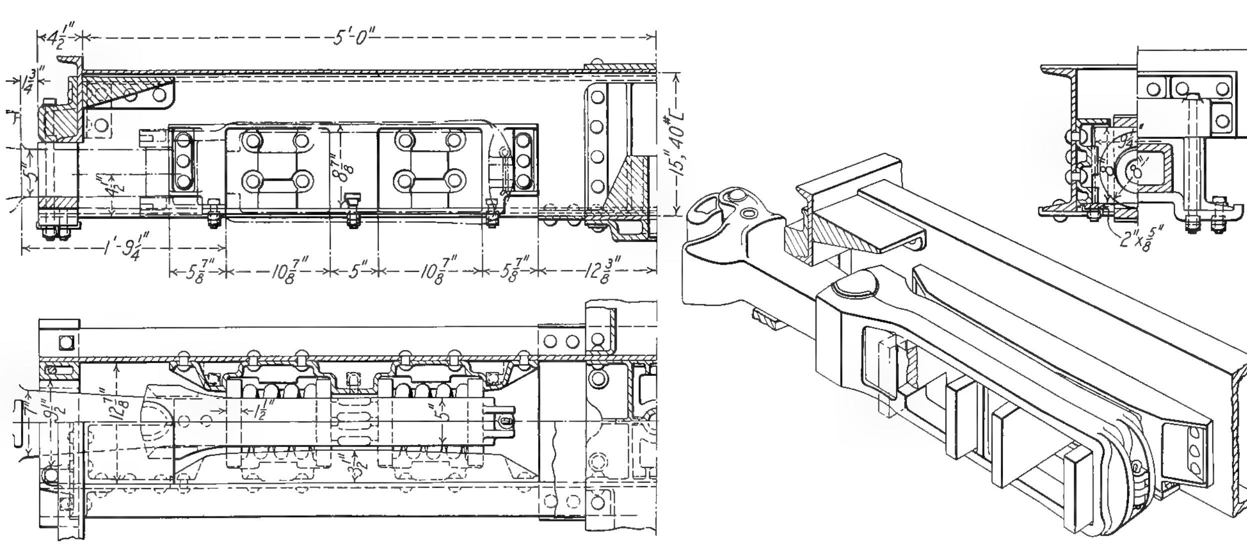


Fig. 734—Miner Tandem Draft Rigging and Two-Part Cast Steel Keyless Yoke as Applied to Freight Equipment.
W. H. Miner.

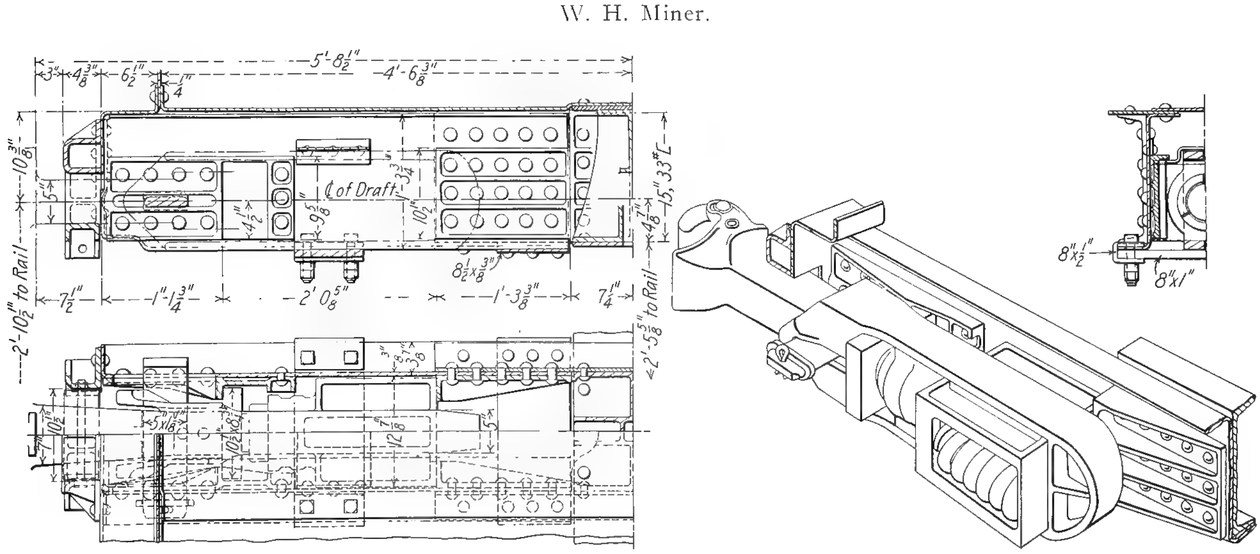


Fig. 735—Miner Friction Draft Gear and Cast Steel Yoke Having Key Connection to Coupler, for New York Central Lines Gondola Cars.
W. H. Miner.

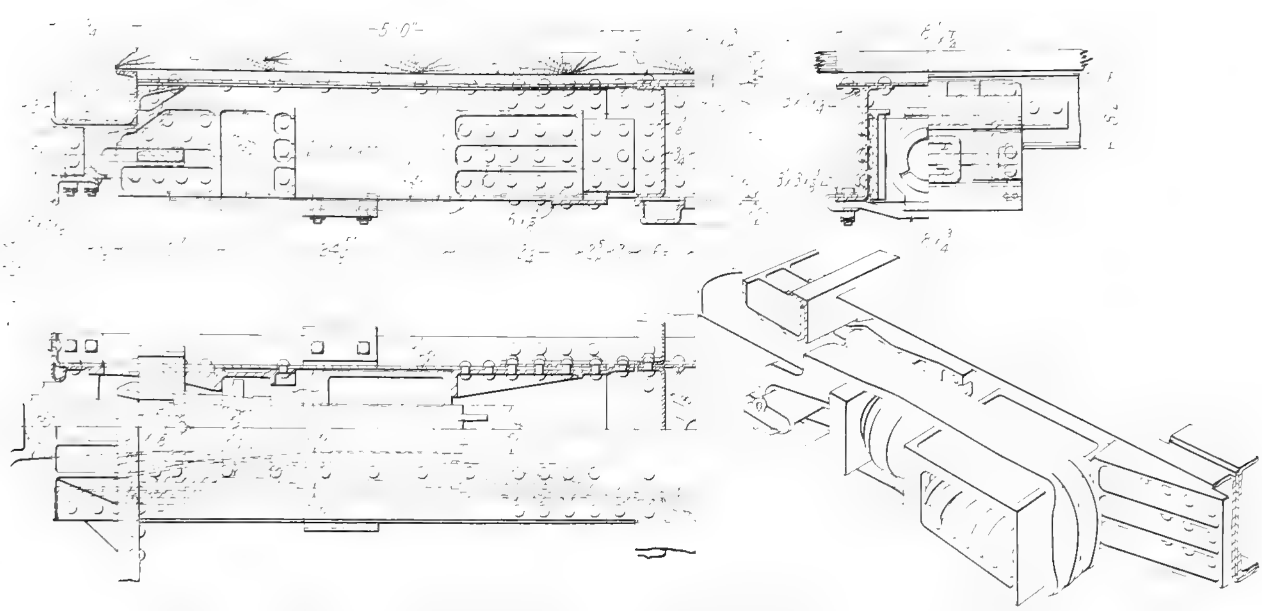


Fig. 736—Miner Friction Draft Gear and Two-Part Cast Steel Yoke with Key Connection to Coupler, for St. Louis Southwestern Flat Cars.
W. H. Miner.

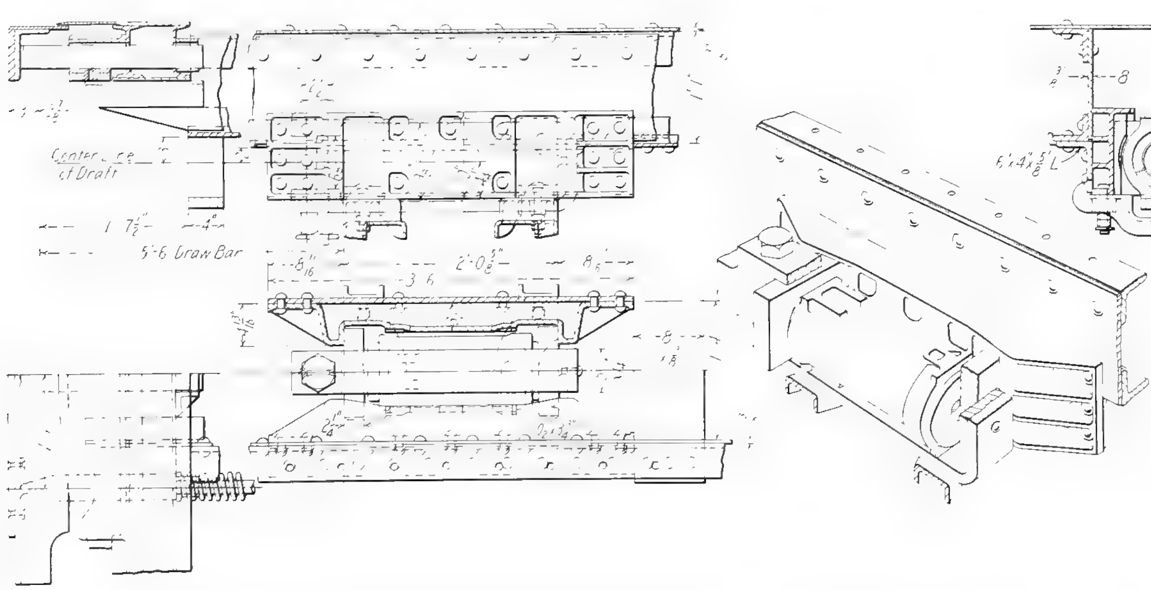


Fig. 737—Miner Friction Draft Gear as Applied to Passenger Equipment.
W. H. Miner.

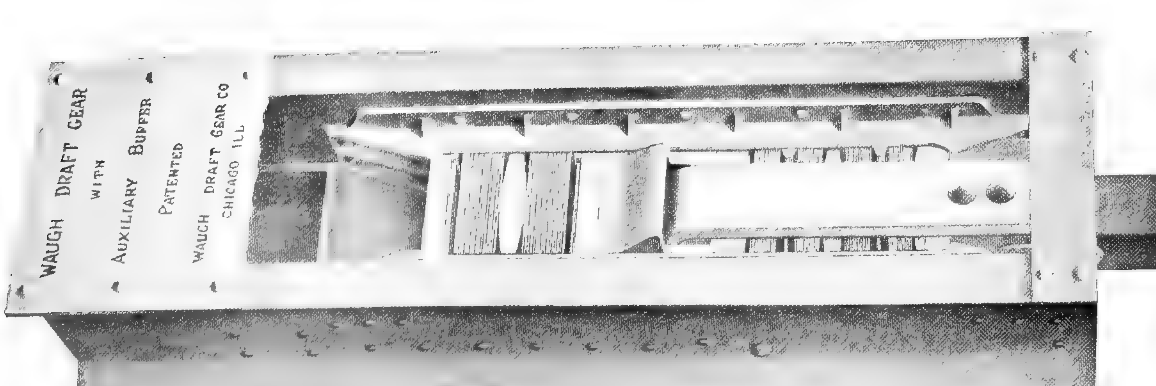


Fig. 738—Waugh Draft Gear with Auxiliary Buffer.
Waugh Draft Gear Company.

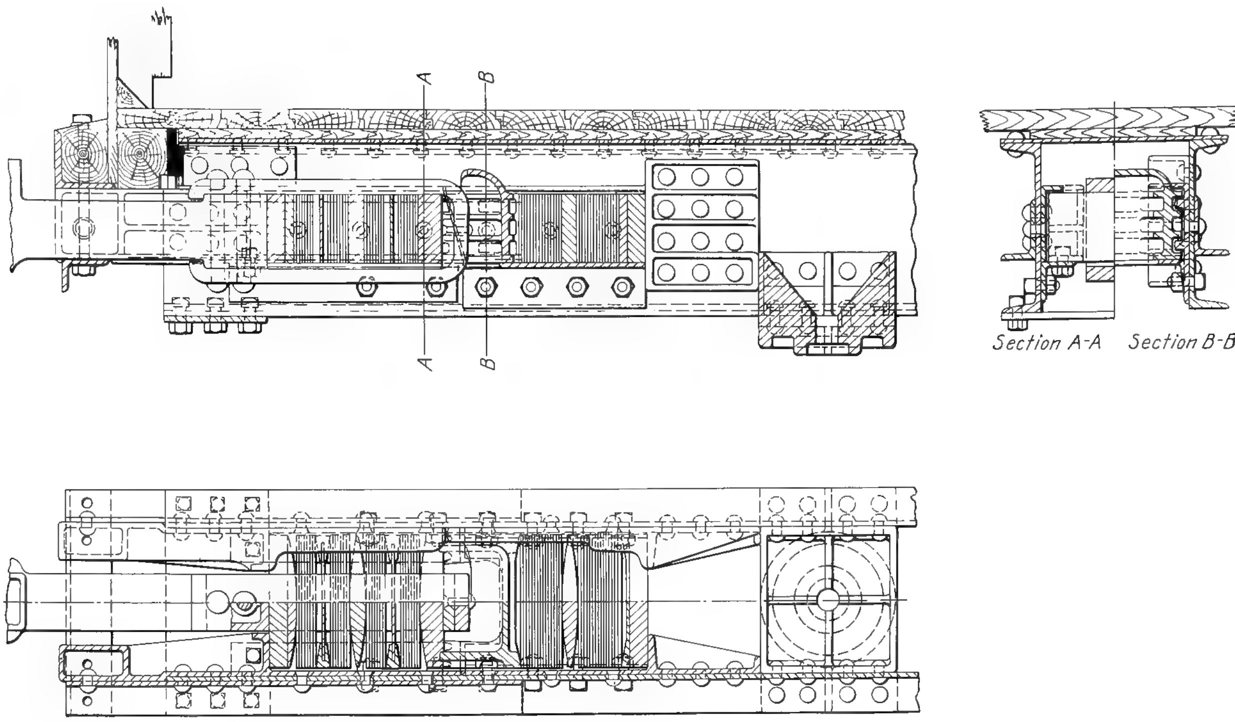


Fig. 739—Waugh Auxiliary Buffer in Combination with Waugh Draft Gear. Waugh Draft Gear Company.

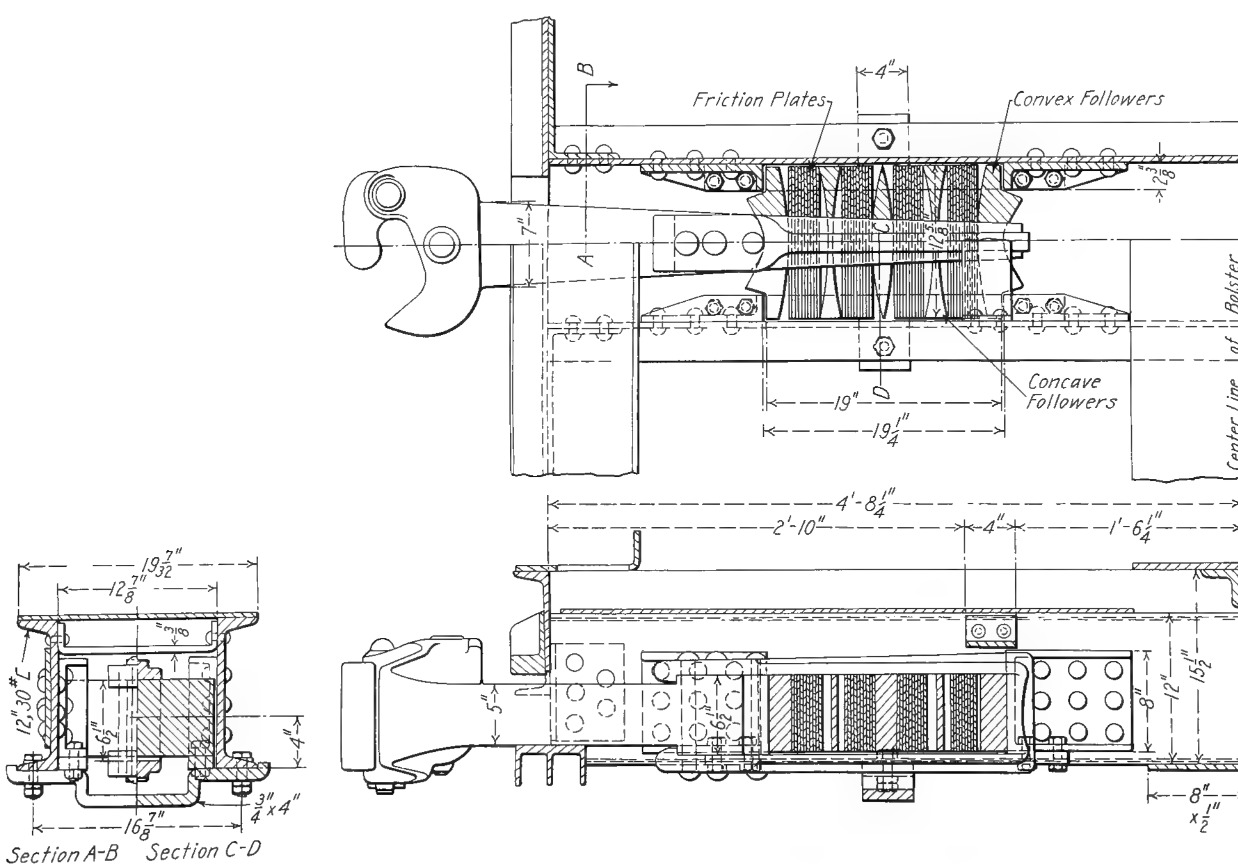


Fig. 740—Application of Waugh-Forsyth High Capacity Radial Draft Gear to Southern Railway **Freight** Cars. Waugh Draft Gear Company.

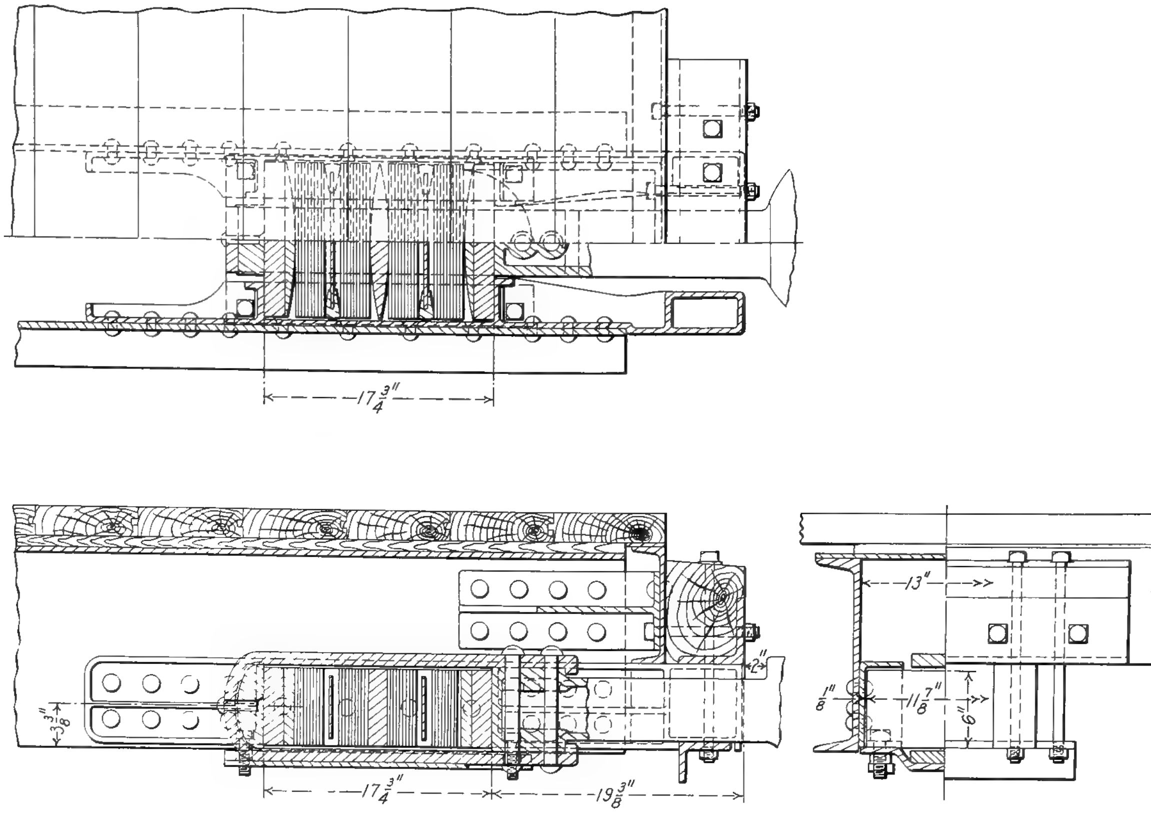


Fig. 741—Waugh Draft Gear as Applied to Chicago & North Western Freight Cars.
Waugh Draft Gear Company.

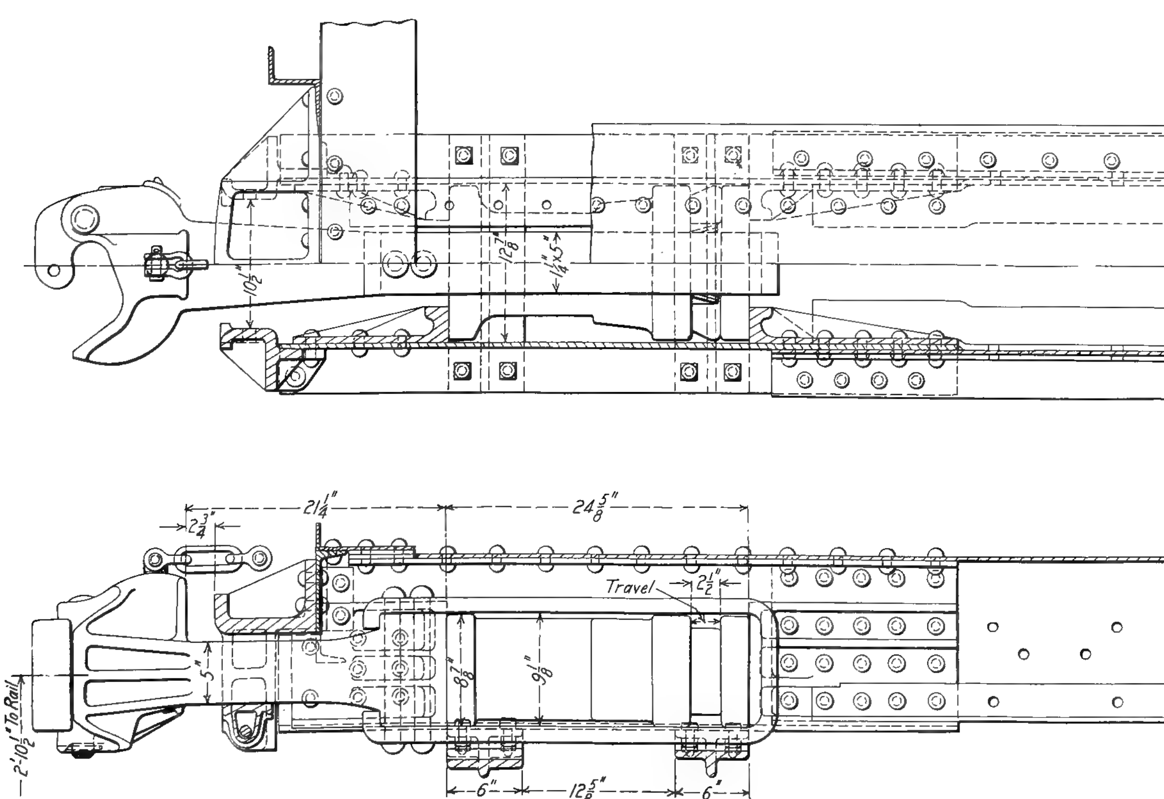


Fig. 742—Application of Gould Friction Draft Gear to Steel Underframe Freight Cars.
Gould Coupler Company.

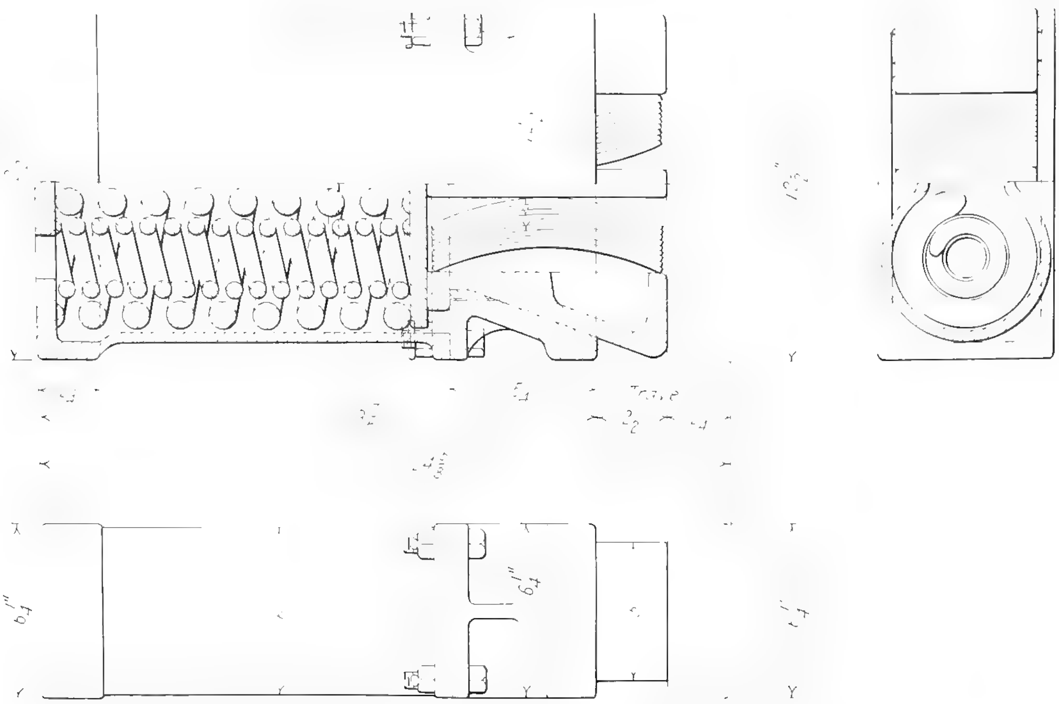


Fig. 743 Passenger Friction Draft Gear for $6\frac{1}{2}$-in. Coupler Yoke. Gould Coupler Company.

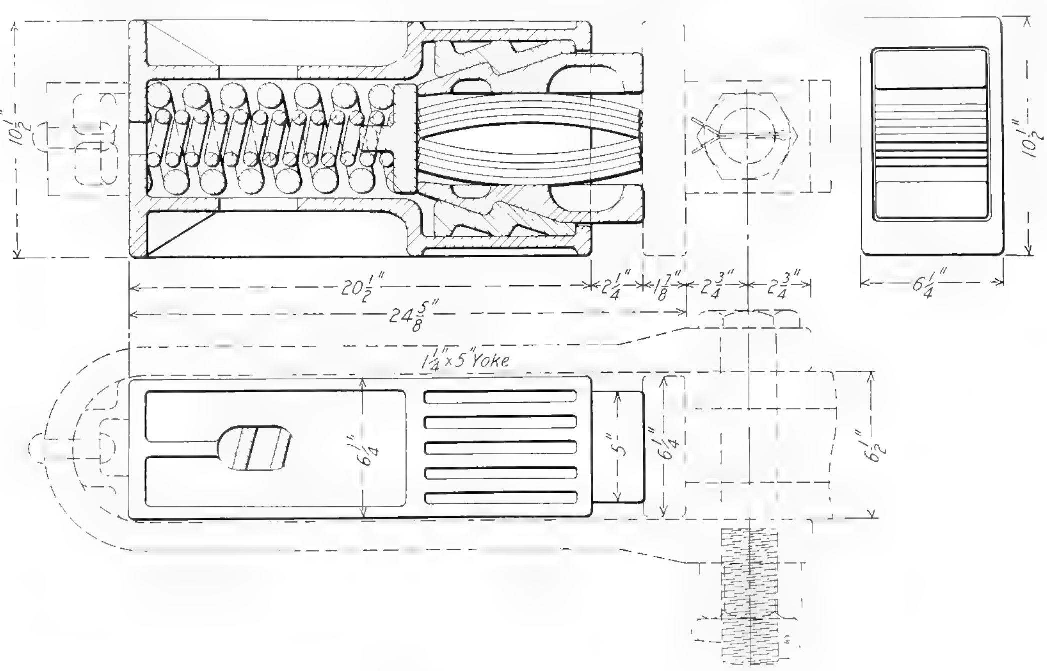


Fig. 744—Gould Passenger Friction Draft Gear FDG-56. Gould Coupler Company.

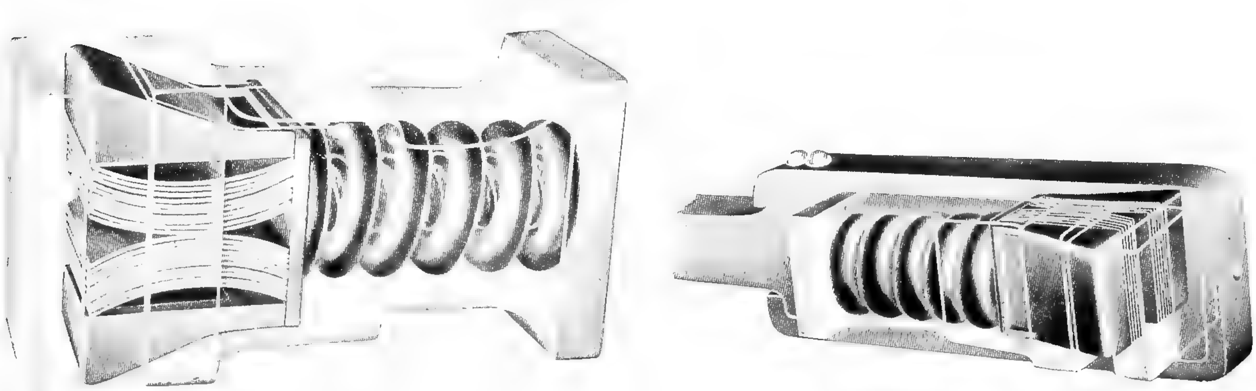


Fig. 745—Gould Heavy Type Friction Draft Gear, No. 175. Gould Coupler Company.

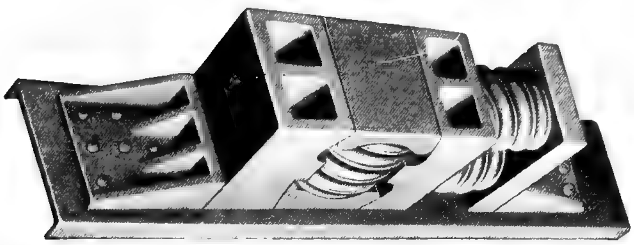


Fig. 746—Butler Friction Draft Gear No. 370 with One Draft Sill Removed.

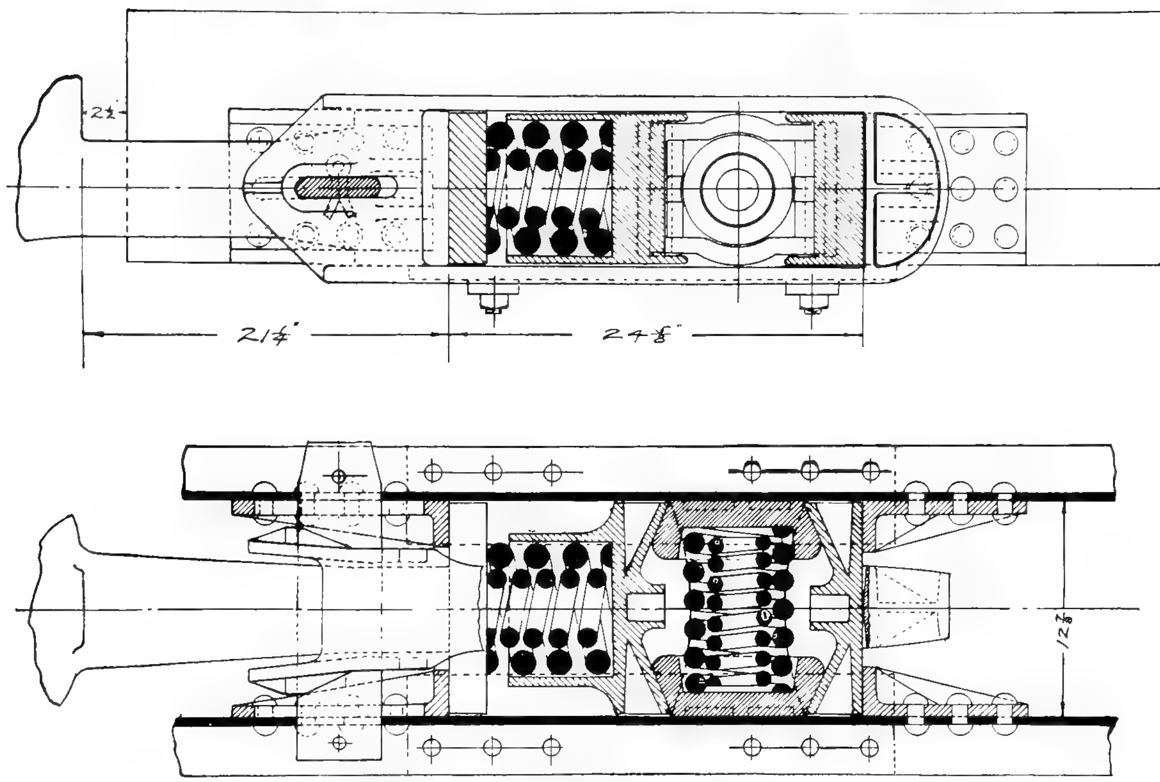


Fig. 747—Butler Friction Draft Gear No. 350 Applied to Freight Car.

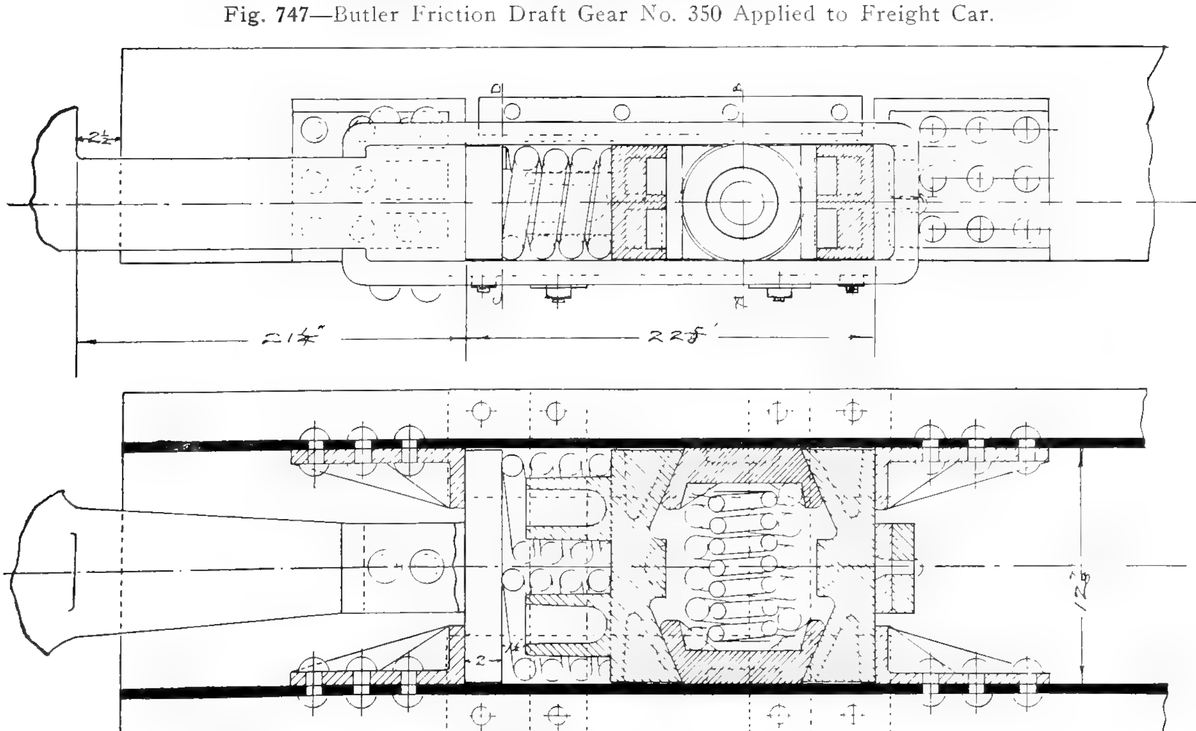


Fig. 748—Butler Friction Draft Gear No. 370 Applied to Freight Car. Butler Drawbar Attachment Company.

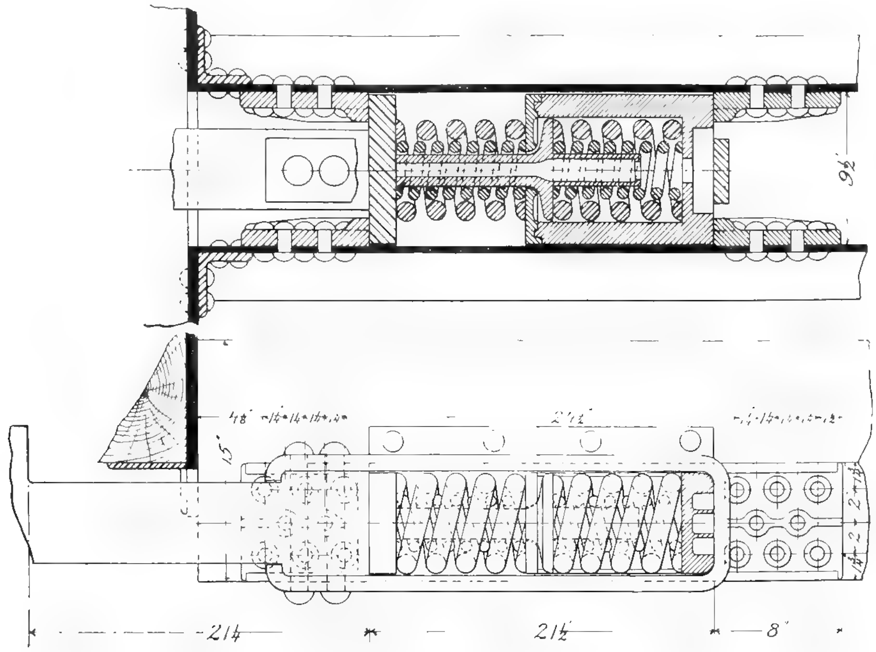


Fig. 749—Butler Special Tandem Spring Draft Gear. Butler Drawbar Attachment Company.

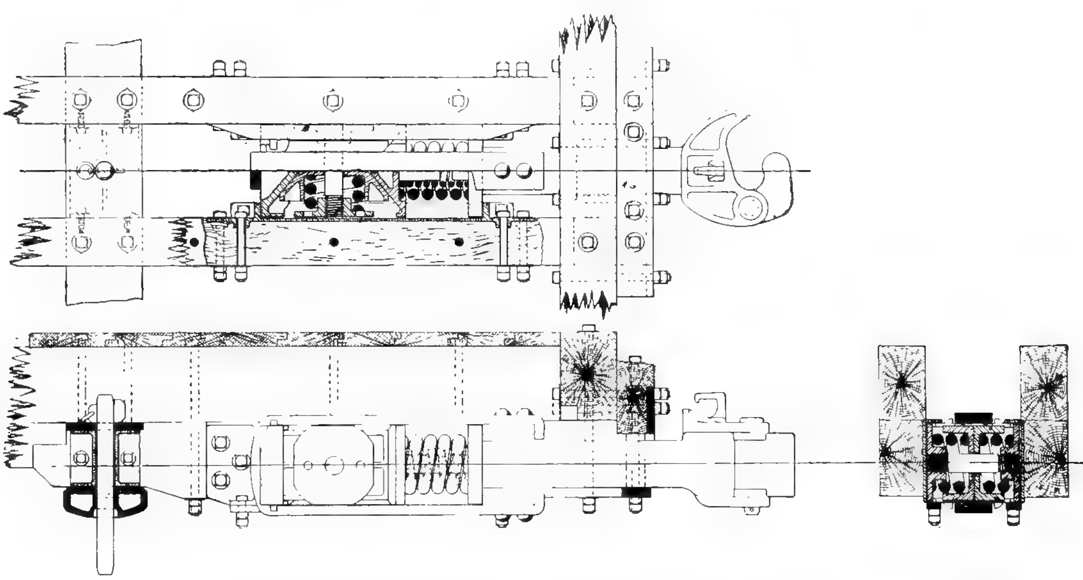


Fig. 750—Republic Friction Draft Gear for Freight Cars with Wooden Sills. Western Railway Equipment Company.

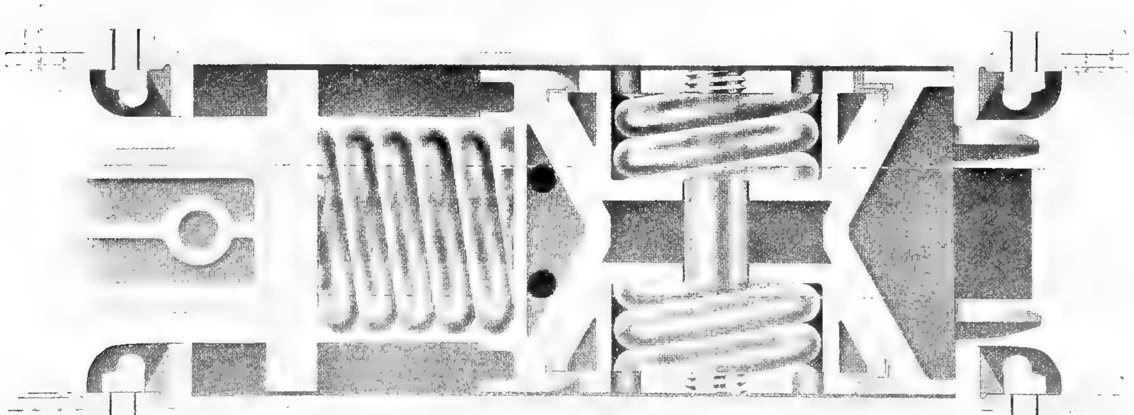


Fig. 751—Republic Friction Draft Gear Under Buffing Compression. Western Railway Equipment Company.

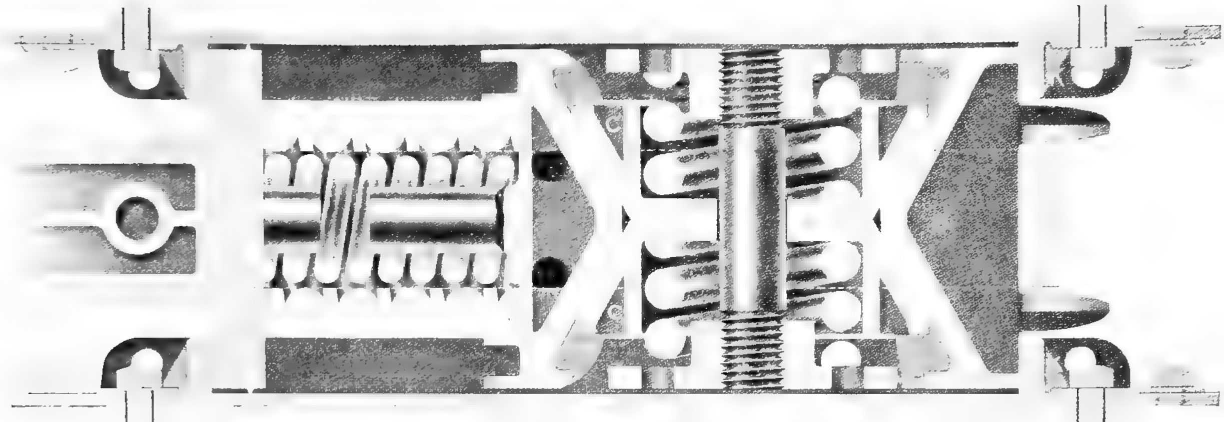


Fig. 752—Republic Friction Draft Gear, Type G, with Parts in Normal Position. Western Railway Equipment Company.

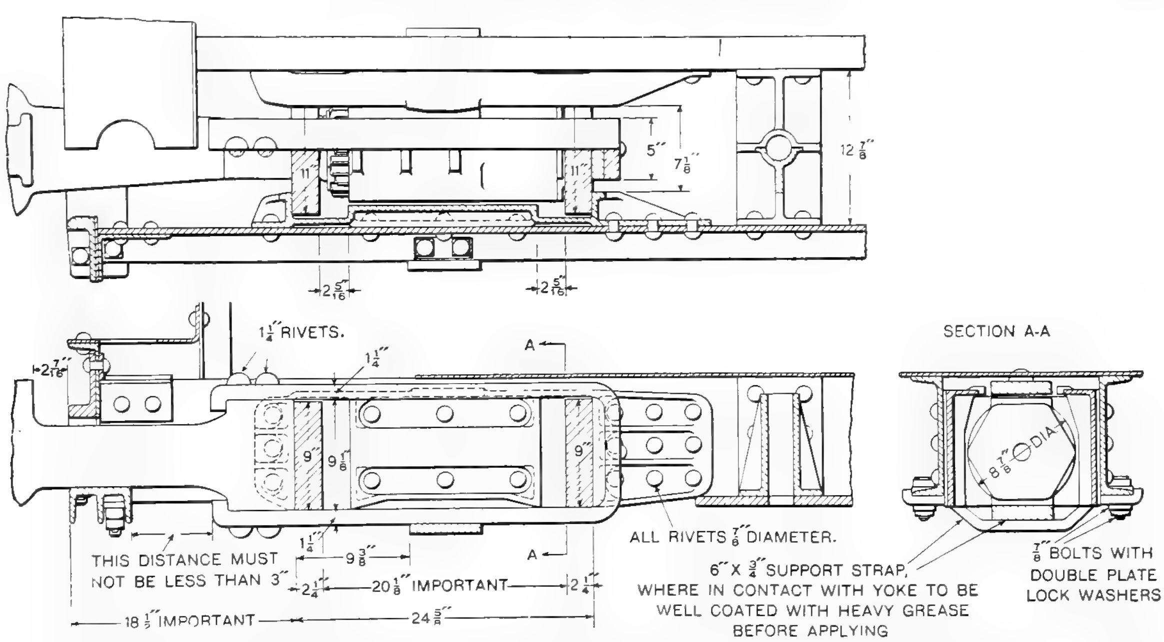


Fig. 753—Westinghouse Type D-3 Friction Draft Gear with Continuous Draft Plates with Limiting Stops, for Steel Underframe Freight Cars. Westinghouse Air Brake Company.

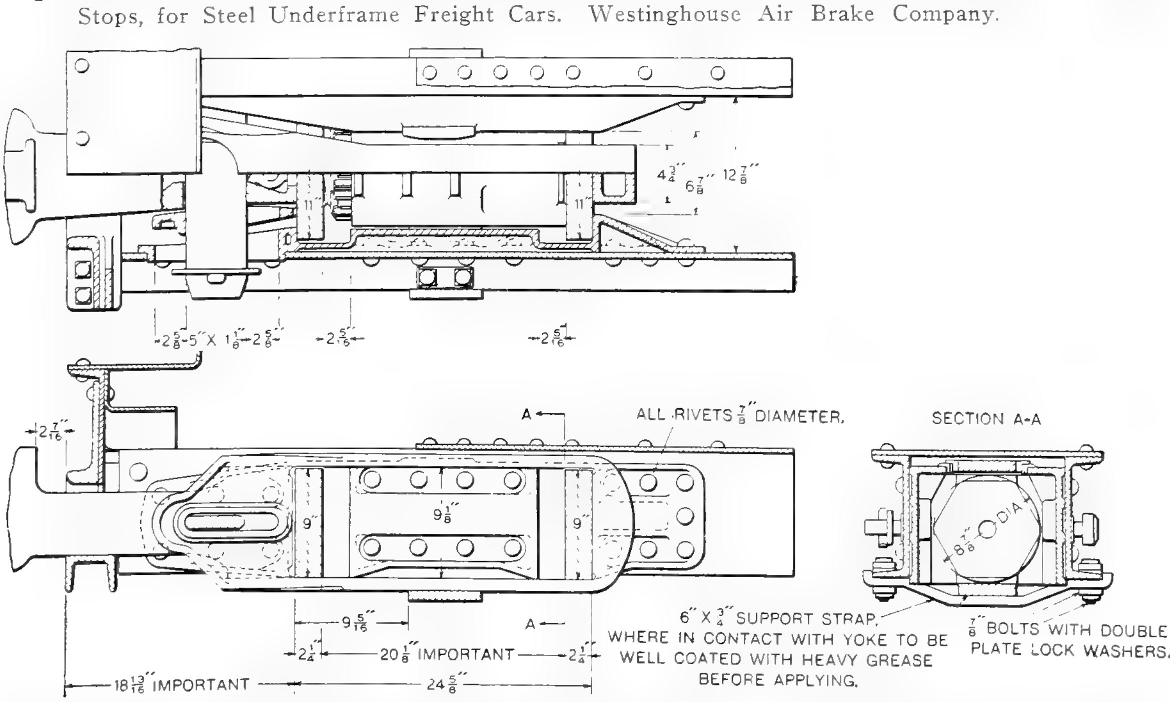


Fig. 754—Westinghouse Type D-3 Friction Draft Gear for Steel Underframe Freight Cars, with Universal Draft Gear Attachment Company's Keyed Yoke and Continuous Draft Plates with Limiting Stops. Westinghouse Air Brake Company.

Parts of Westinghouse Friction Draft Gear, Type D-3.

42355	*Type D-3 Friction Draft Gear, complete*
42292	*Cylinder Body*
5662	*Release Spring*
5663	*Preliminary Spring*
5664	*Auxiliary Release Spring*
5665	*Auxiliary Preliminary Spring*
5666	*Nut for Release Pin*
5667	*Release Pin*
5668	*Rivet for Securing Release Pin Nut*
5669	*Wedge*
5670	*Female Segment*
5671	*Male Segment*
5672	*Friction Strip*
5673	*Wedge and Release Pin with Auxiliary Preliminary Spring.*

Fig. 755—Details of Westinghouse Friction Draft Gear. Westinghouse Air Brake Company.

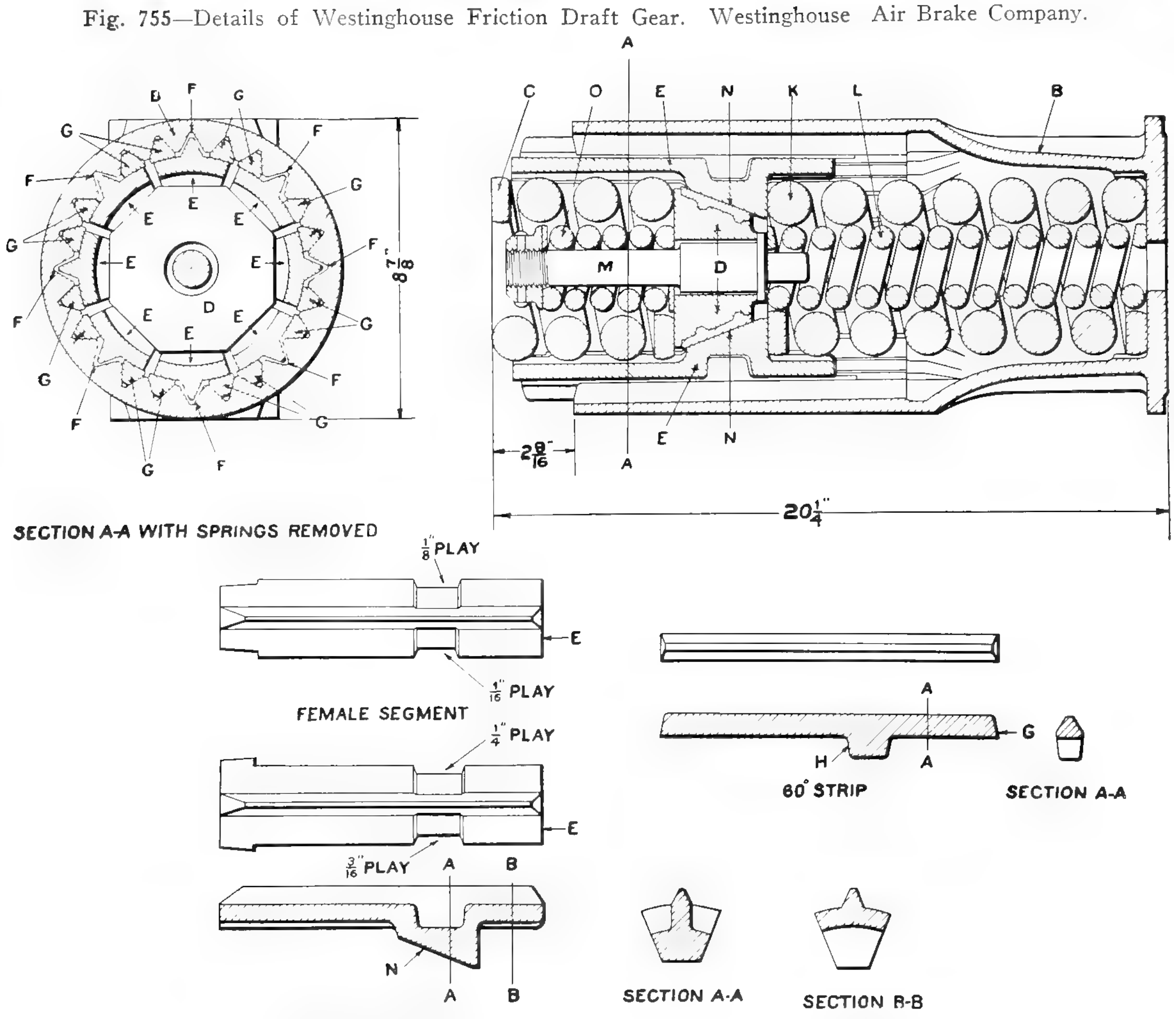


Fig. 756—Section Through Westinghouse Friction Draft Gear, Type D-3. Westinghouse Air Brake Company.

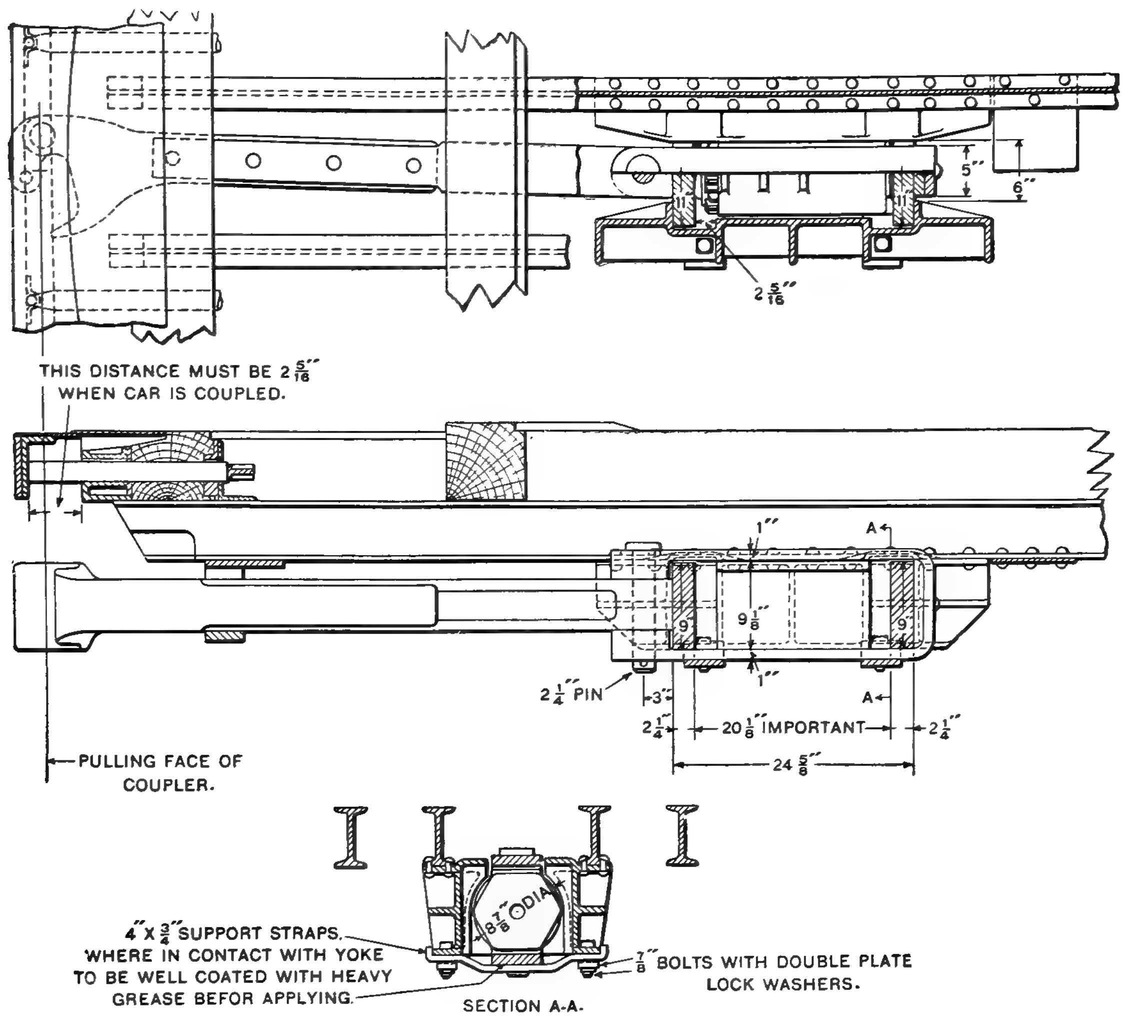


Fig. 757—Westinghouse Type D-3 Friction Draft Gear with Continuous Draft Plates with Limiting Stops, for Passenger Equipment with Standard Steel Platforms. Westinghouse Air Brake Company.

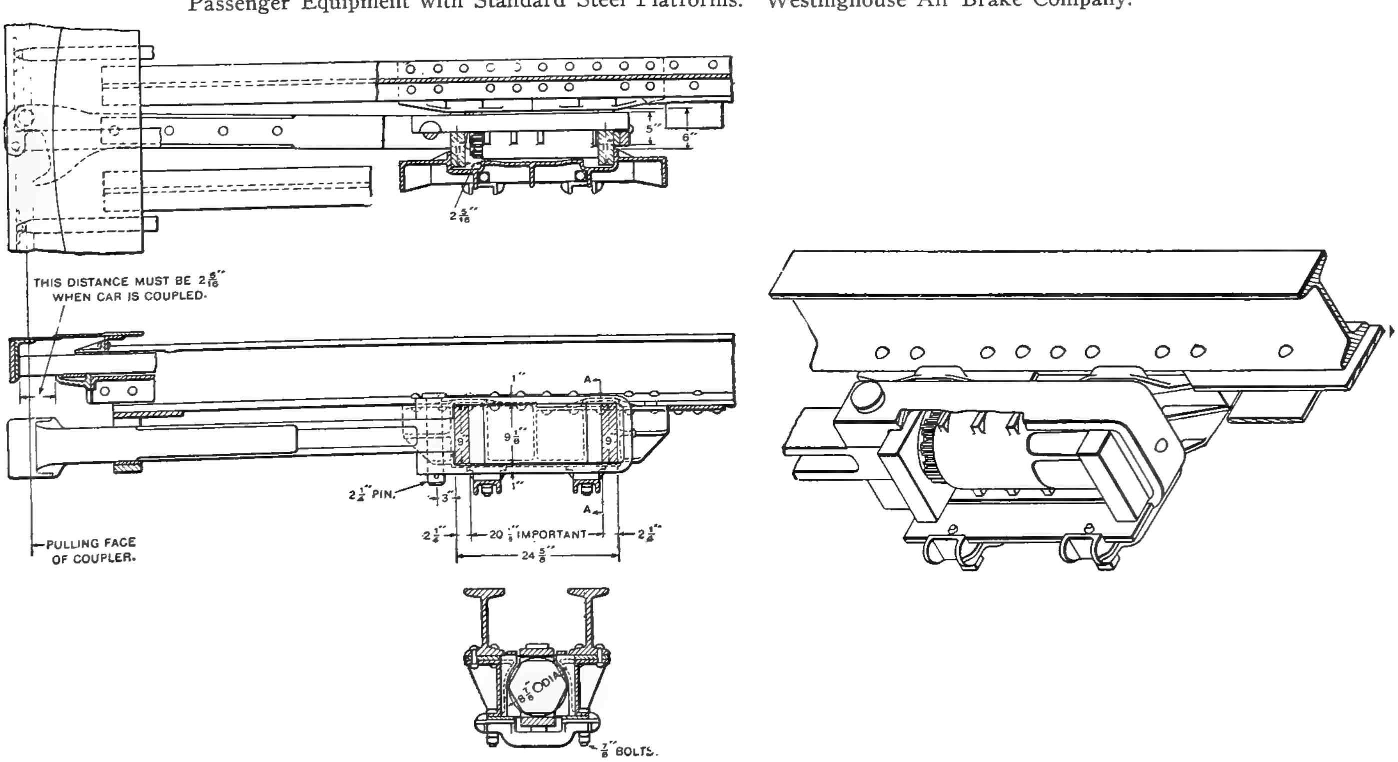


Fig. 758—Westinghouse Type D-3 Friction Draft Gear with Universal Draft Gear Attachment Company's Continuous Draft Plates for Passenger Equipment with Standard Steel Platforms. Westinghouse Air Brake Company.

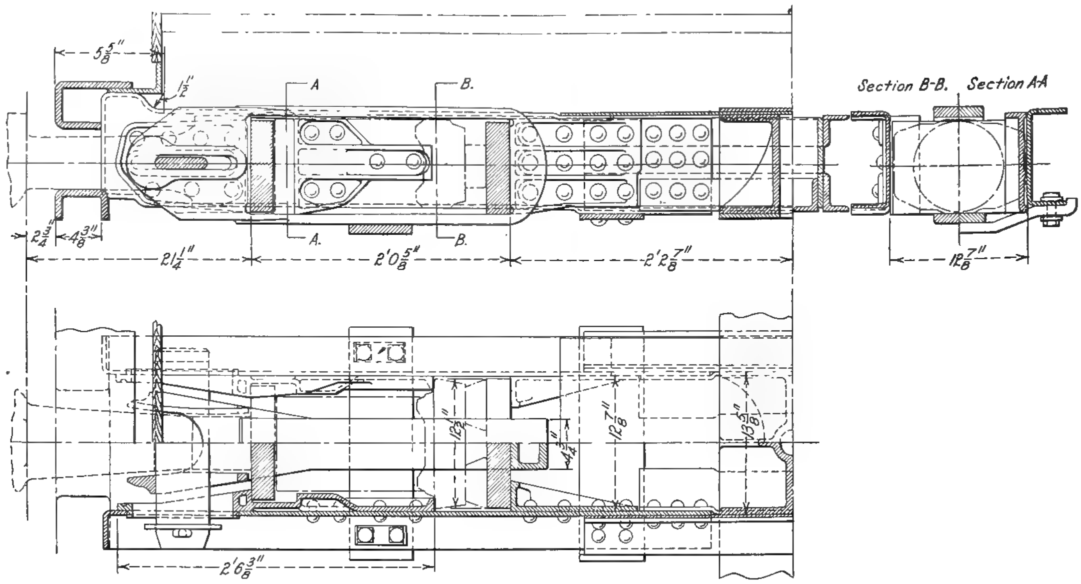


Fig. 759—Universal Attachments and Yoke for Sessions Draft Gear, Type K. Universal Draft Gear Attachment Company.

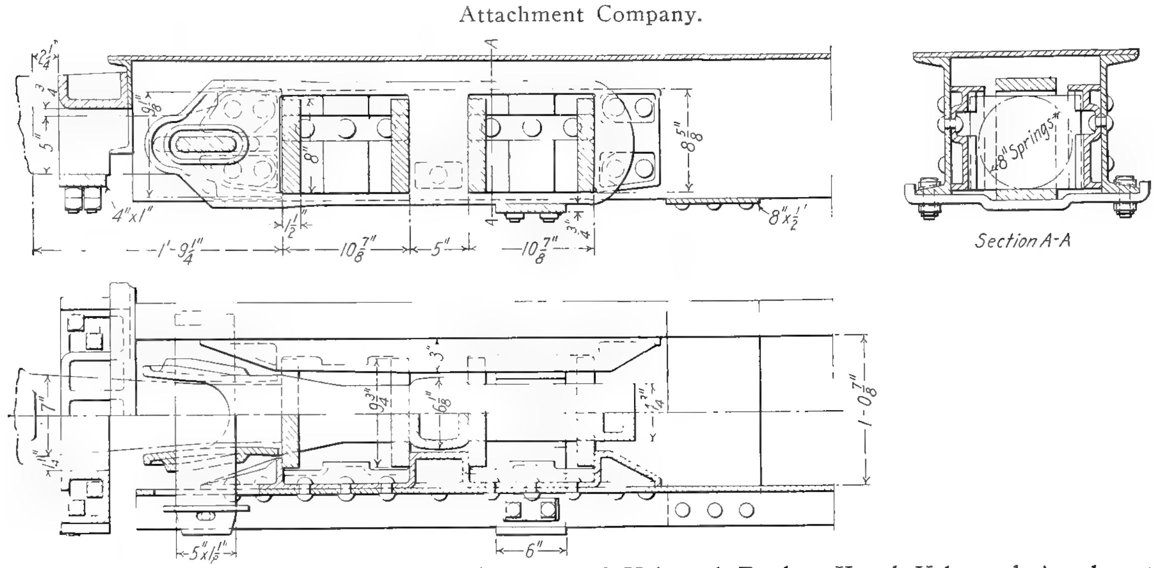


Fig. 760—General Application to Steel Underframes of Universal Tandem Keyed Yoke and Attachments Used with Class G Springs. Universal Draft Gear Attachment Company.

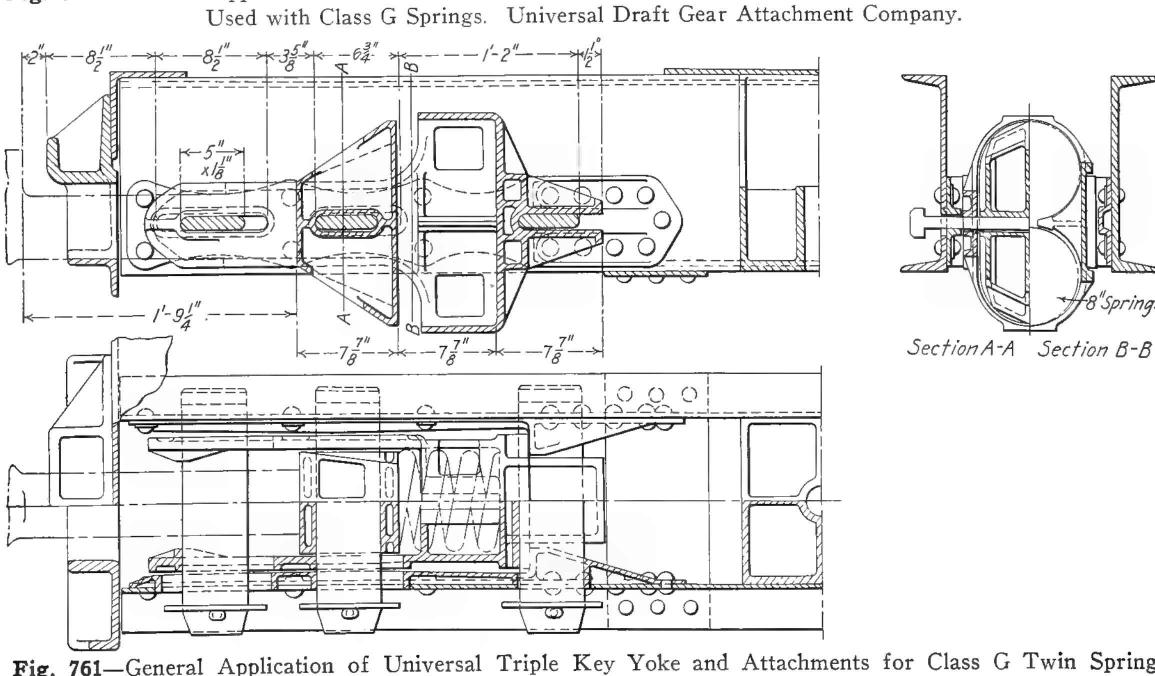


Fig. 761—General Application of Universal Triple Key Yoke and Attachments for Class G Twin Springs. Universal Draft Gear Attachment Co.

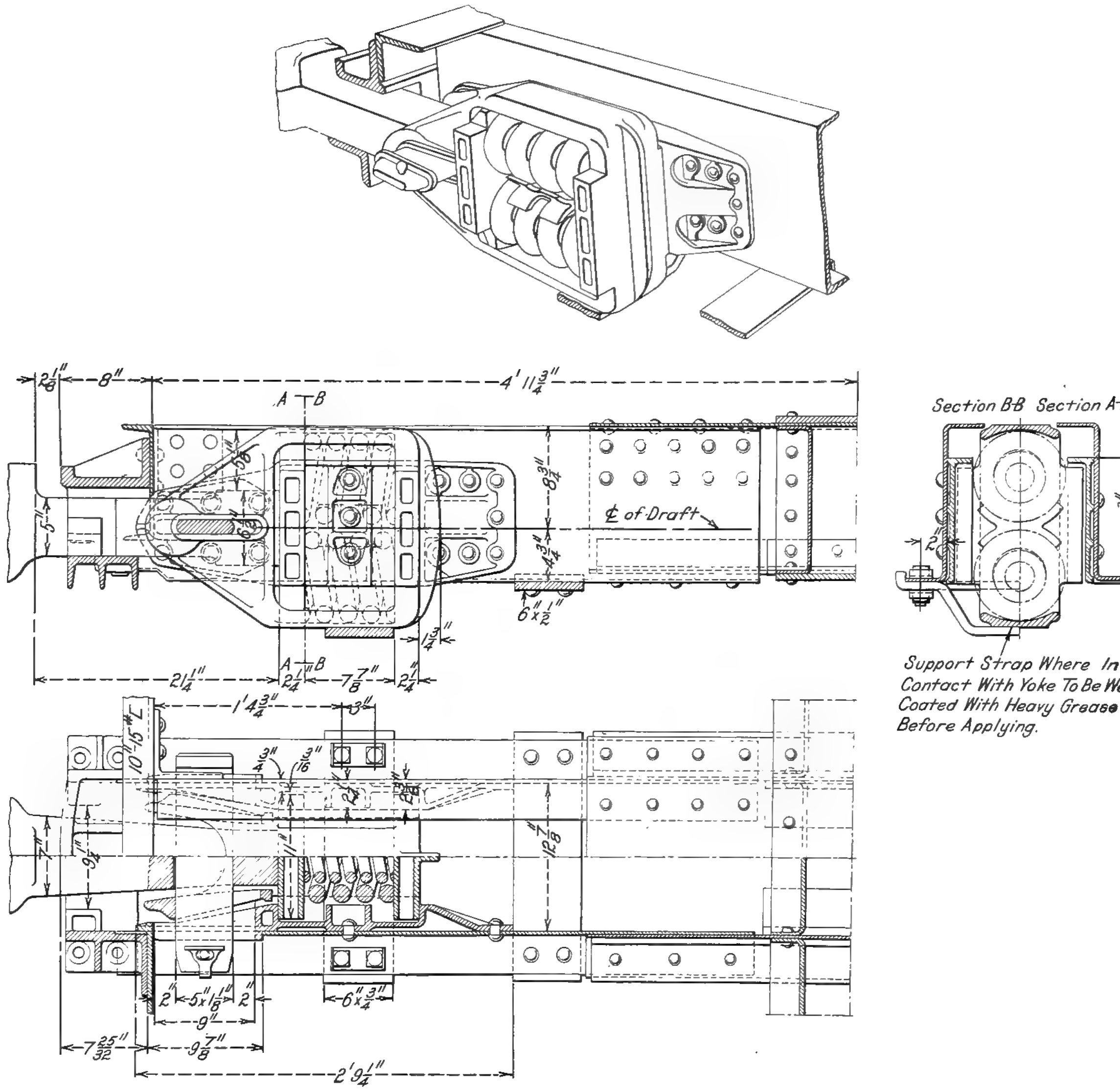


Fig. 762—Universal Attachments and Yoke for Twin Spring Draft Gear. Universal Draft Gear Attachment Company.

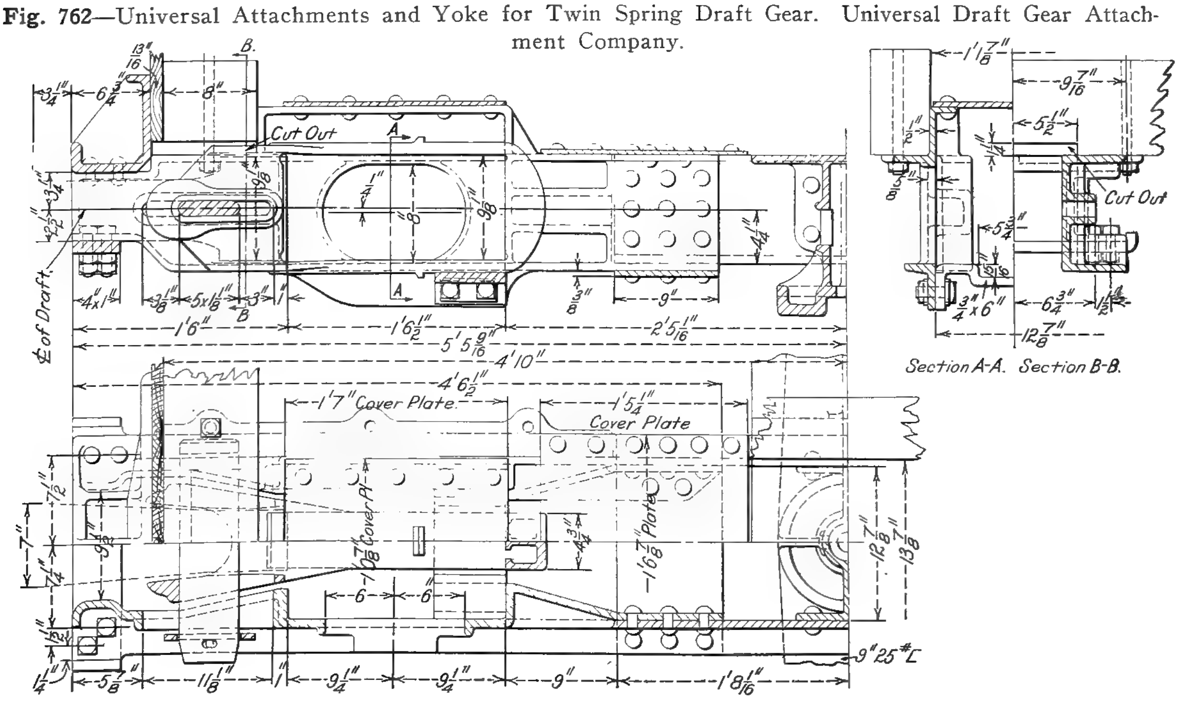


Fig. 763—Universal Attachments and Keyed Yoke with Cast Steel Draft Arms, for Cardwell Friction Draft Gear, Type G. Universal Draft Gear Attachment Company.

Parts of Sessions-Standard Friction Draft Gear. See Fig. 764.

A *Spring Barrel*
B *Friction Box*
C *Side Friction Blocks*
D *Center Friction Blocks*
E *Follower Plate*
F *Cheek Plate, right*
G *Cheek Plate, left*
H *Draft Gear Carrier*
I *Double Coil Draft Spring*

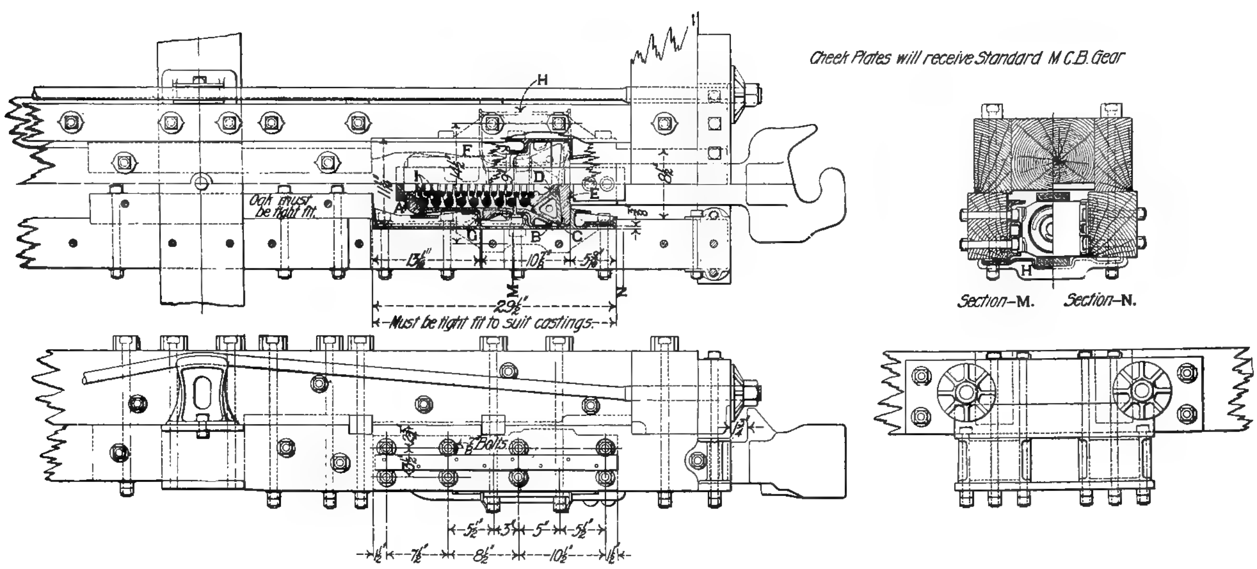


Fig. 764—Sessions-Standard Friction Draft Gear, Type E, for Freight Cars with Wooden Center Sills. Standard Coupler Company.

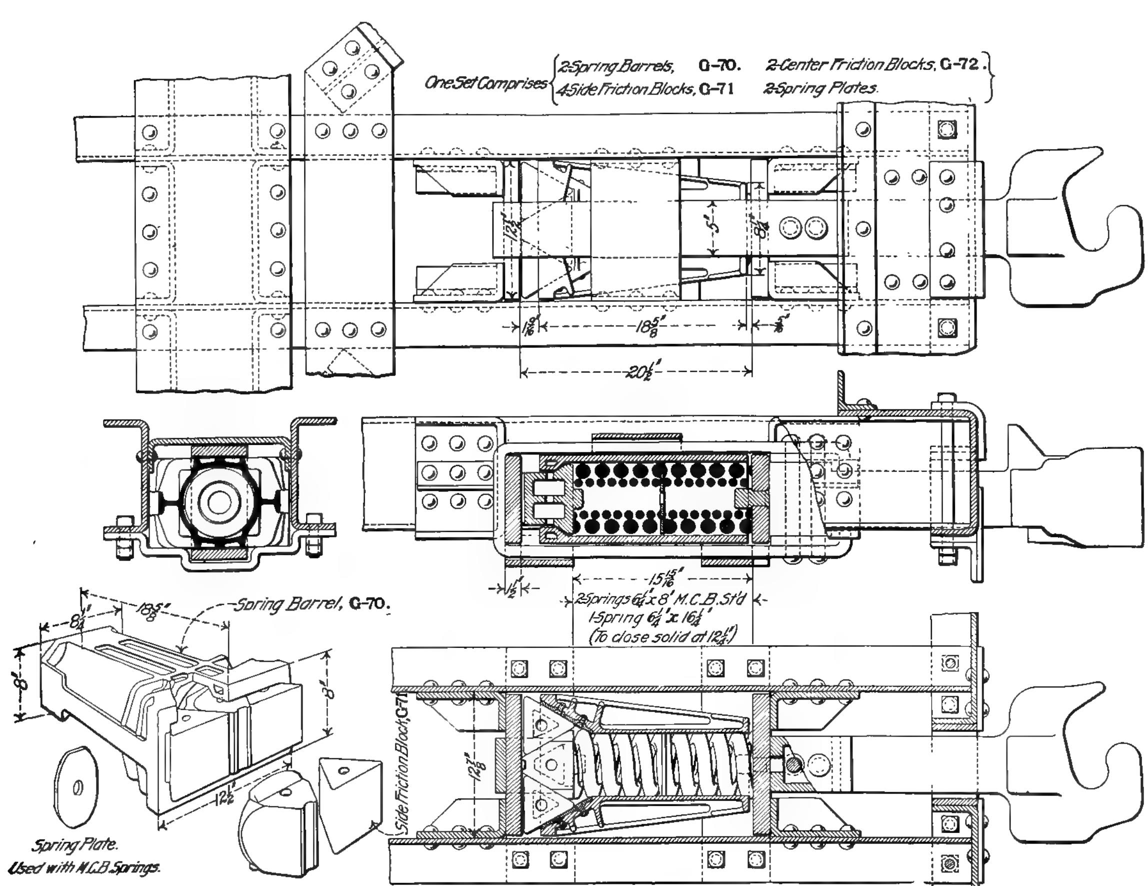


Fig. 765—Sessions-Standard Friction Draft Gear, Type C, for Freight Cars with Pressed Steel Underframes. Standard Coupler Company.

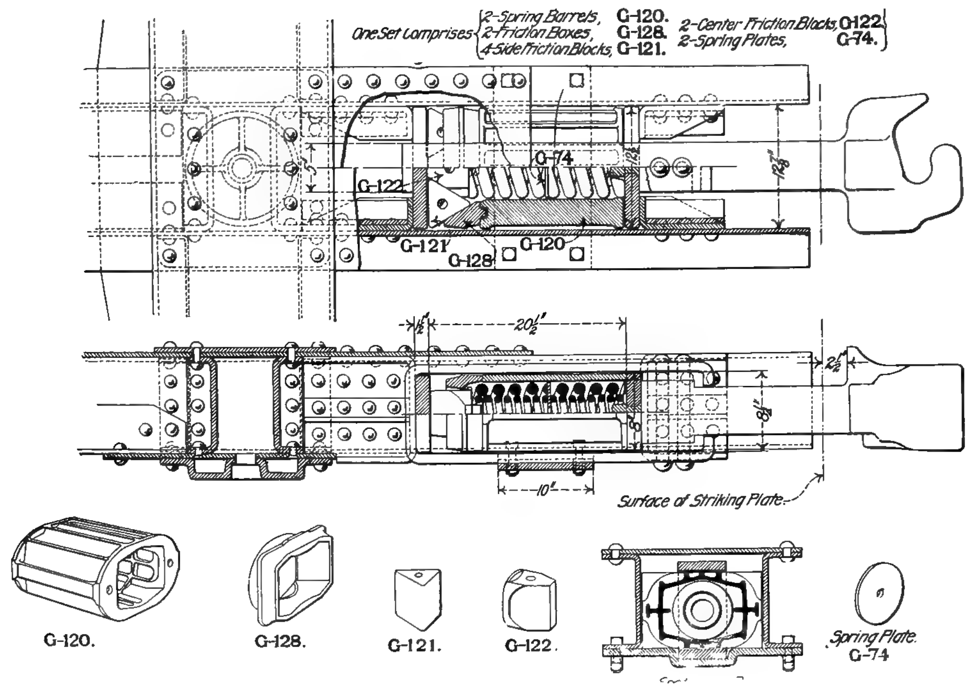


Fig. 766—Sessions-Standard Friction Draft Gear, Type H, for Freight Cars with Pressed Steel Underframes. Standard Coupler Company.

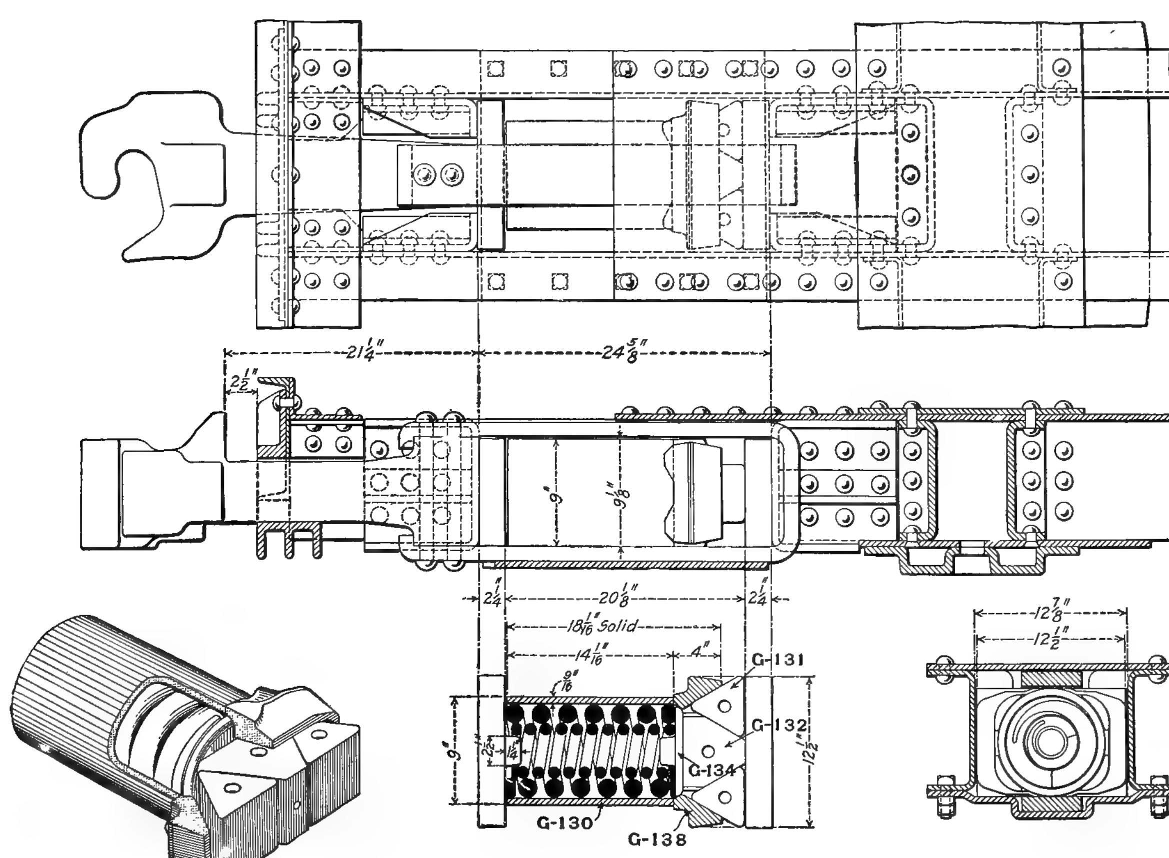


Fig. 767—Sessions-Standard Friction Draft Gear, Type K, for Freight Cars. Standard Coupler Company.

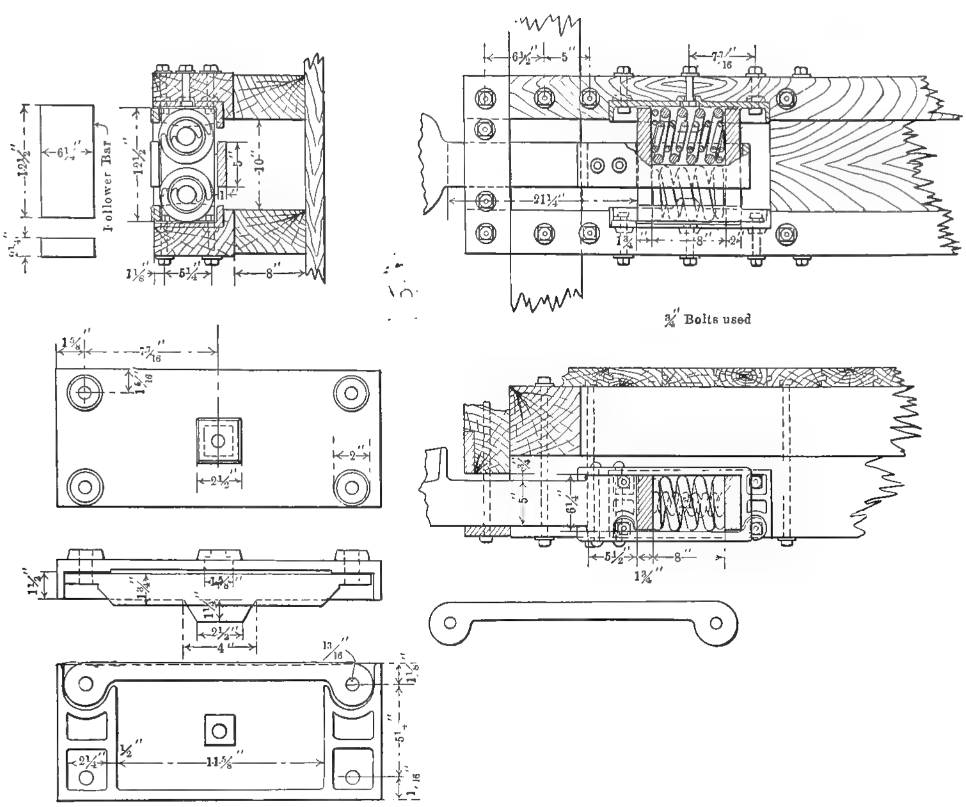


Fig. 768—Hinson Twin Spring Draft Gear for Freight Cars with Wooden Center Sills. National Car Coupler Company.

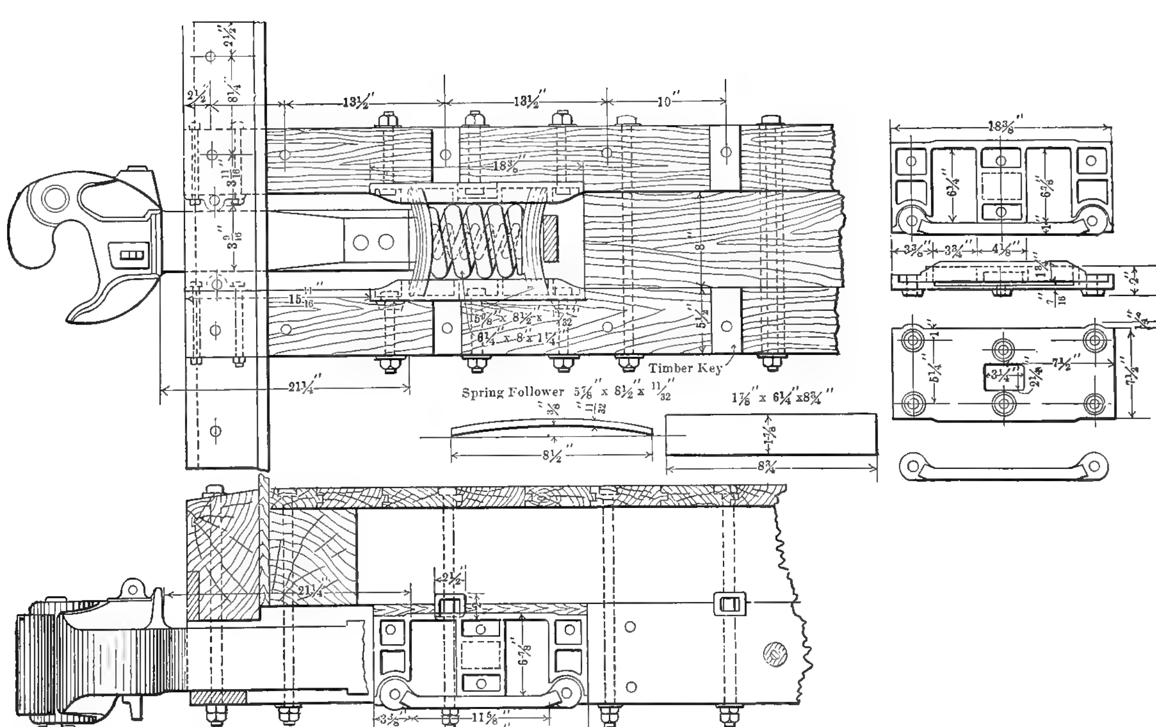


Fig. 769—Hinson Single Spring Draft Gear with Spring Follower Plates for Freight Cars with Wooden Center Sills. National Car Coupler Company.

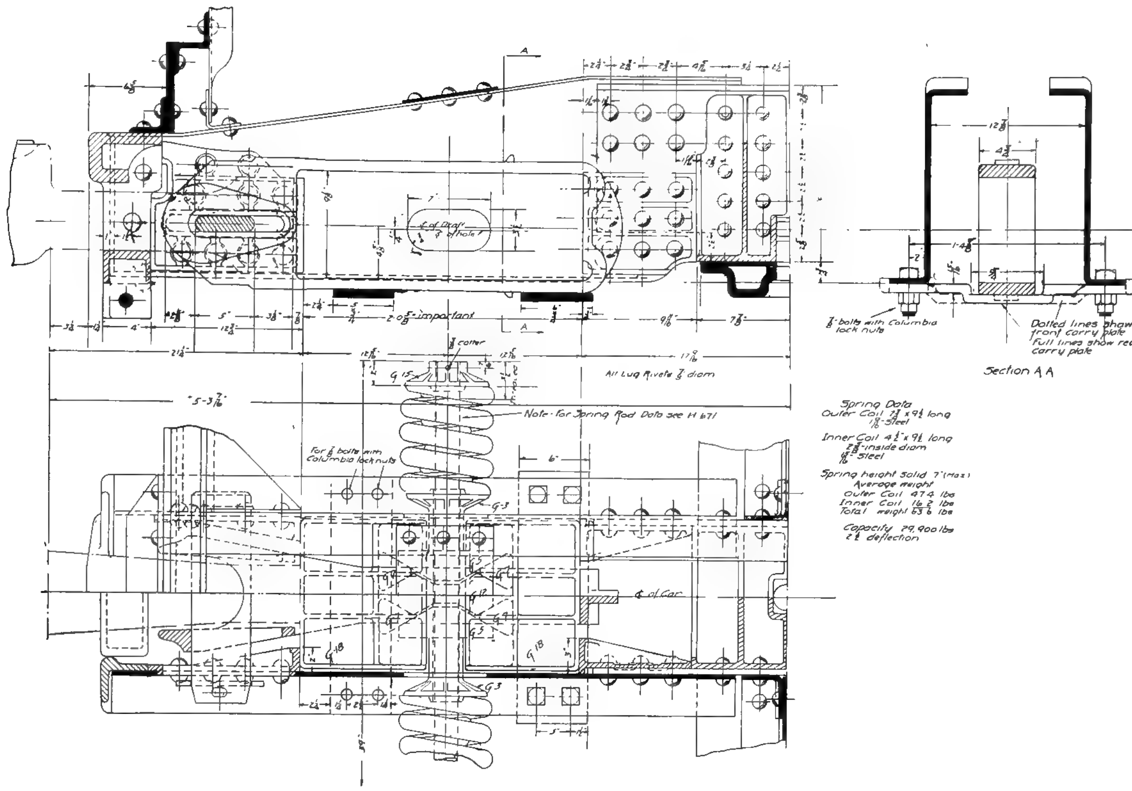


Fig. 770—Cardwell Friction Draft Gear, Type G, Class 18, for New York Central Hopper Cars. Union Draft Gear Company.

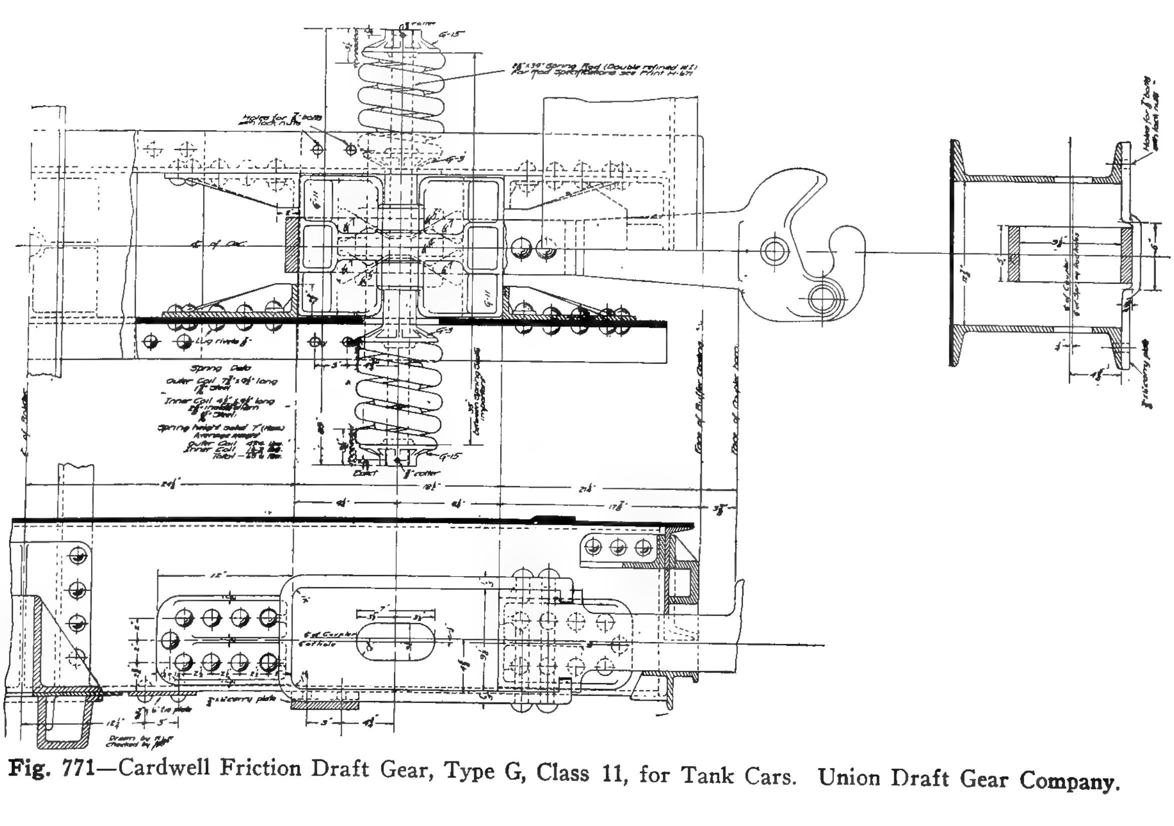


Fig. 771—Cardwell Friction Draft Gear, Type G, Class 11, for Tank Cars. Union Draft Gear Company.

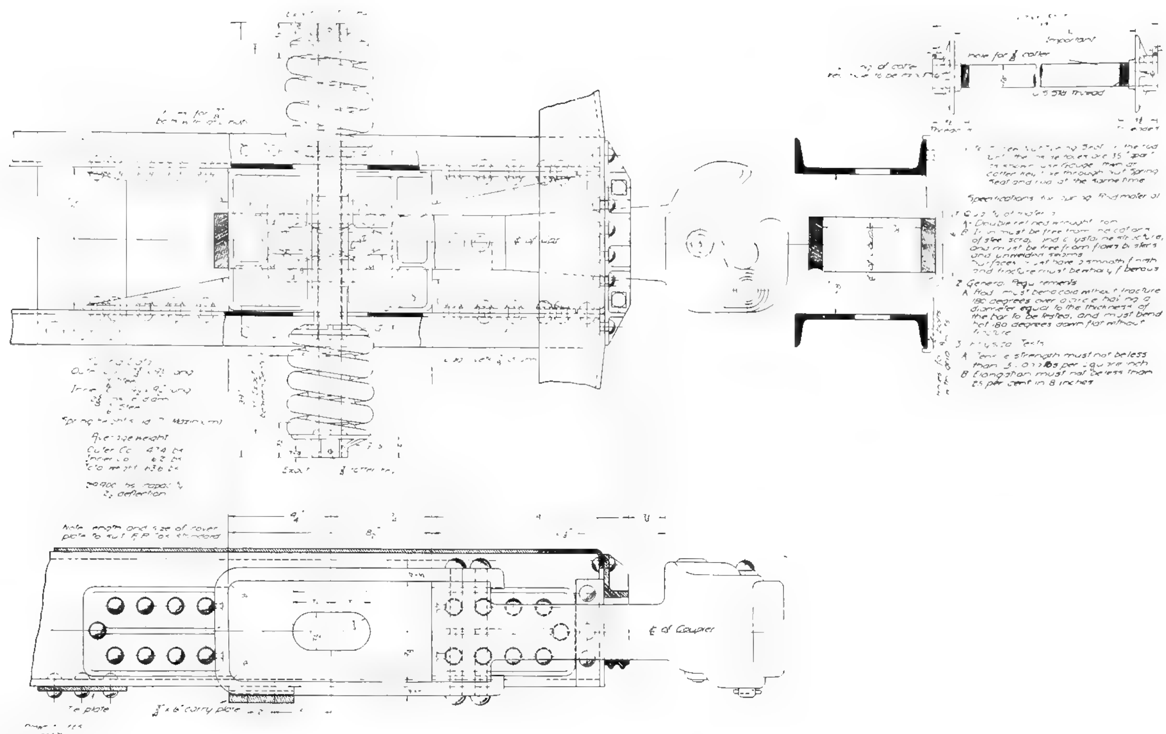


Fig. 772—General Design of Application of Cardwell Friction Draft Gear, Type G, Class 11. Union Draft Gear Company.

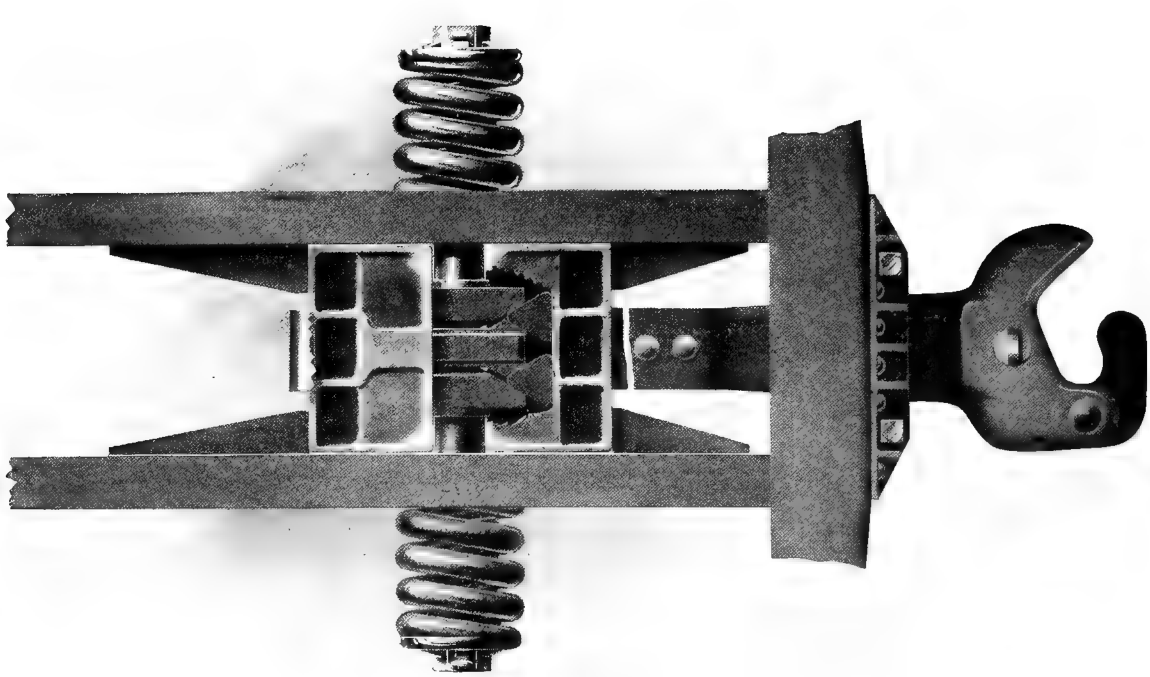


Fig. 773—General Design of Application of Cardwell Friction Draft Gear, Type G, Class 11. Union Draft Gear Company.

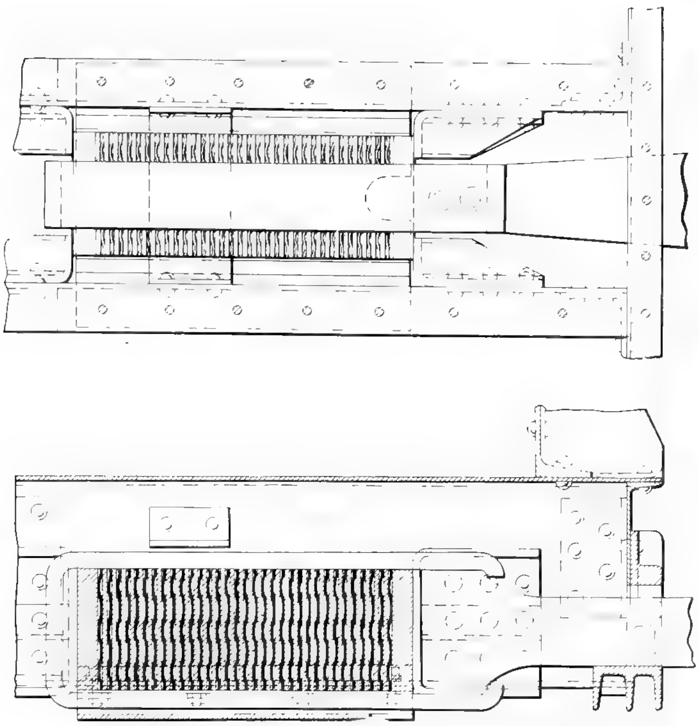


Fig. 774—Slick Friction Draft Gear. Cambria Steel Company.

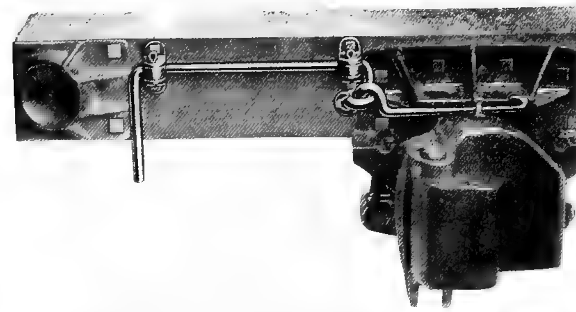


Fig. 775—Imperial Release Rigging. Imperial Appliance Company.

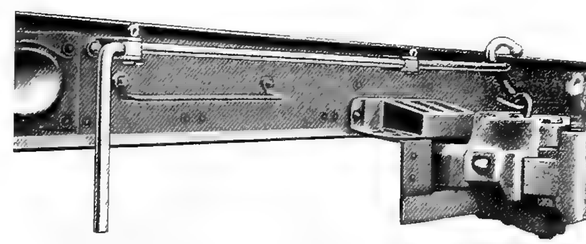


Fig. 776—Imperial Type "B" Release Rigging. Imperial Appliance Company.

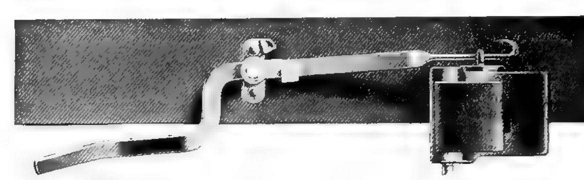


Fig. 777—Carmer Release Rigging. Imperial Appliance Company.

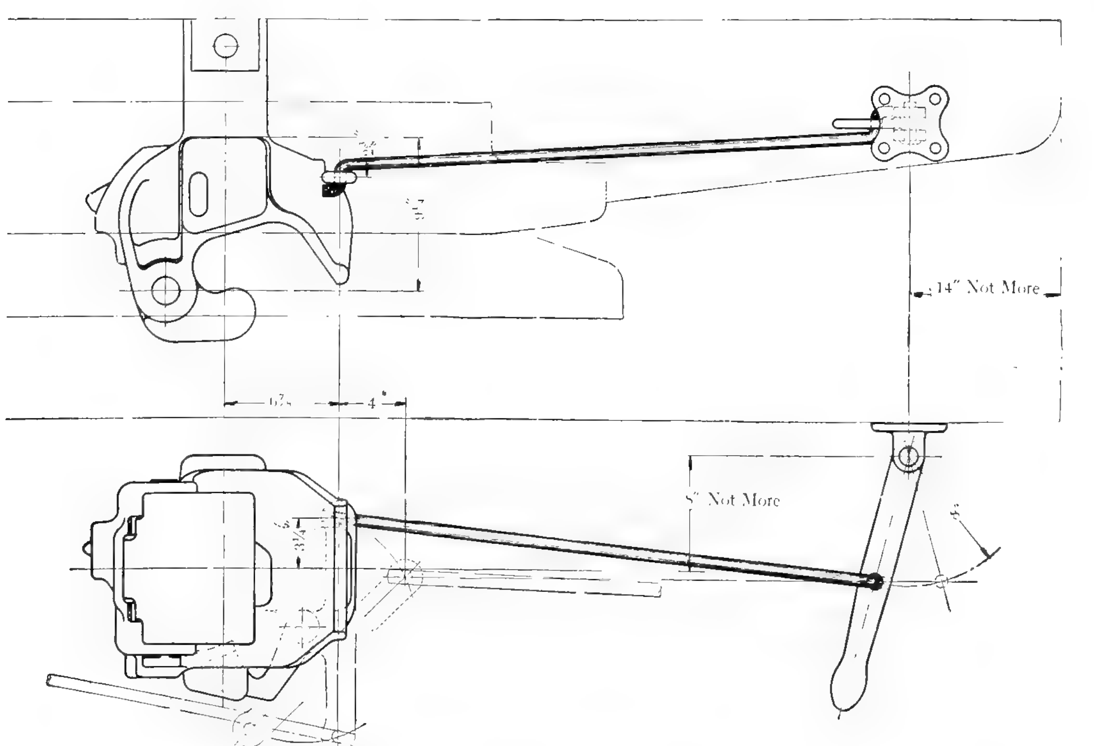
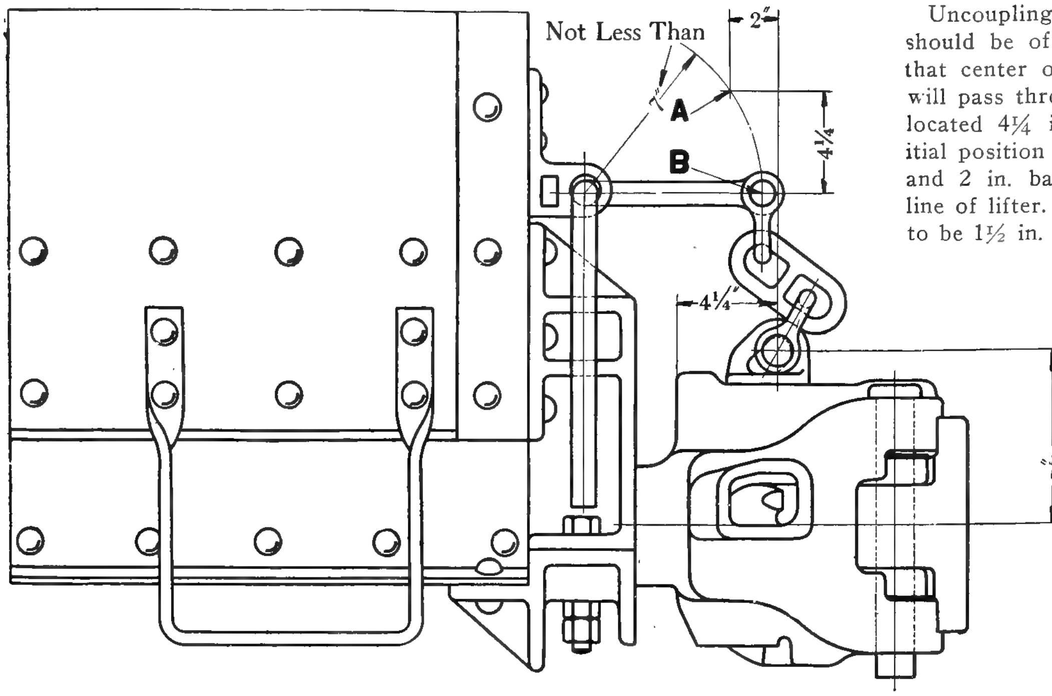


Fig. 778—Recommended Uncoupling Arrangement for Simplex Passenger Coupler. American Steel Foundries.



Uncoupling lever arm should be of such length that center of pin-hole **B** will pass through point **A** located 4¼ in. above initial position of lever arm and 2 in. back of center line of lifter. Chain slack to be 1½ in. to 2 in.

Fig. 779—Recommended Method for Application o f Uncoupling Lever to Simplex Top Lift Freight Coupler. American Steel Foundries.

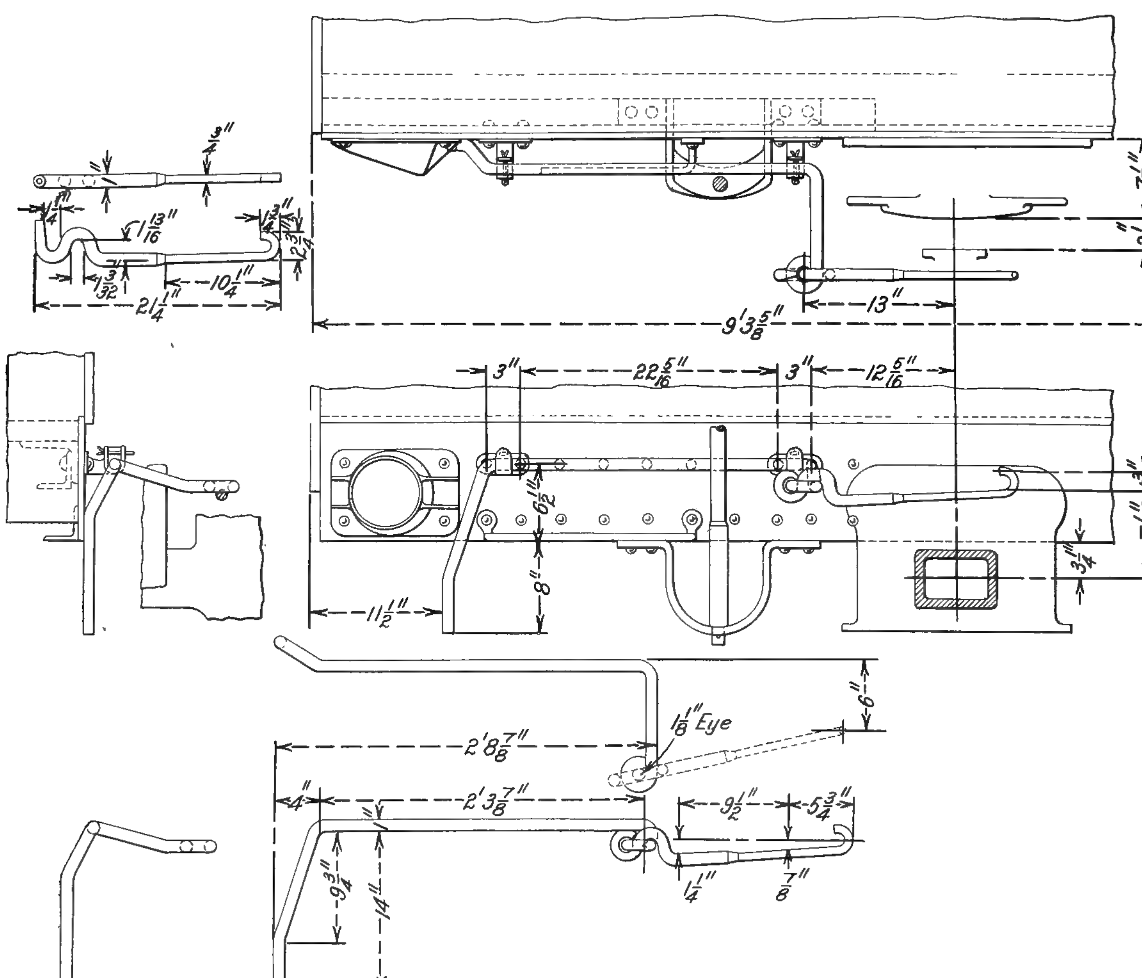


Fig. 780—Imperial Uncoupling Apparatus and Details, for New York Central Box Cars.

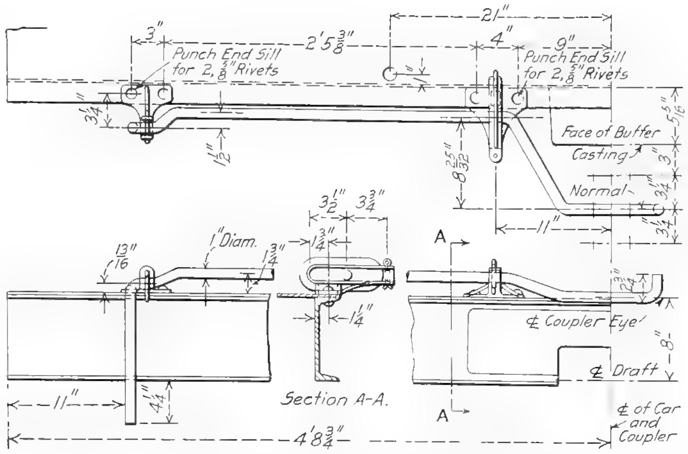


Fig. 781—Coupler Release Rigging. National Railway Devices Company.

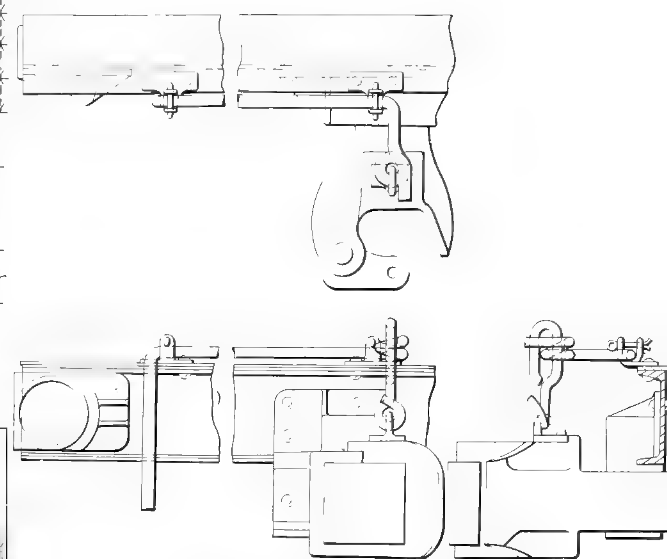


Fig. 782—Singlelink Coupler Release Rigging. National Railway Devices Company.

Fig. 783—Exterior of Hopper with Door Closed, Canadian Pacific Hopper Bottom Box Car.

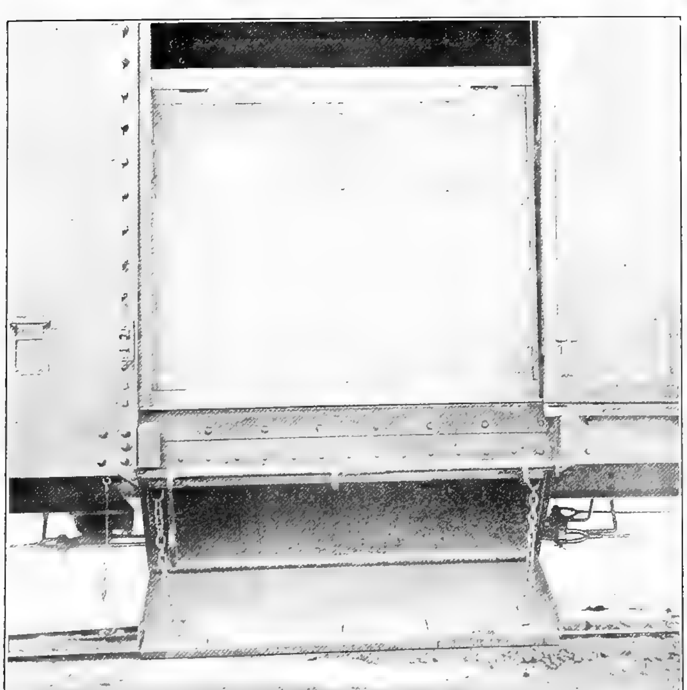


Fig. 784—Hopper Open and Grain Door in Place, Canadian Pacific Hopper Bottom Box Car.

Fig. 785 -Interior of Grand Trunk Hopper Bottom Box Car.

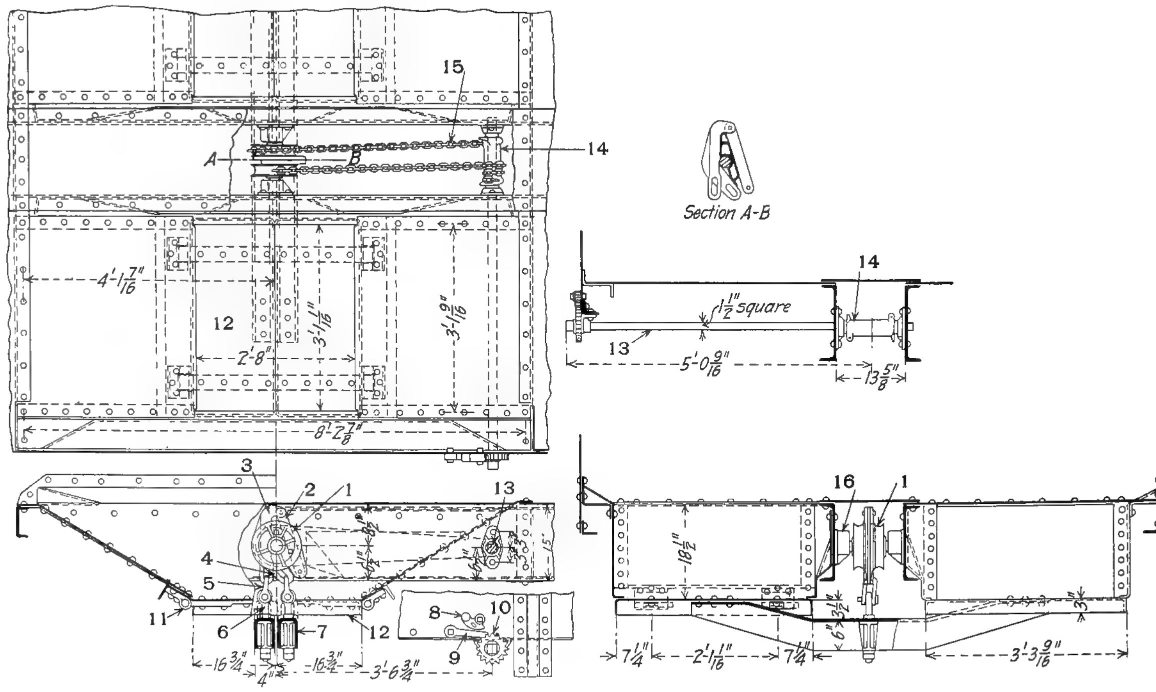
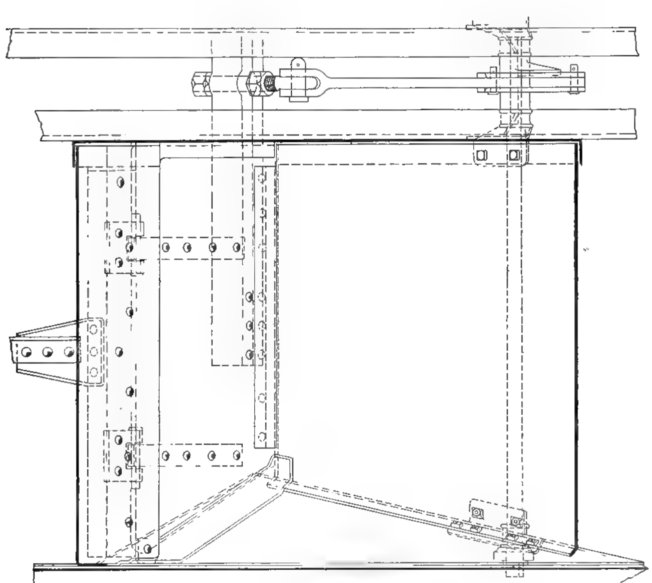


Fig. 786—Simonton Door Operating Apparatus for Twin-Hopper Gondola Car. Standard Steel Car Company.

Parts of Dumping Apparatus Shown in Fig. 786.

1 *Double Sheave with Arm*
2 *Link*
3 *Left Hanger*
4 *Right Hanger*
5 *Hanger Clevis*
6 *I-Bolt*
7 *Door Stiffener*
8 *Latch Dog*
9 *Latch*
10 *Latch Wheel and Bushing*
11 *Hinge and Hinge Butt*
12 *Door*
13 *Square Winding Shaft*
14 *Winding Shaft Drum*
15 *Chain for Operating Gear*
16 *Sheave Bearing*



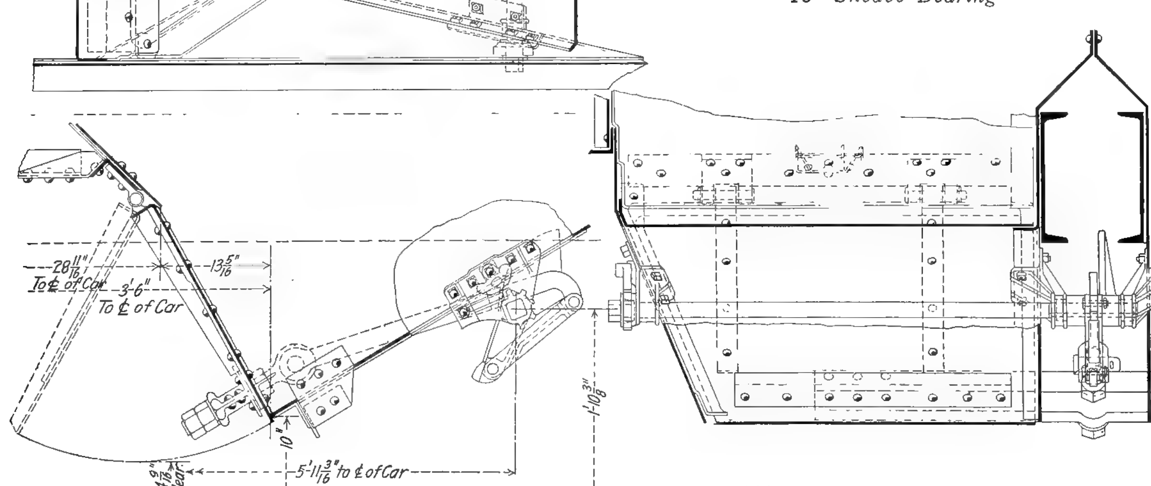


Fig. 787—Simonton Door Operating Apparatus for Self-Clearing Hopper Car. Standard Steel Car Company.

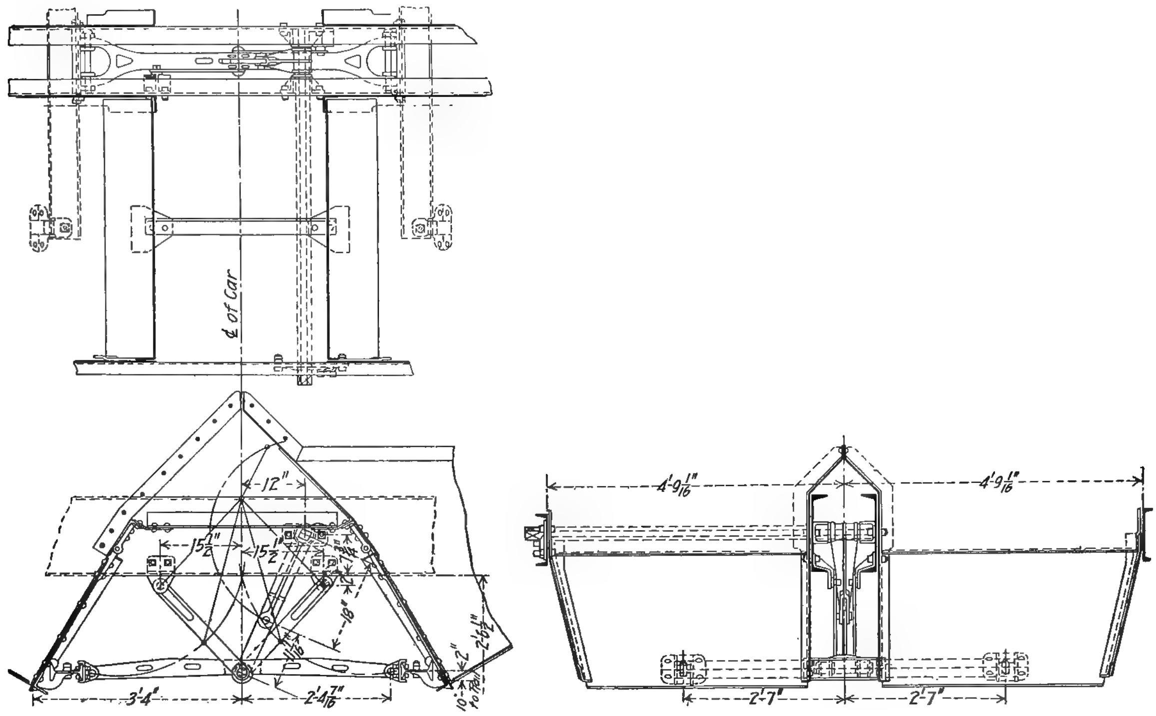


Fig. 788—Hopper Door Operating Apparatus. Standard Steel Car Company.

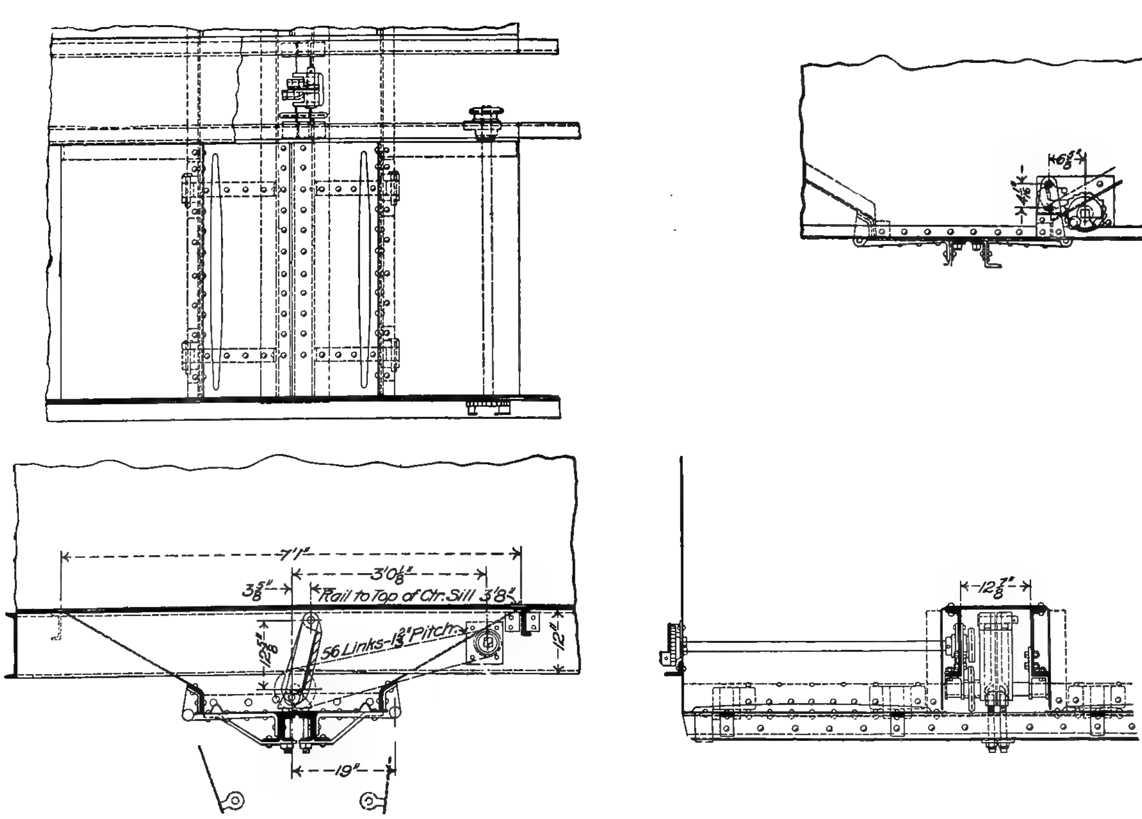


Fig. 789—Dunham Drop Door Apparatus for All-Steel Hopper Bottom Gondola Car.
U. S. Metal & Manufacturing Company.

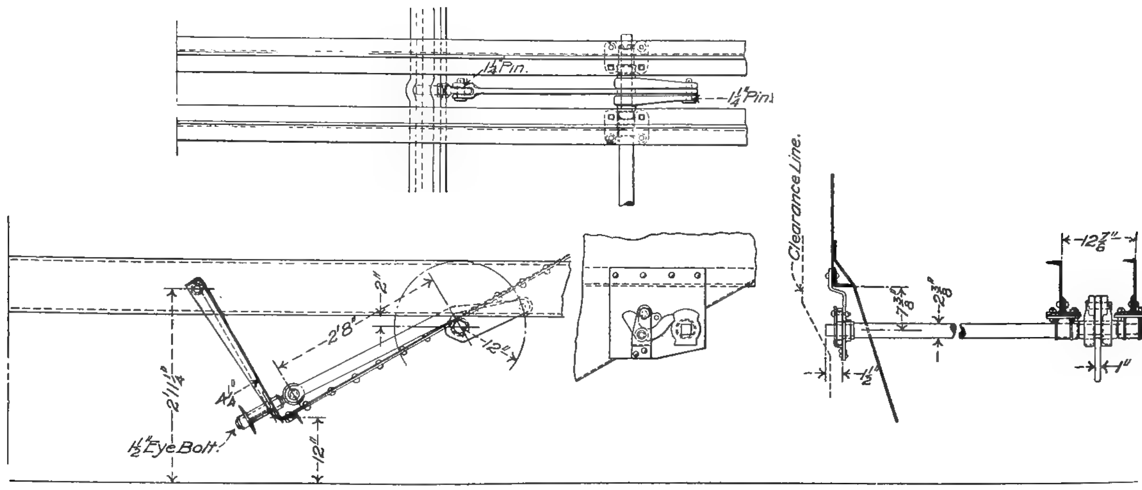


Fig. 789—Dunham Hopper Door Apparatus for Pennsylvania Railroad All-Steel Hopper Car. U. S. Metal & Manufacturing Company.

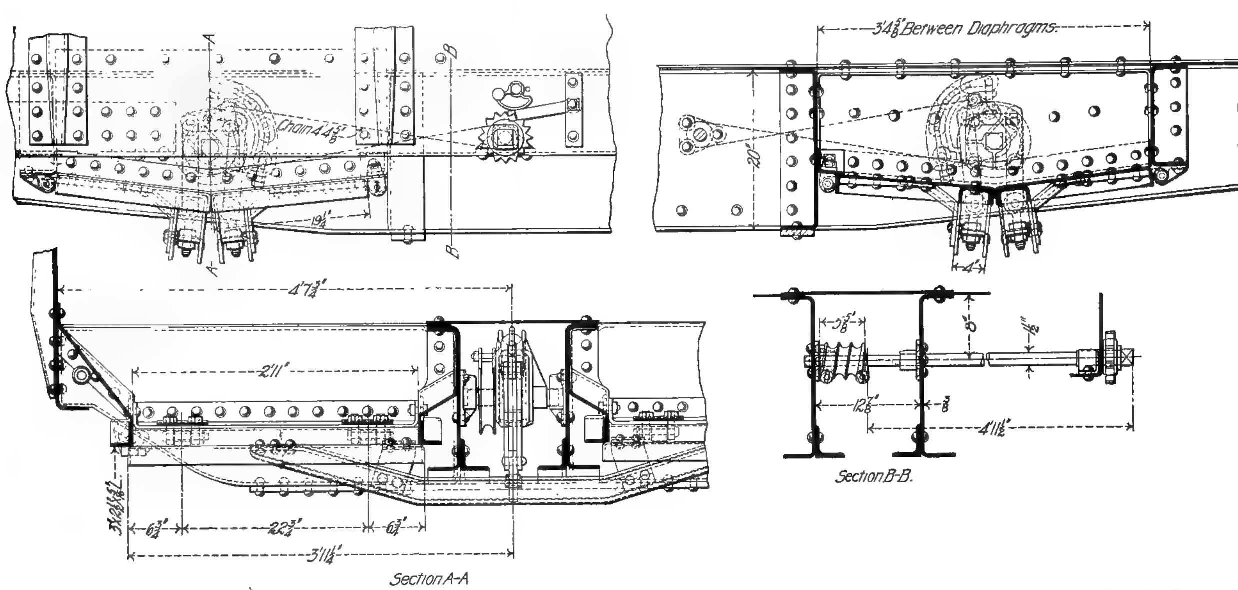


Fig. 790—Lind Drop Door Apparatus for All-Steel Hopper Bottom Gondola Car. Pressed Steel Car Company.

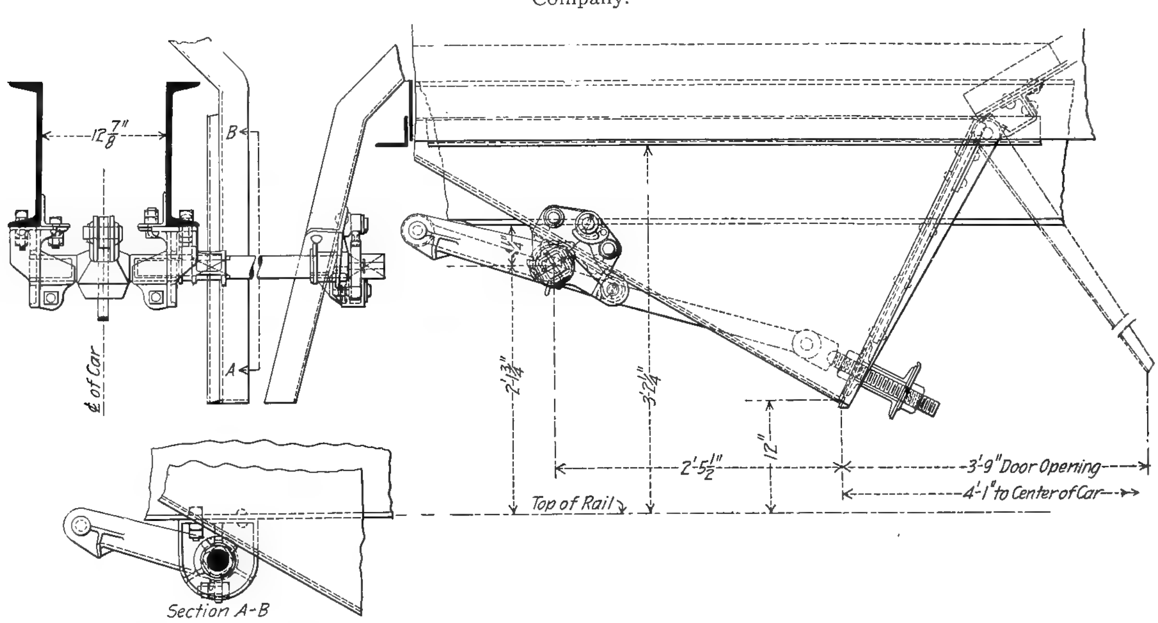


Fig. 791—Door Operating Apparatus with Lind Safety Clutch for All-Steel Hopper Car. Pressed Steel Car Company.

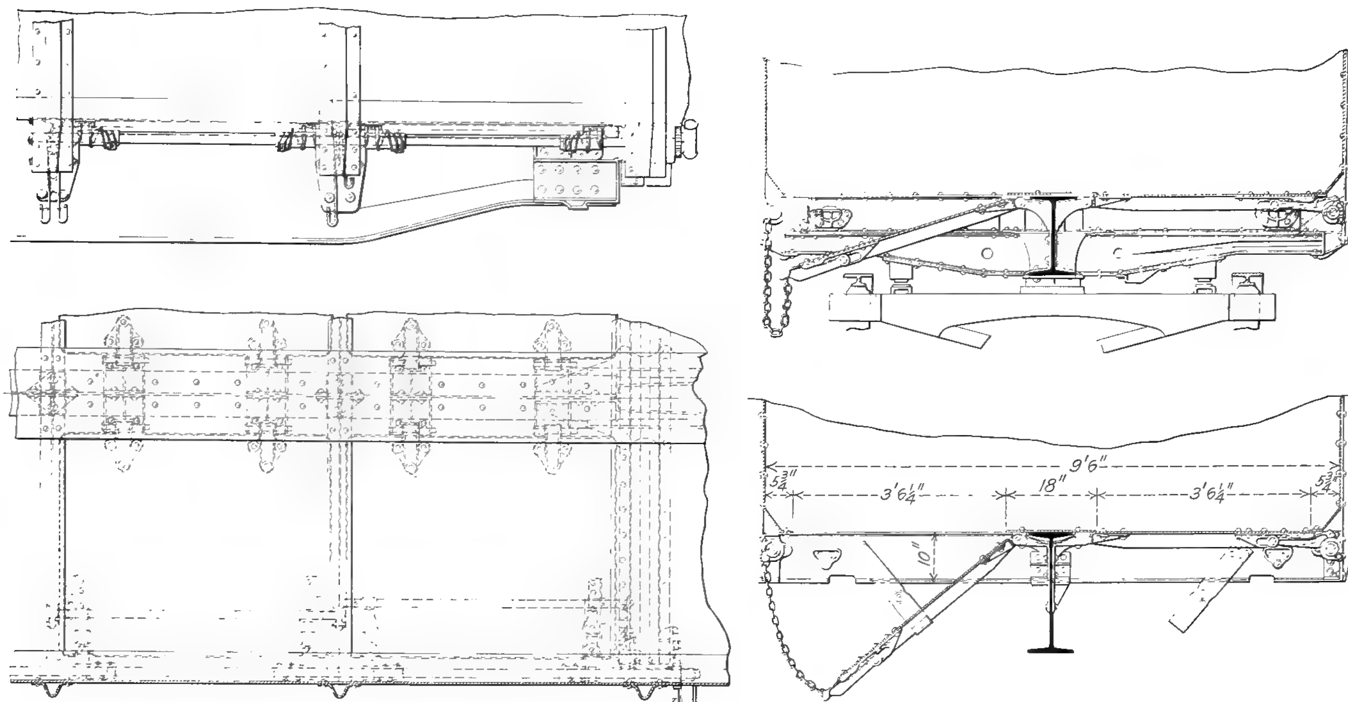


Fig. 792—Bettendorf Drop Door Mechanism for Illinois Central 50-Ton Capacity Gondola Car. The Bettendorf Company.

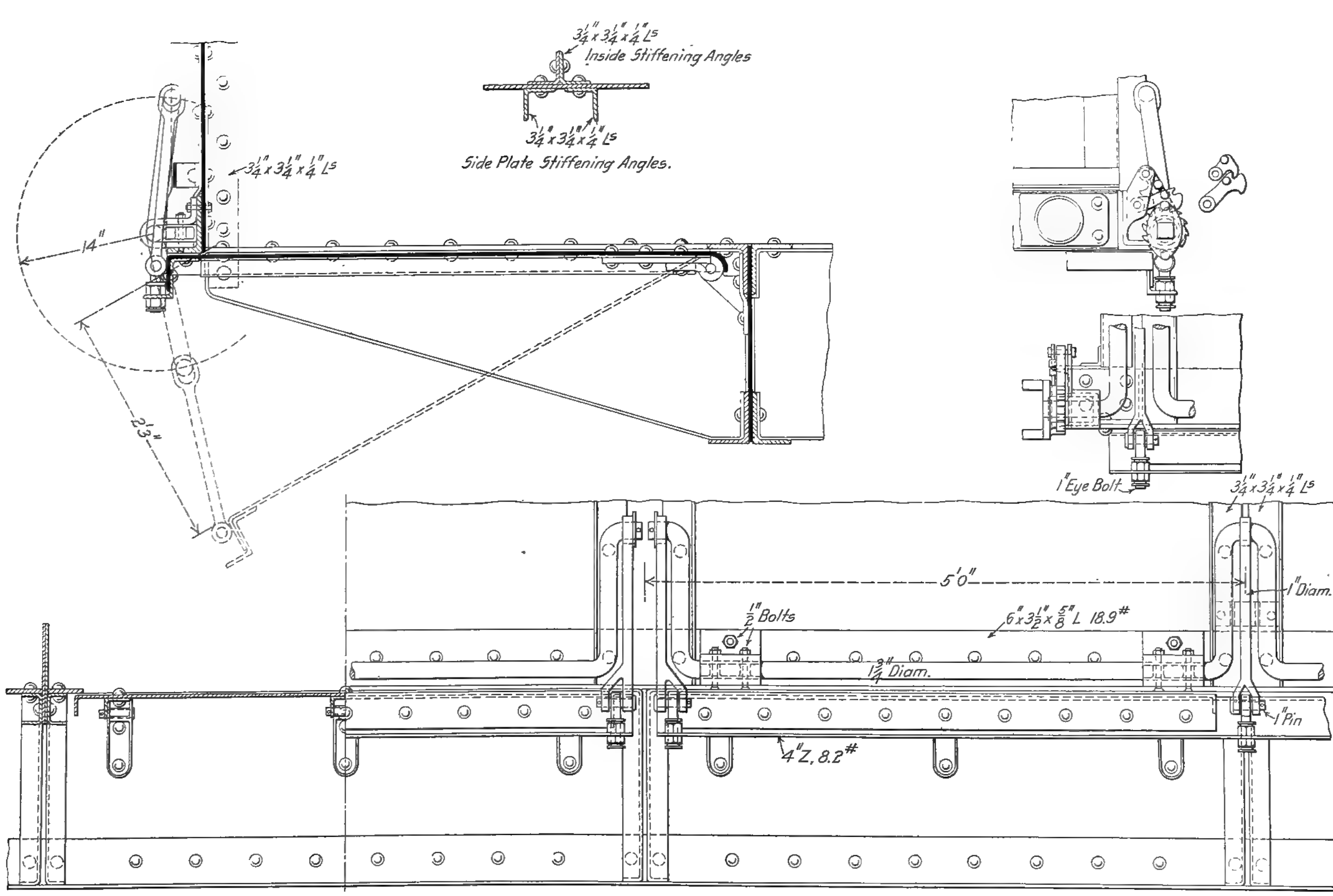


Fig. 793—Empire Drop Door Operating Apparatus for General Service Car. U. S. Metal & Manufacturing Company.

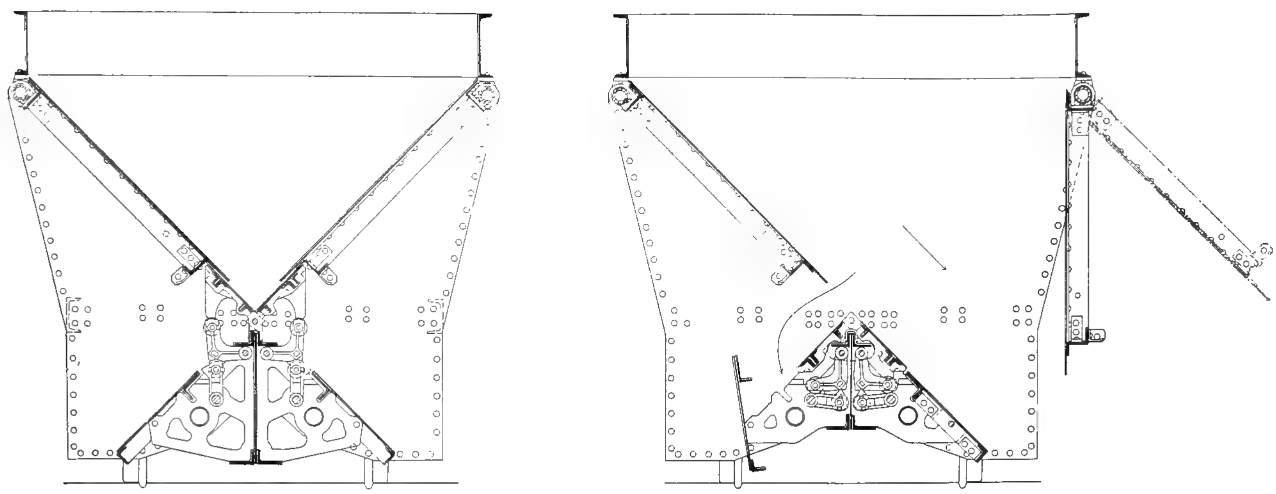


Fig. 794—Door Positions of the Gilman-Taylor Car Shown in Fig. 68. Goodwin Car Company.

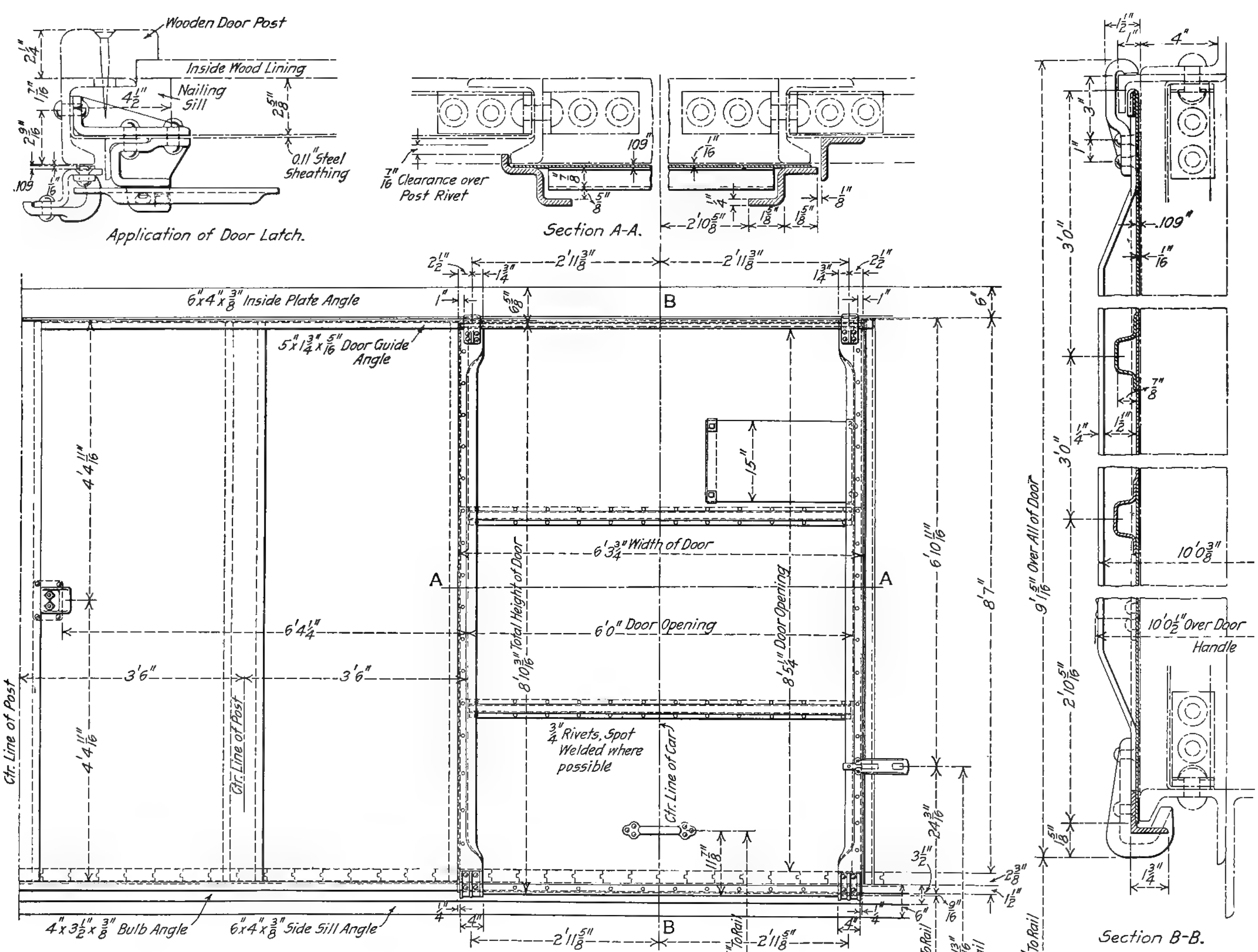


Fig. 795—Side Door of Pennsylvania Railroad Steel Box Car Shown in Fig. 7.

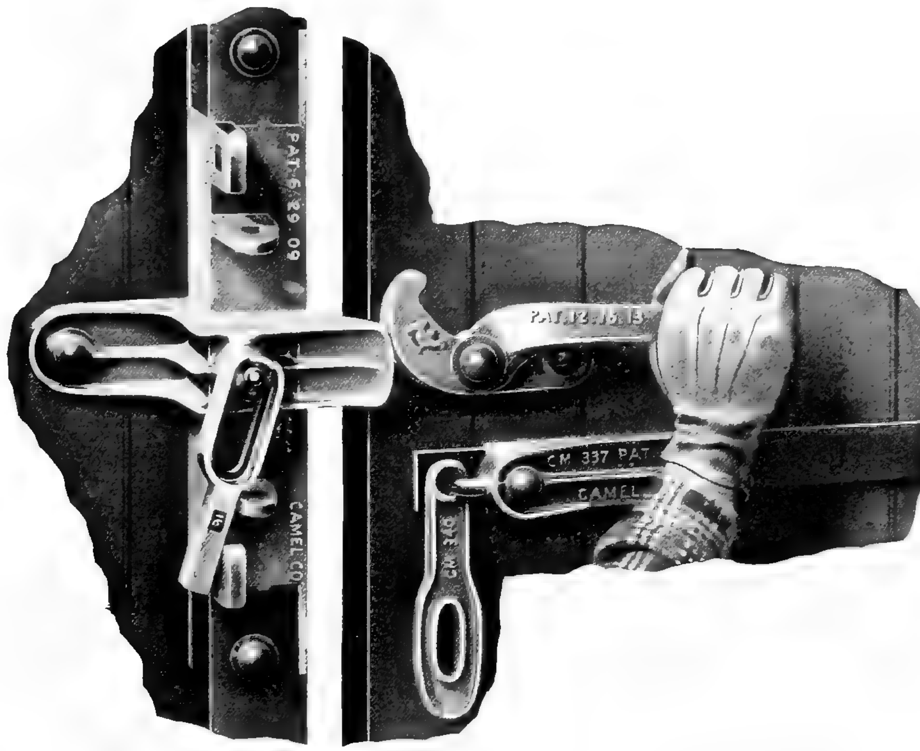


Fig. 796—Camel Combination Door Stop and Lever with Door Starter. The Camel Company.

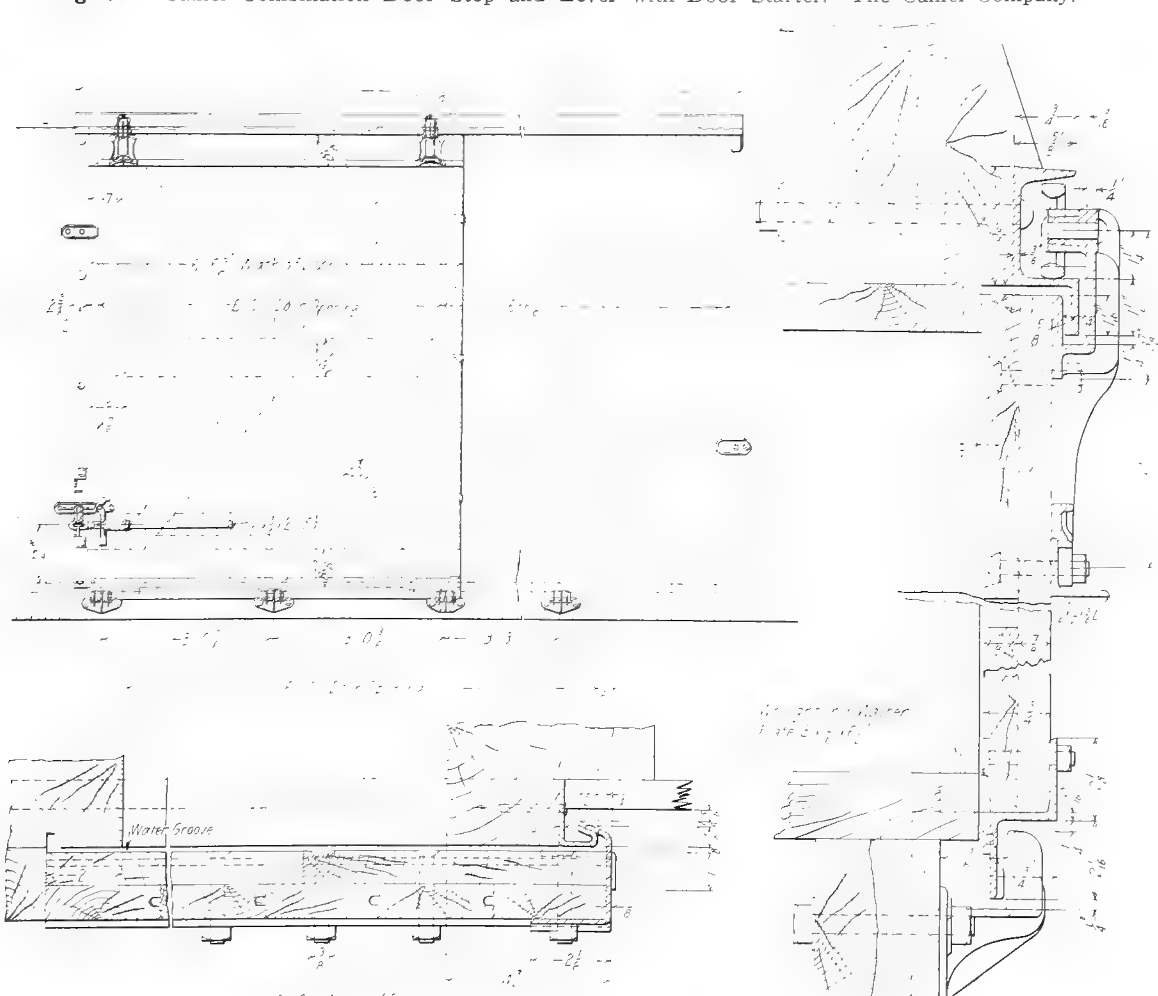


Fig. 797—Camel Box Car Side Door No. 27, with Door Starter and Large Bottom Z-Bar. The Camel Company.

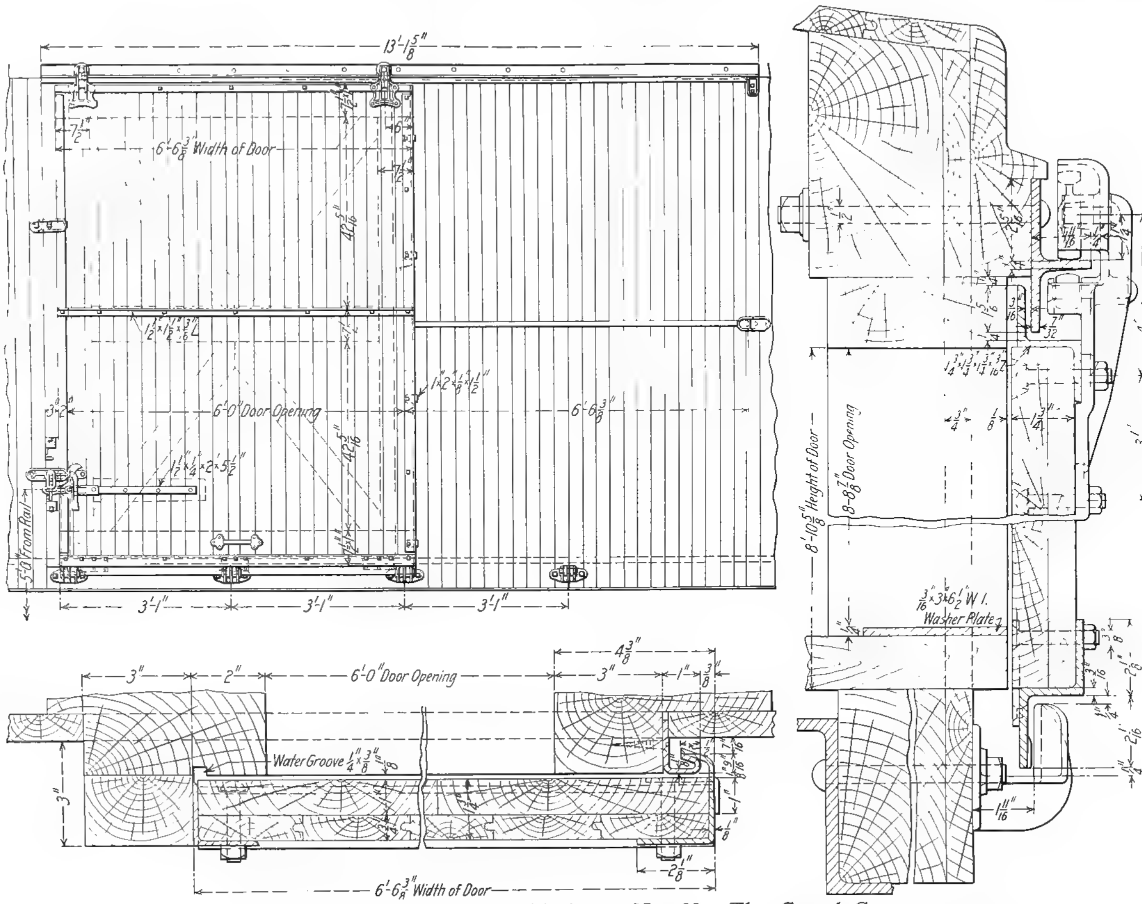


Fig. 798—Camel Box Car Side Door No. 32. The Camel Company.

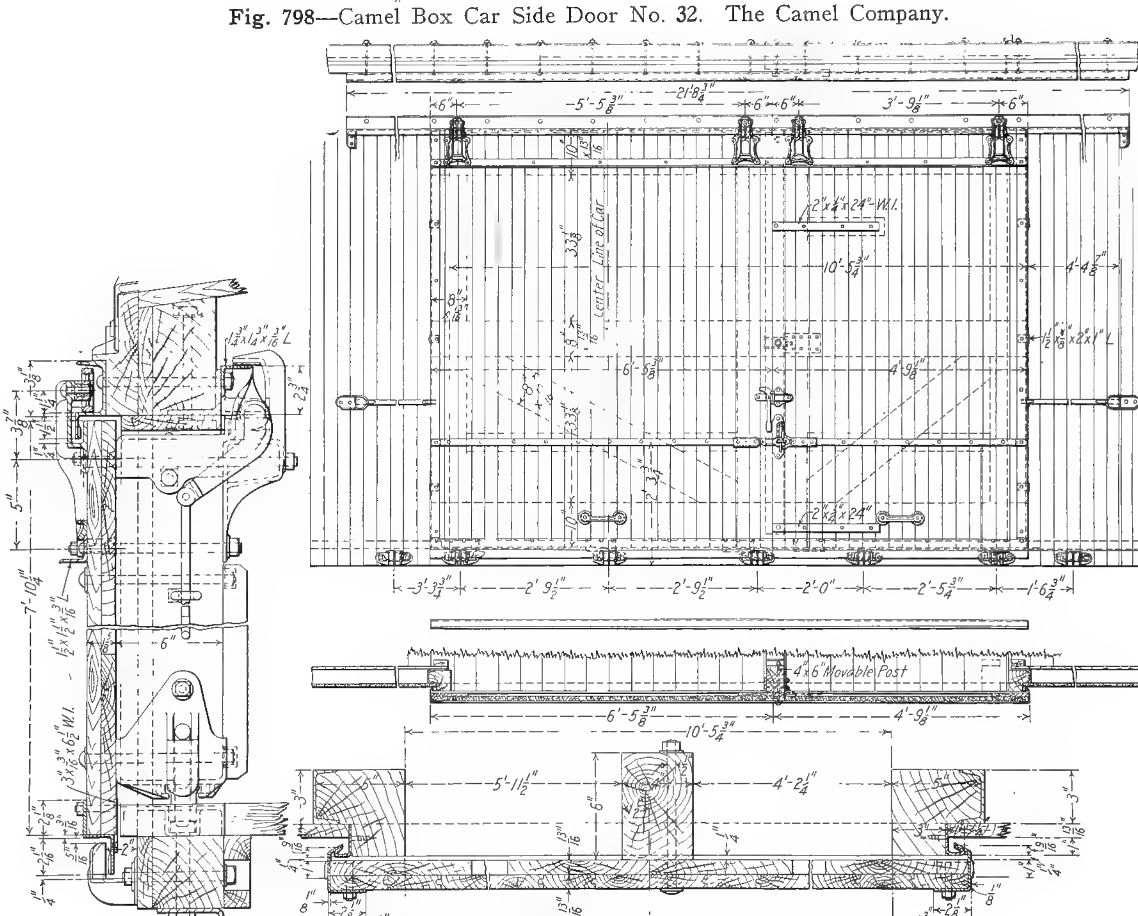


Fig. 799—Camel Box Car Side Door No. 27 with Movable Post, for Baltimore & Ohio Automobile Cars.
The Camel Company.

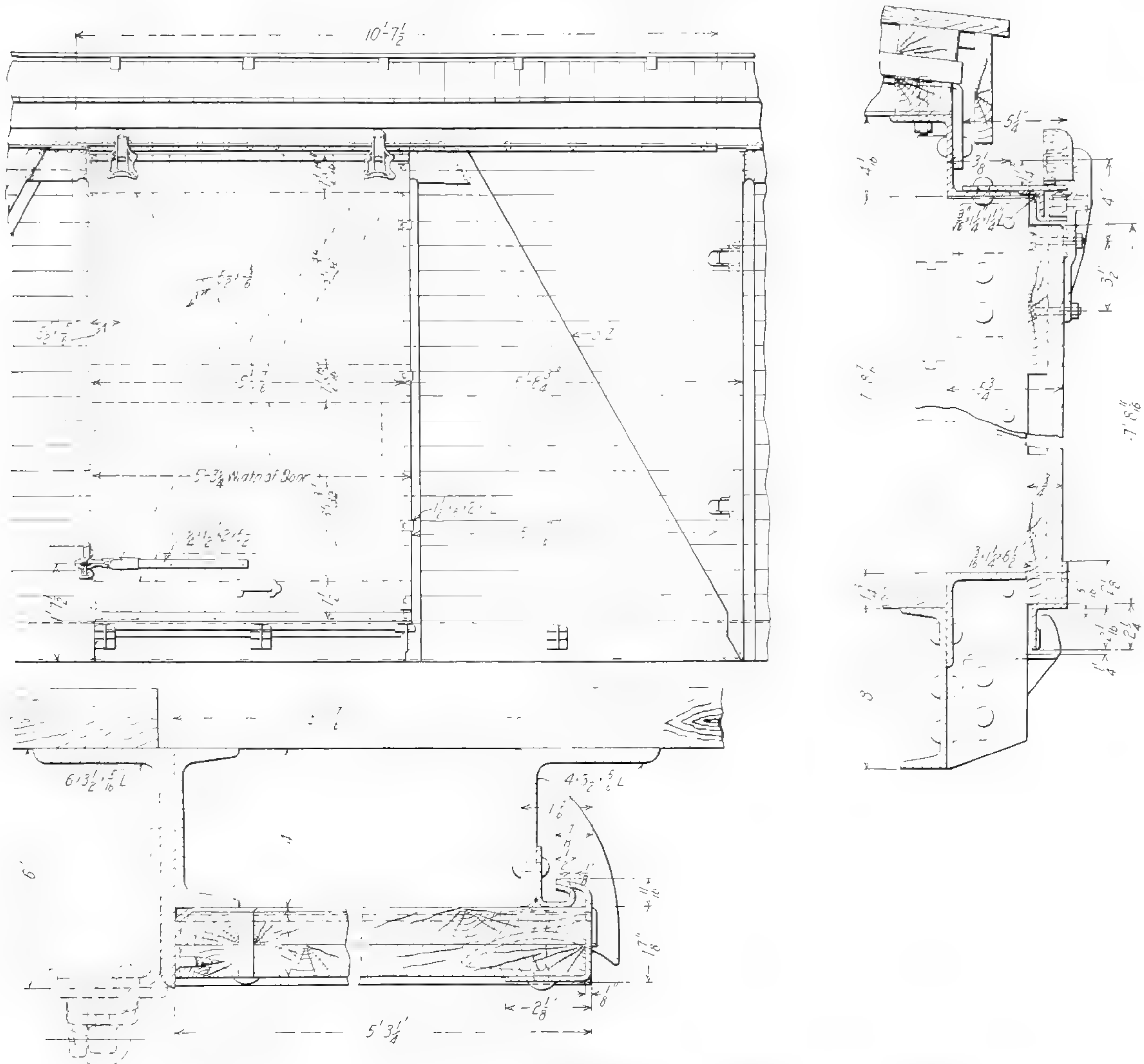


Fig. 800 Camel Side Door No. 30 for Steel Superstructure Box Cars. The Camel Company.

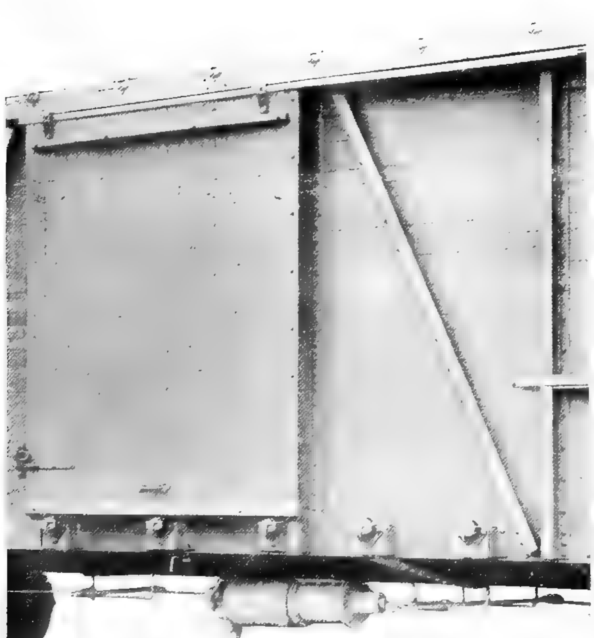


Fig. 801—National Box Car Door. Union Metal Products Company.

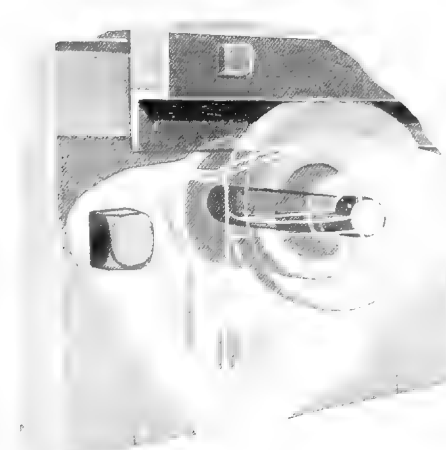


Fig. 802—National Car Door Bracket. Union Metal Products Company.

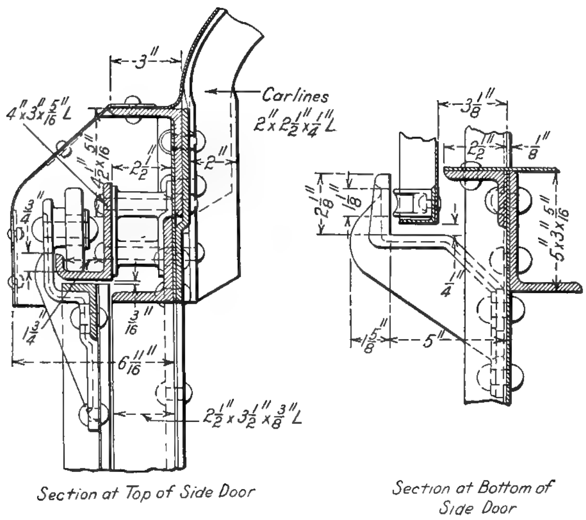


Fig. 803—Details of Side Door for Original Union Pacific All-Steel Box Car.

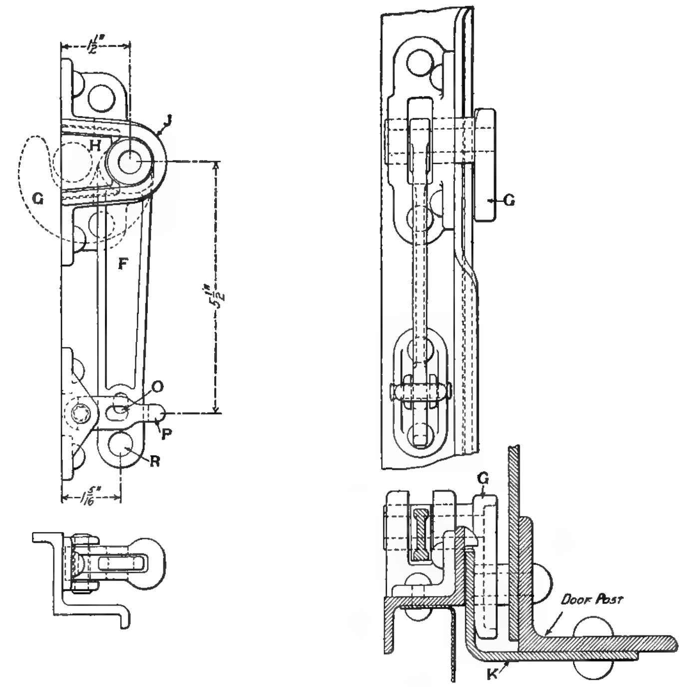


Fig. 804—Latch for Door of Summers All-Steel Box Car Shown in Fig. 1. See Also Fig. 808.

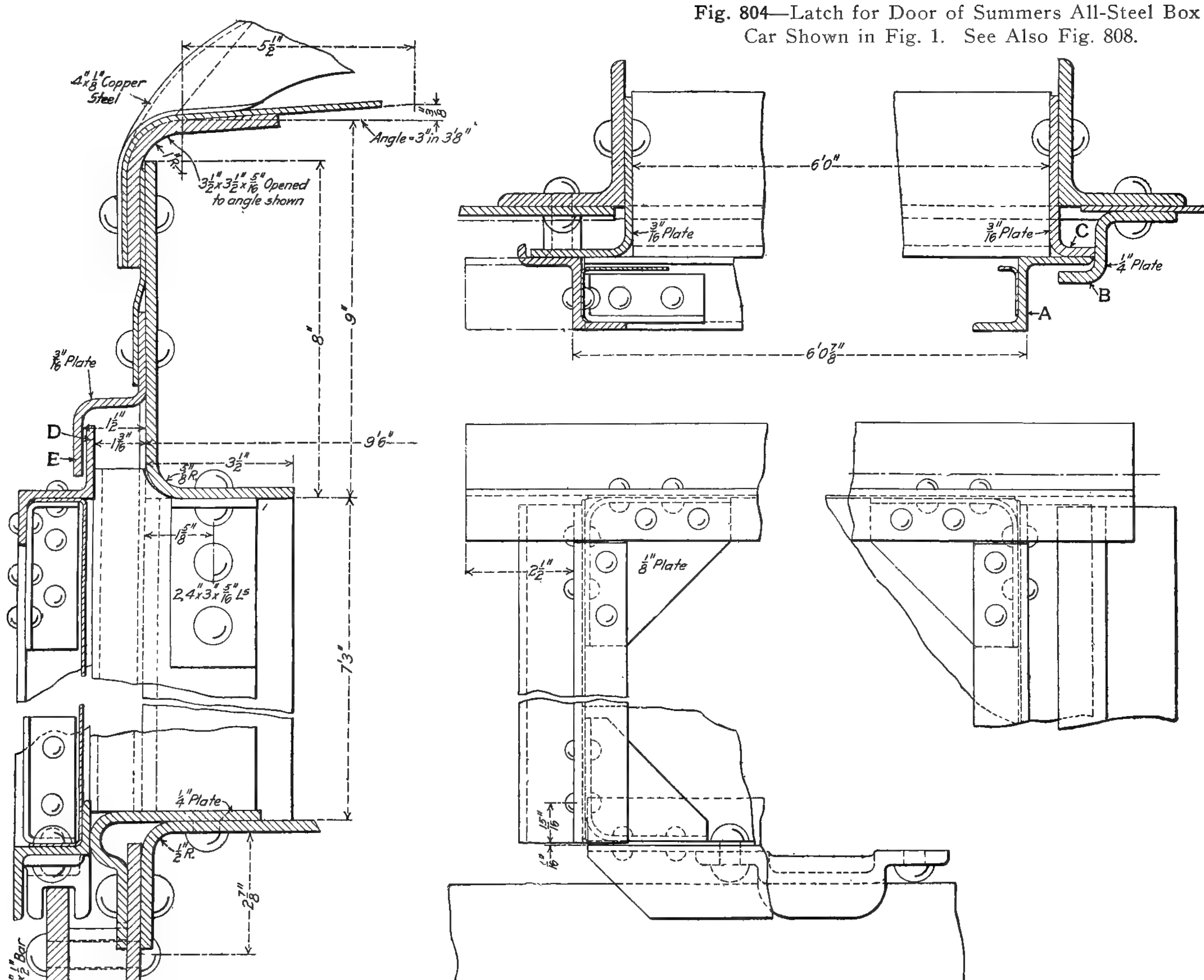


Fig. 805—Details of Door for All-Steel Box Car Shown in Figs. 1 and 259-261. Summers Steel Car Company.

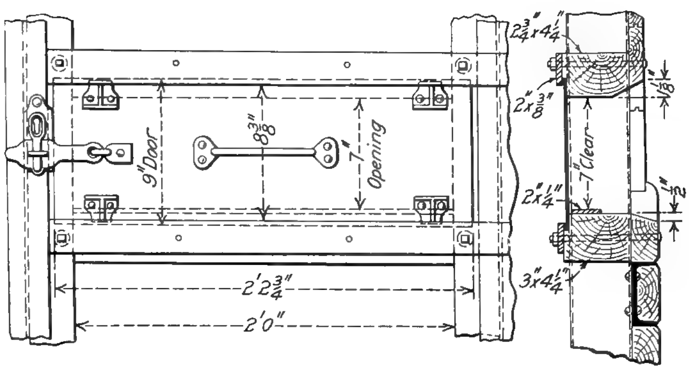


Fig. 806—End Door for Northern Pacific Stock Car.

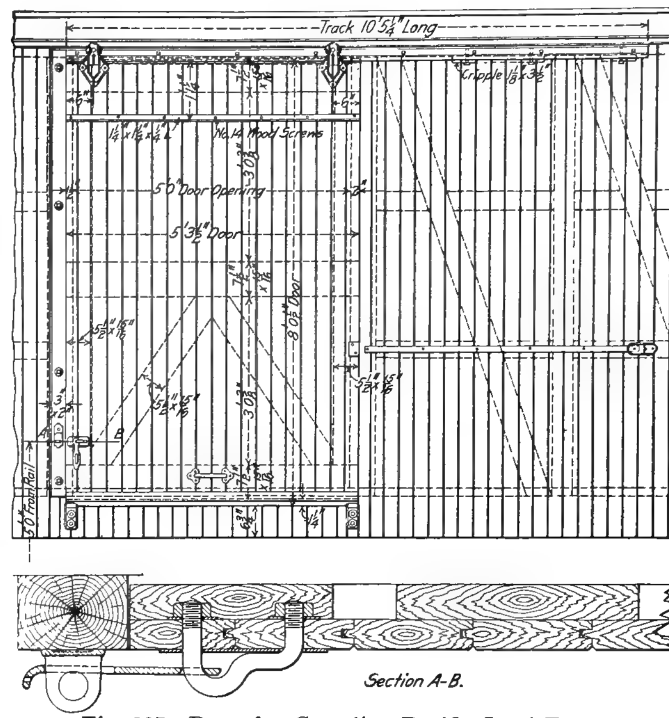


Fig. 807—Door for Canadian Pacific Steel-Frame Box Car.

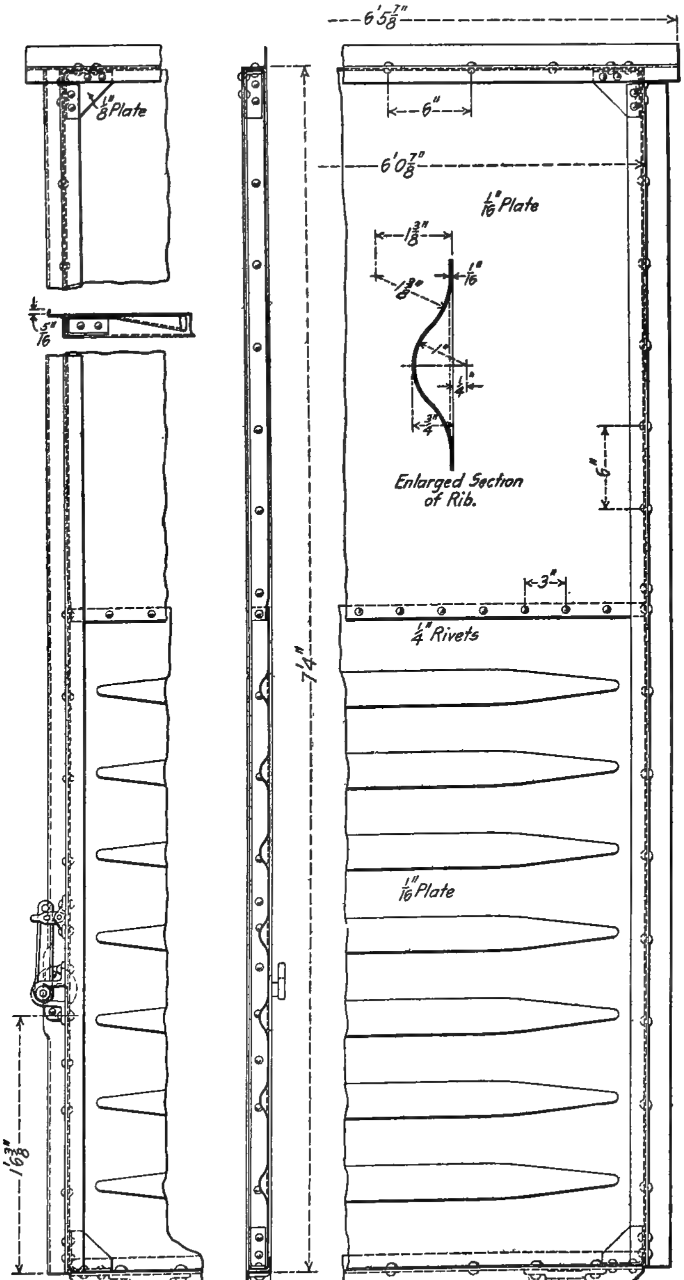


Fig. 808—Door for Summers All-Steel Box Car. See also Figs. 804 and 805.

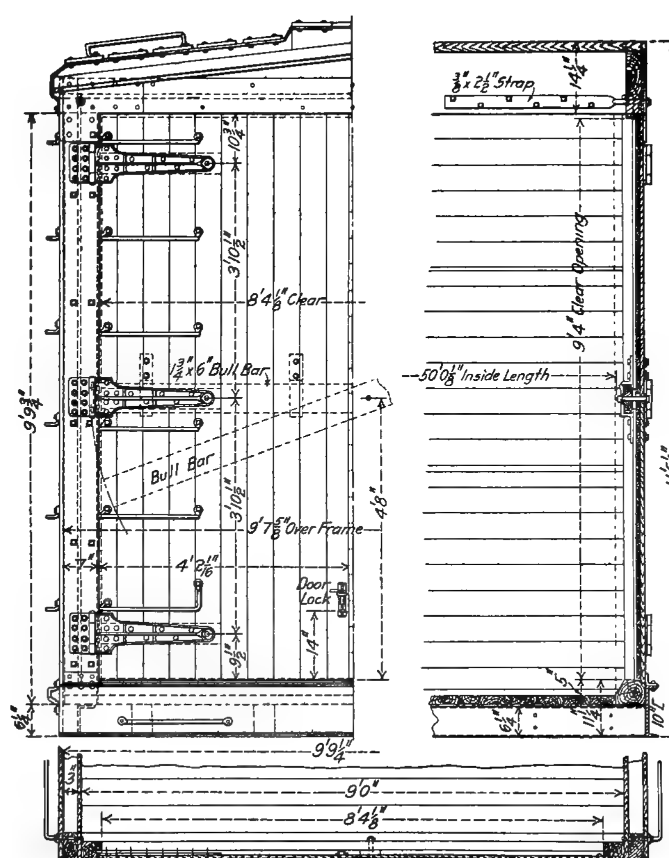


Fig. 809—End Door for Chicago, Milwaukee & St. Paul Automobile Box Car.

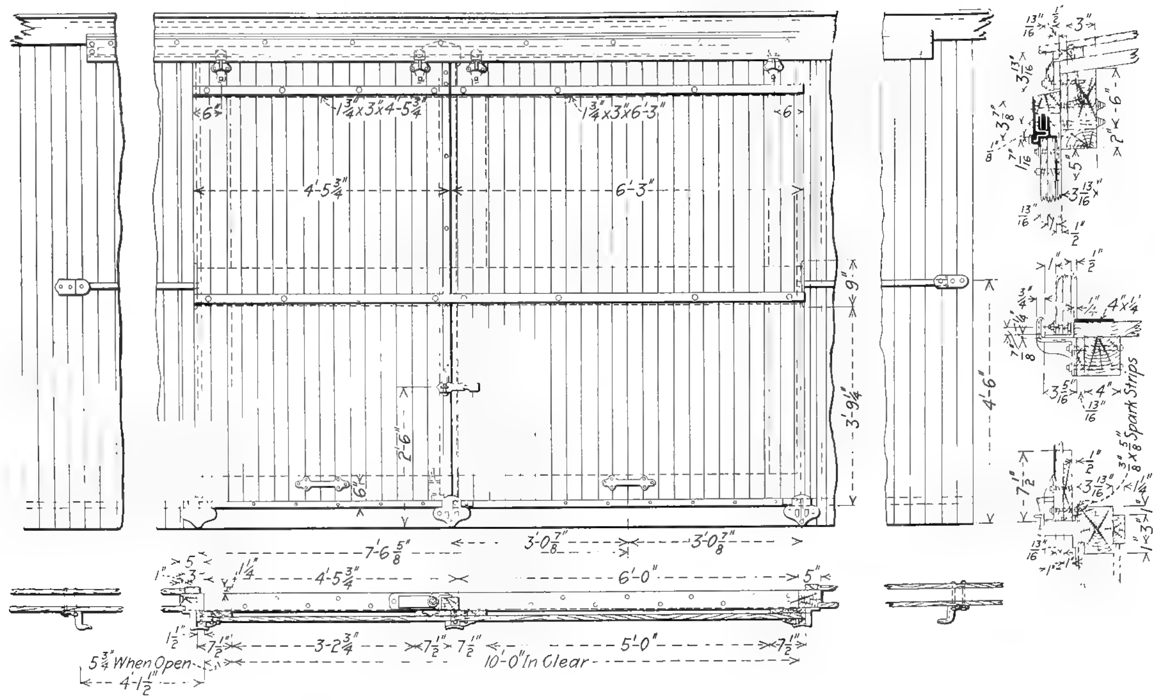


Fig. 810—Two-Piece Side Door for Automobile Box Car. Western Steel Car & Foundry Company.

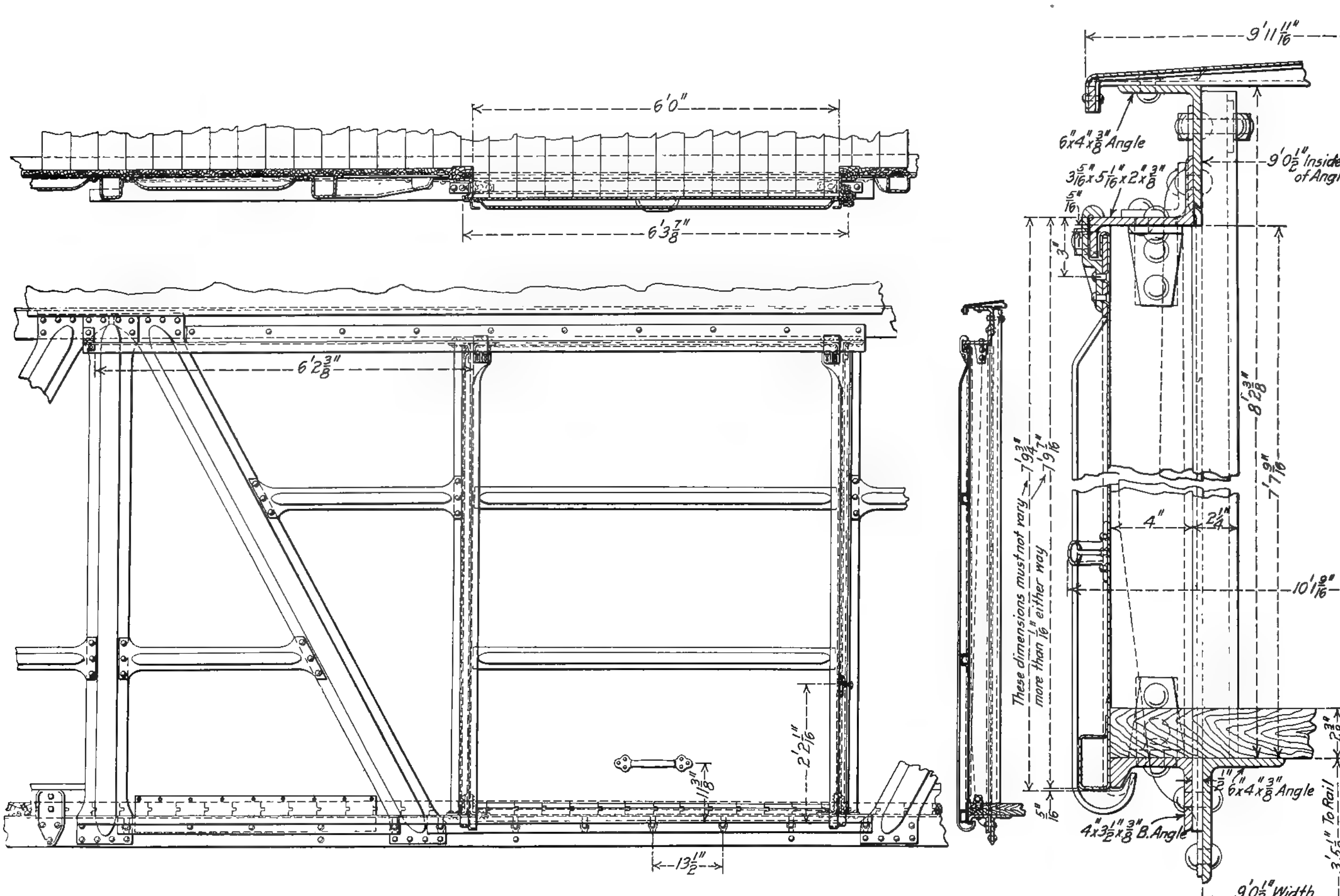


Fig. 811—All-Steel Door Used on Pennsylvania Railroad Steel Frame Box Car.

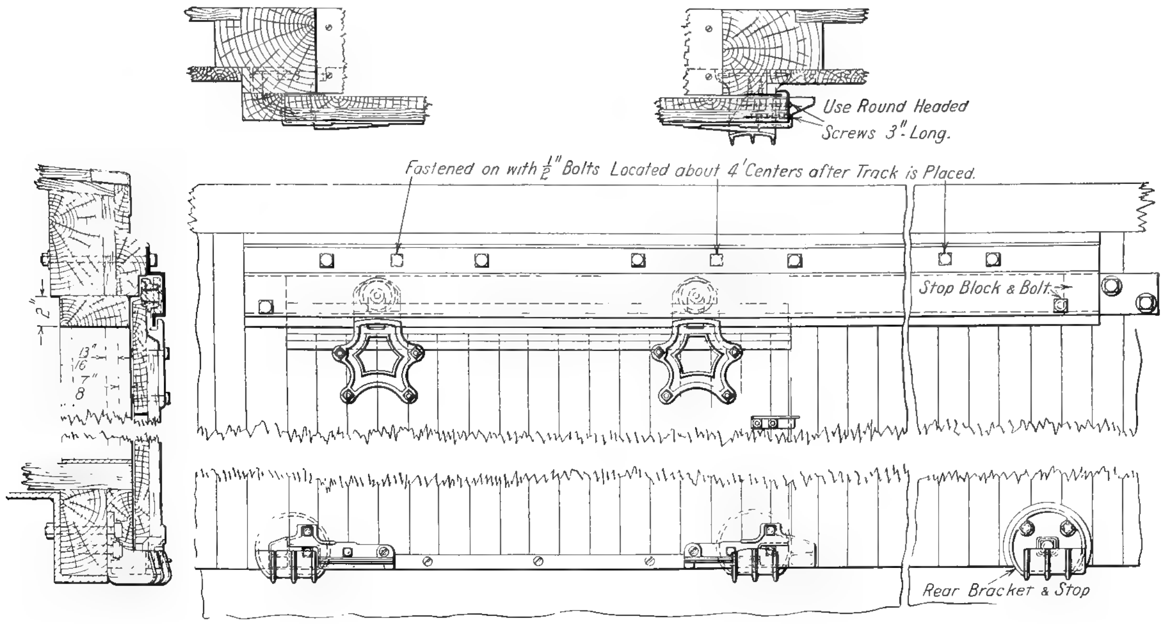


Fig. 812—Chicago Car Door and Fixtures. Chicago Car Door Company

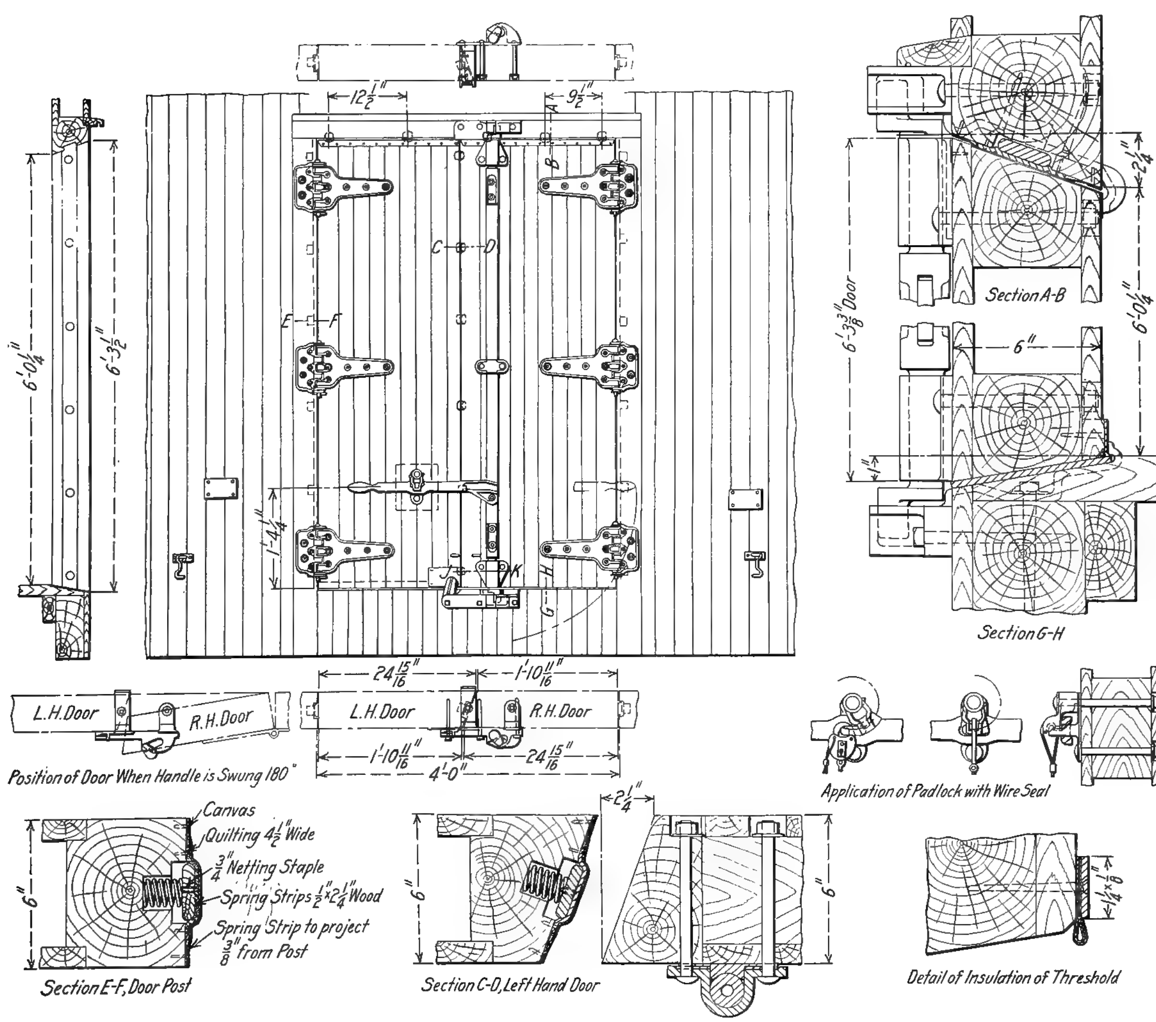


Fig. 813—Miner Refrigerator Car Door Fastener and La Flare Insulation. W. H. Miner.

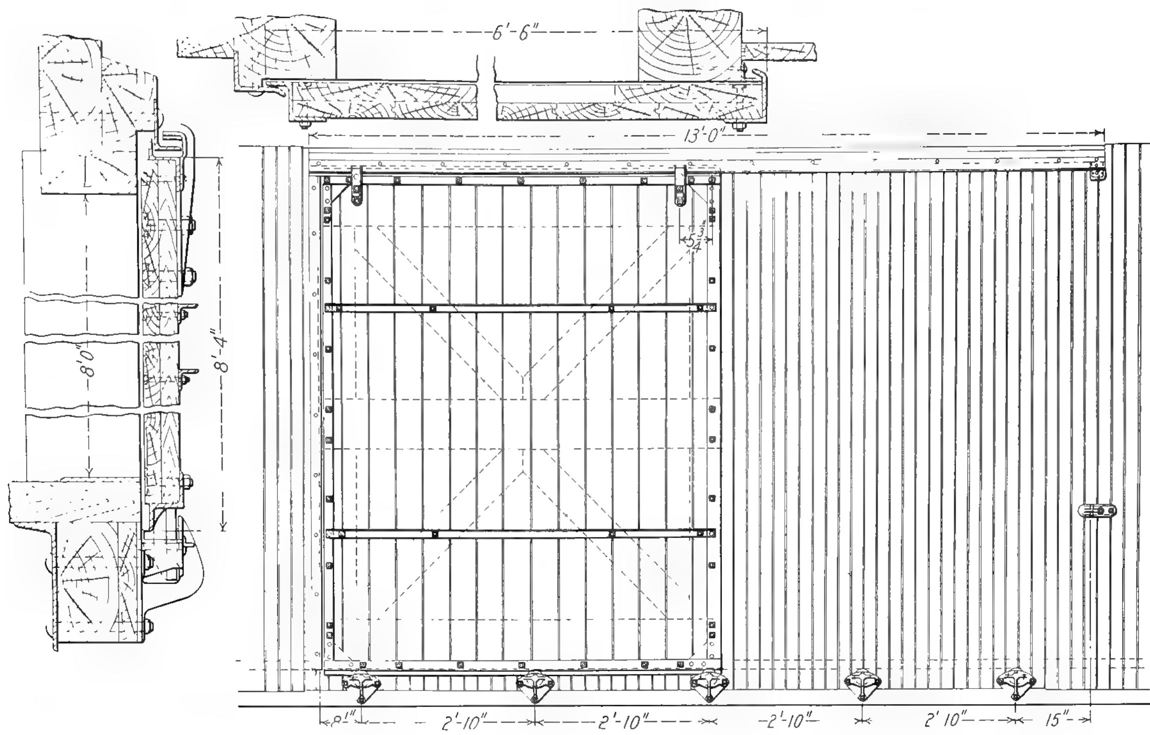


Fig. 814—Box Car Side Door. National Appliance Company.

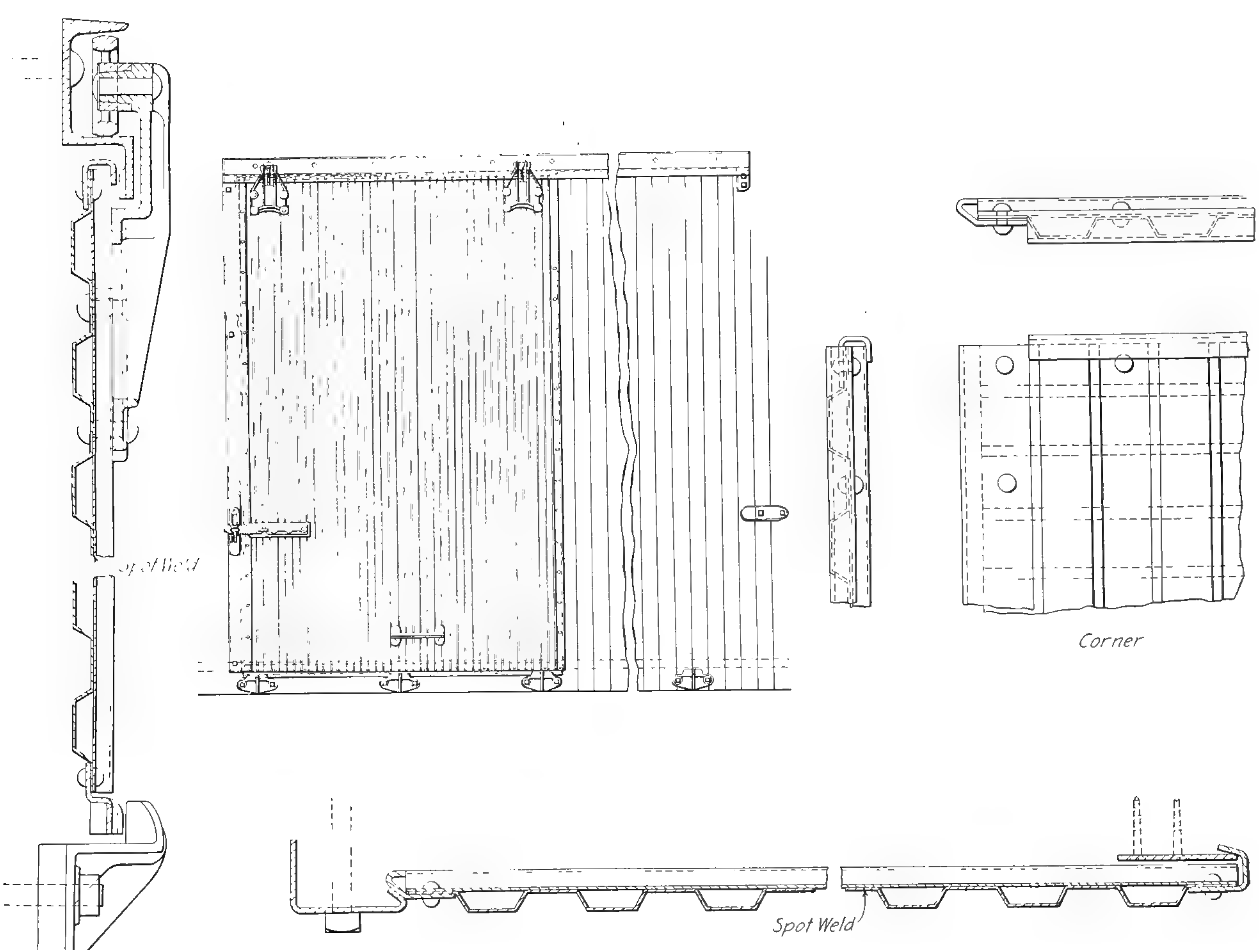


Fig. 815—Titanlite Steel Freight Car Door. Transportation Utilities Company.

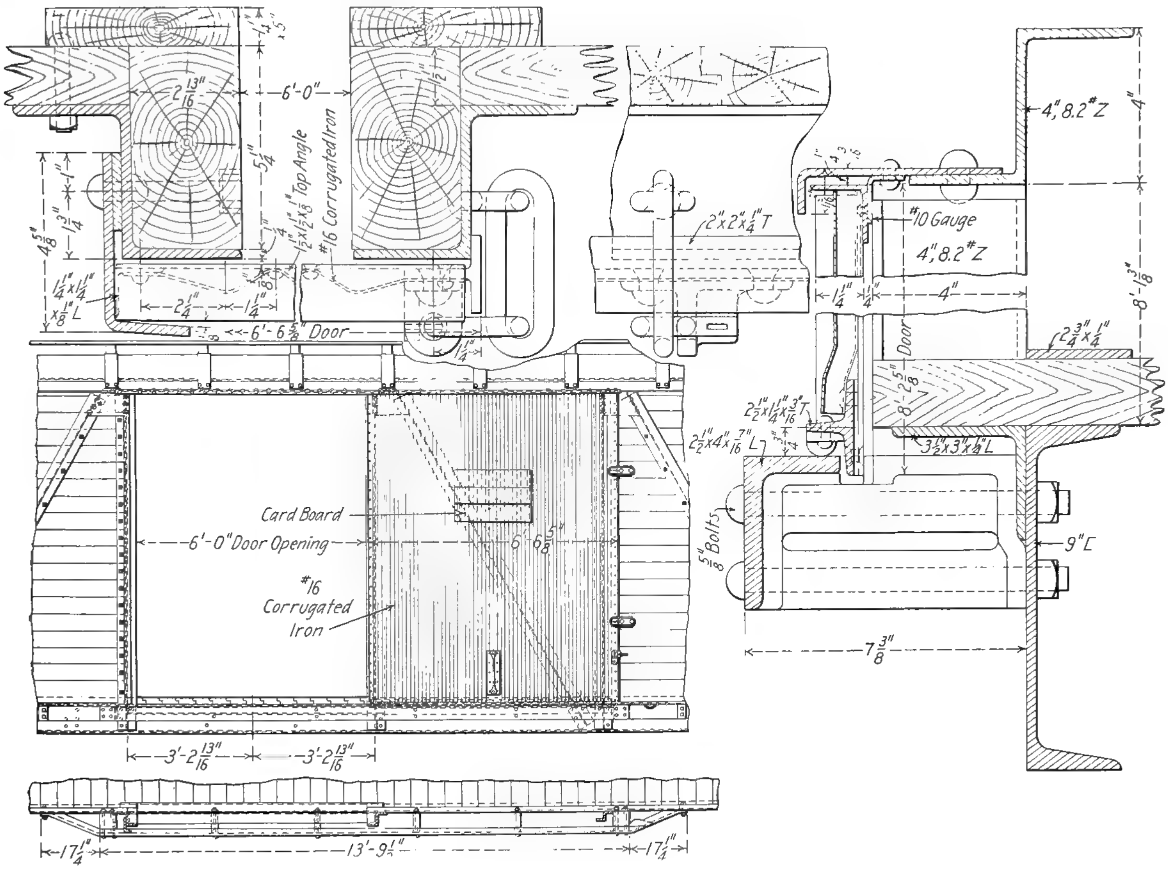


Fig. 816—Side Door and Fender for Steel Frame Box Car. American Car Roof Company.

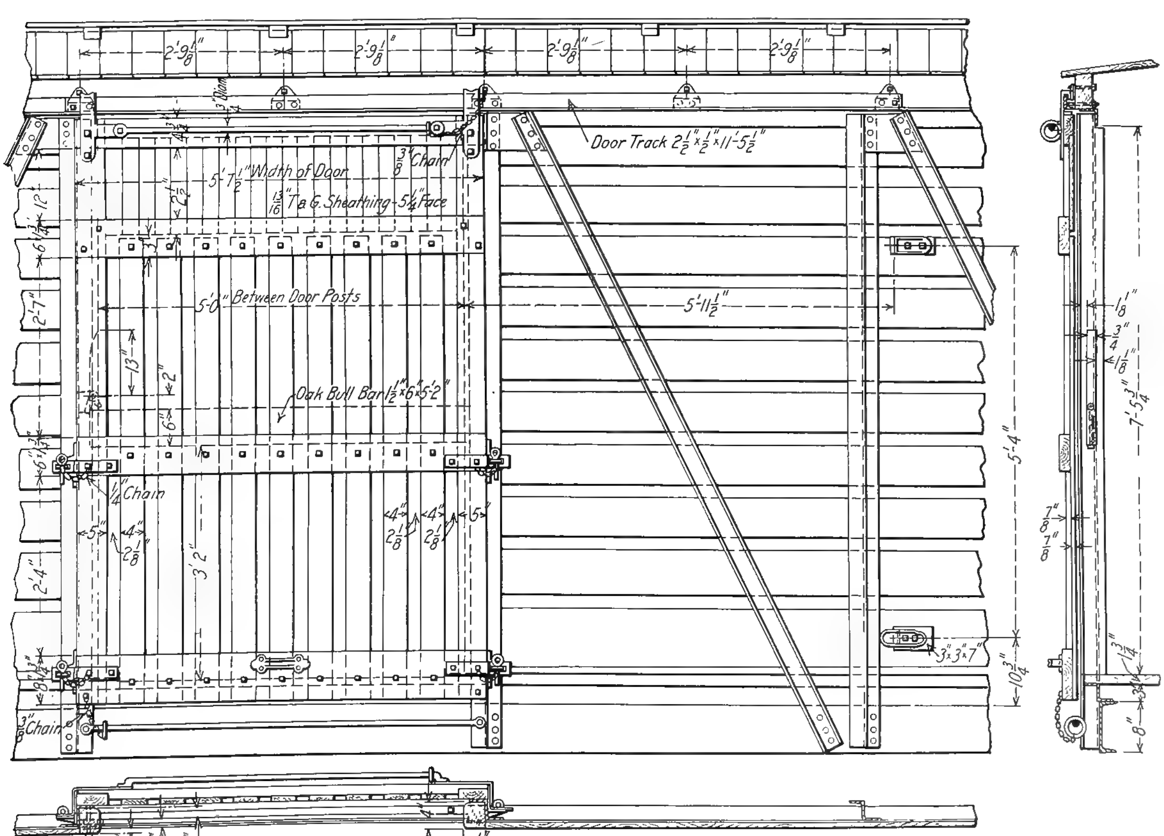


Fig. 817—Side Door for Mather Stock Car Shown in Fig. 94.

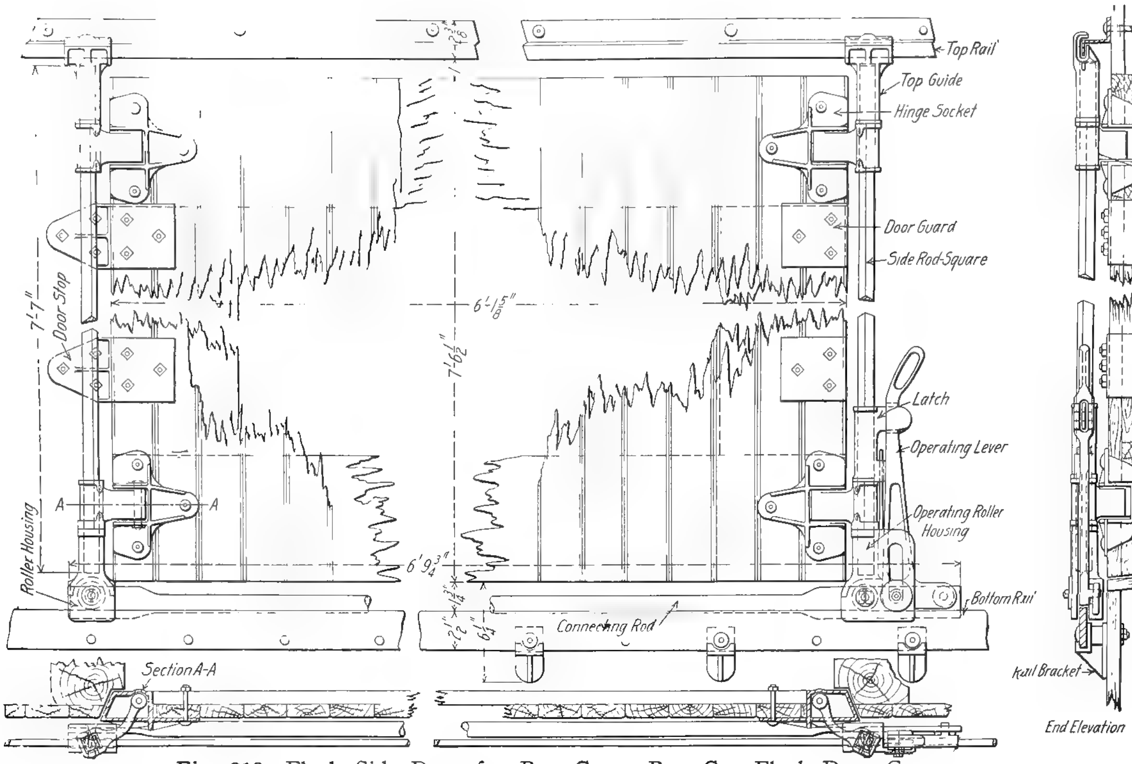


Fig. 818—Flush Side Door for Box Cars. Box Car Flush Door Company.

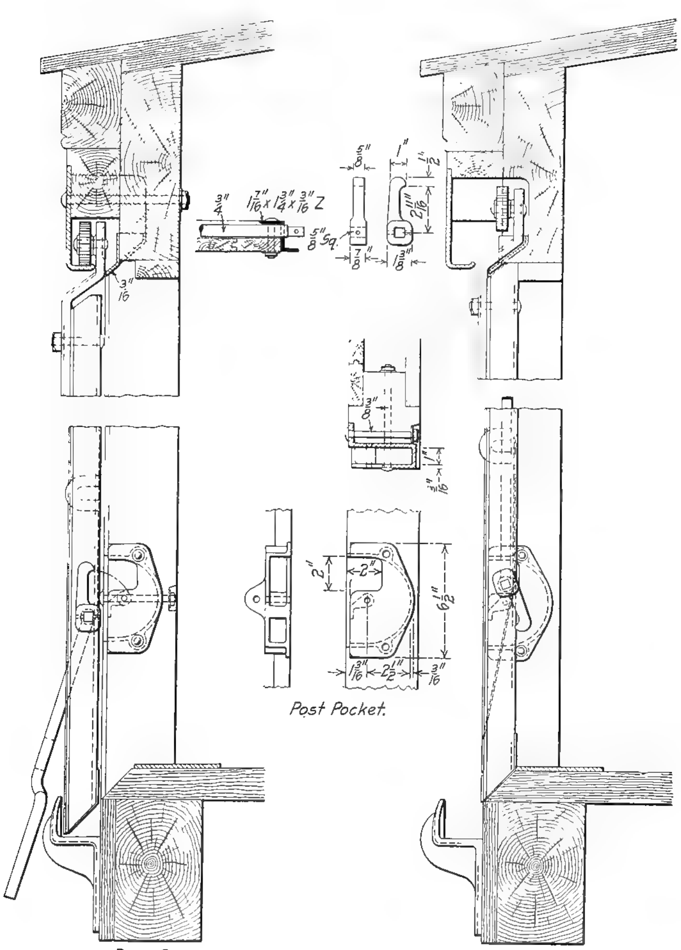


Fig. 819—Ohio Flush Box Car Door. Ralston Steel Car Company.

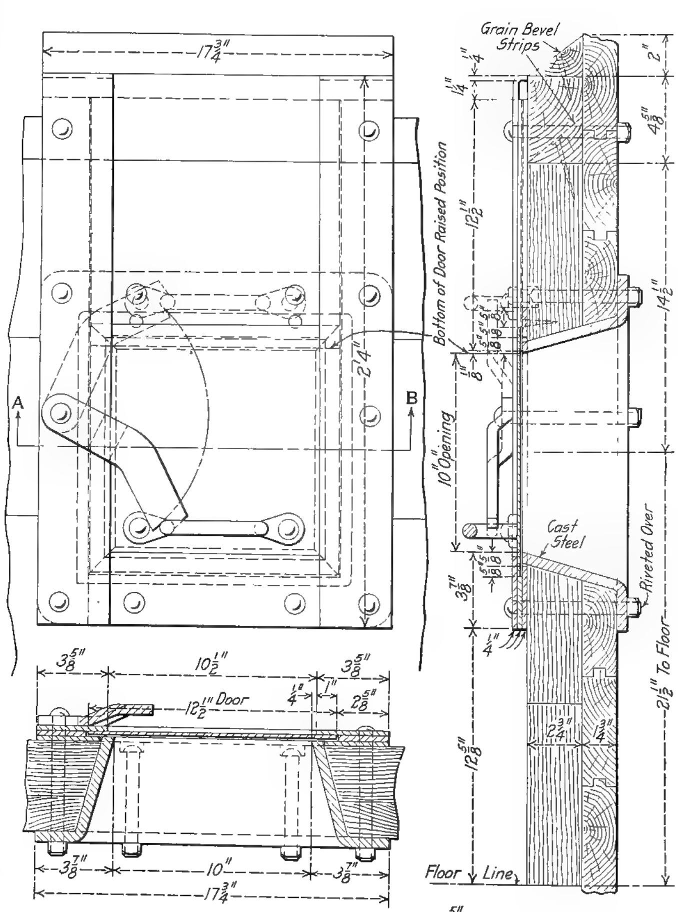


Fig. 820—Lower Rail End Door Used on Canadian Government Railways Box Cars.

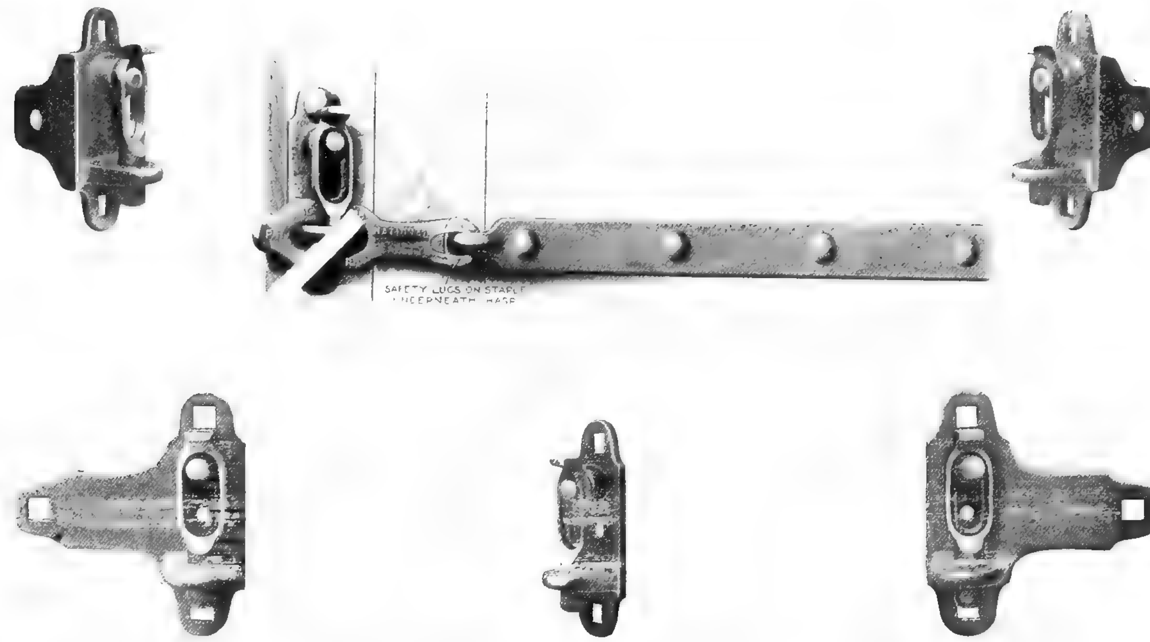


Fig. 821—National Car Door Fasteners—Locks (Patented).

Fig. 822— Two-Hole Hasp.

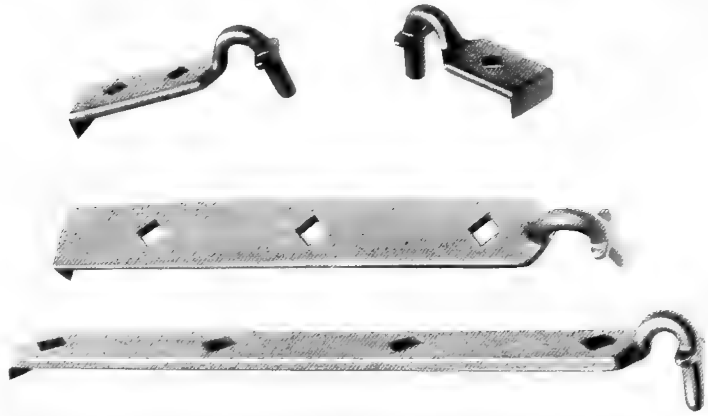


Fig. 823—National Car Door Fasteners—Staples (Patented).

Fig. 824— One-Hole Hasp.

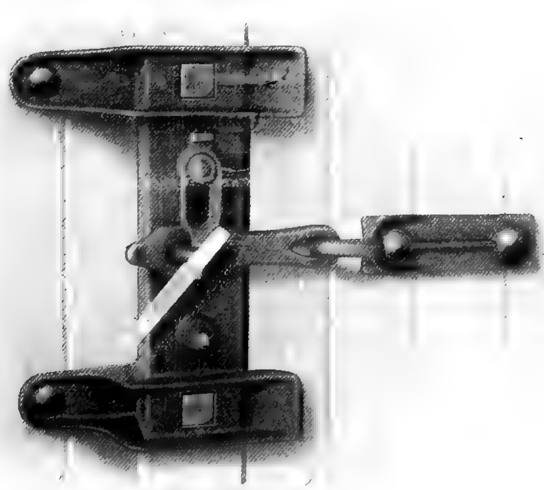
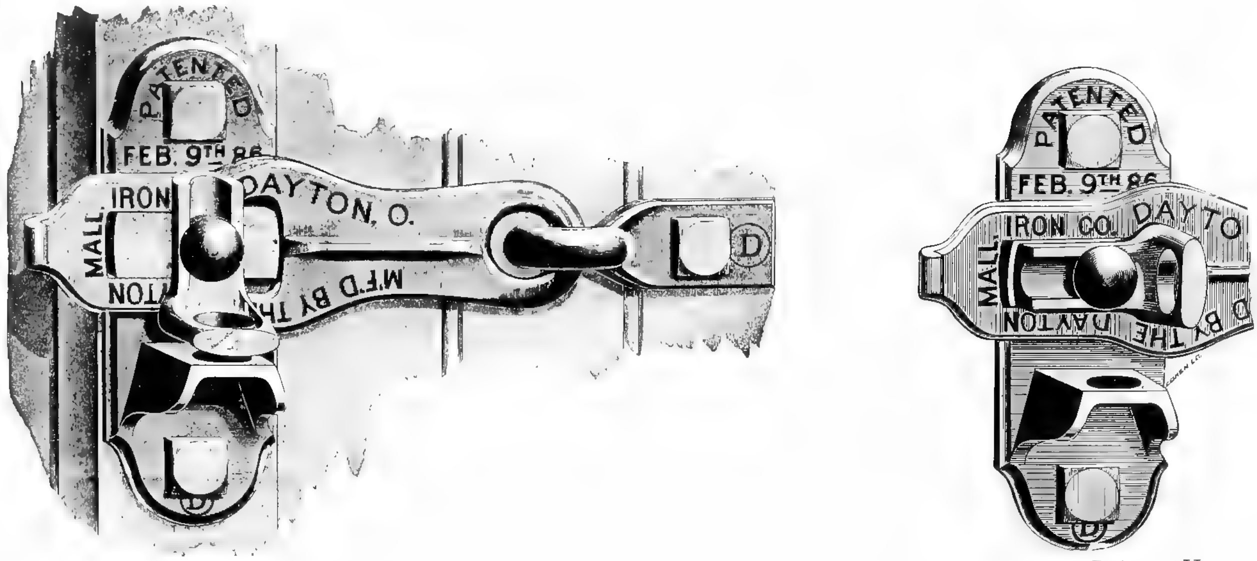


Fig. 825—National Car Door Stop and Lock Combined (Patent Pending).

Fig. 826—National Burglar Proof Car Door Bracket (Patented).

The National Malleable Castings Company.



Closed, Ready for Sealing. In Position to Release Hasp.

Fig. 828—Dayton Freight Car Door Lock. Dayton Malleable Iron Company.

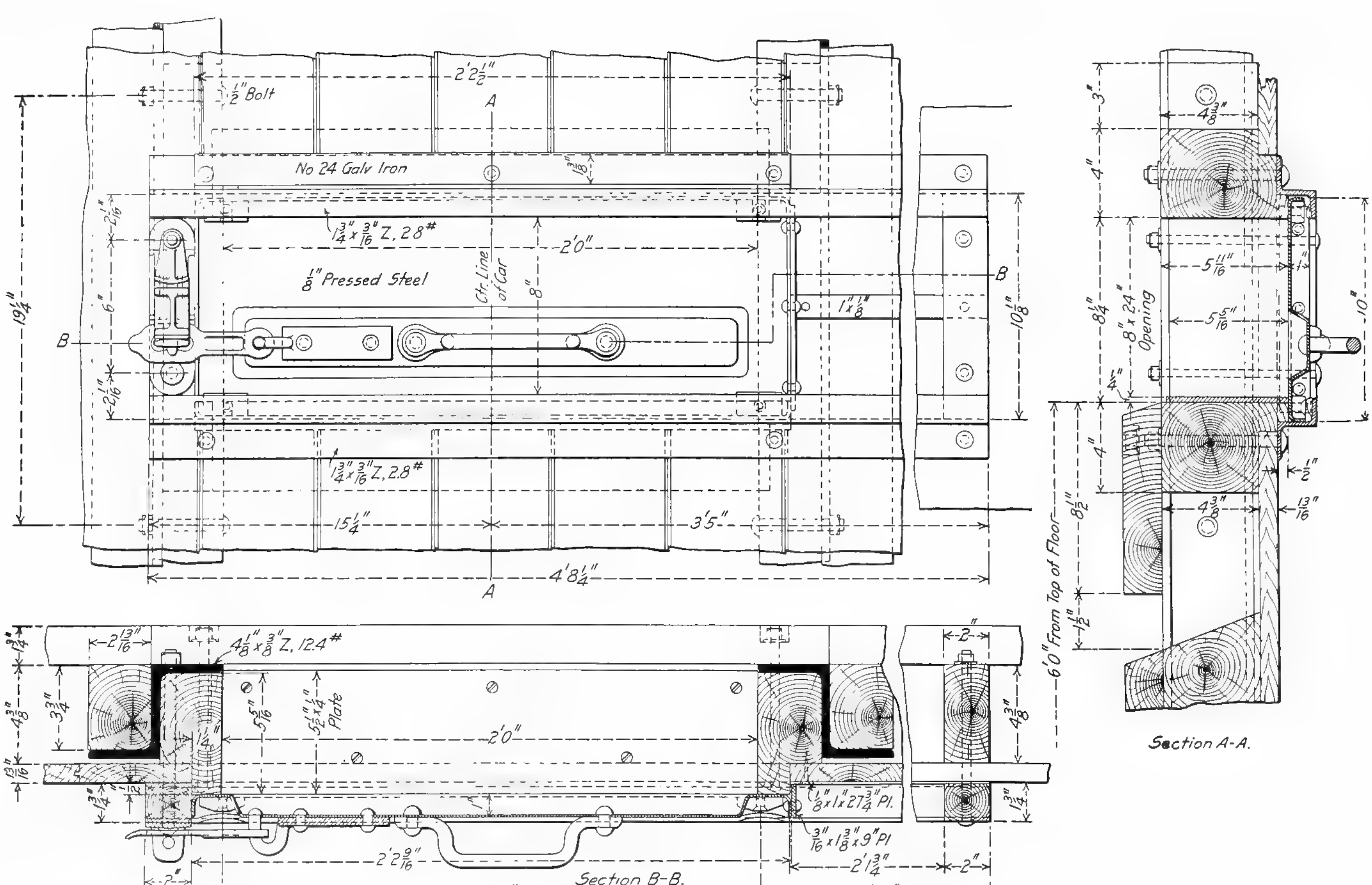


Fig. 829—End Door for Atchison, Topeka & Santa Fe Box Car.

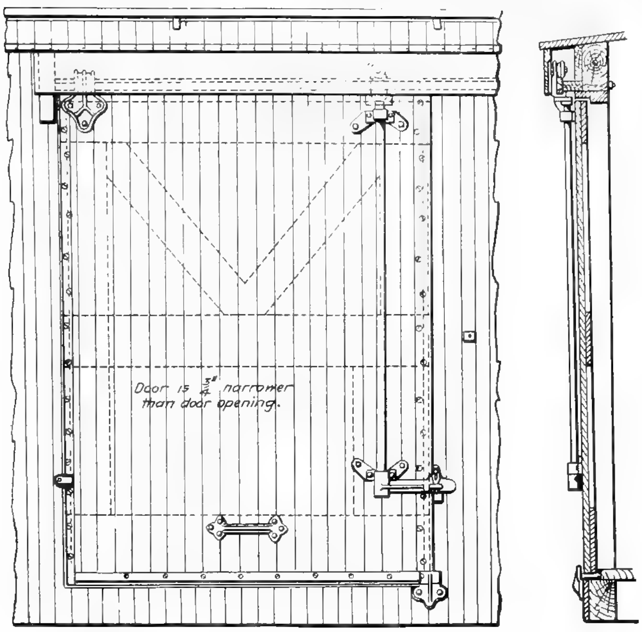


Fig. 830—St. Louis Flush Car Door.

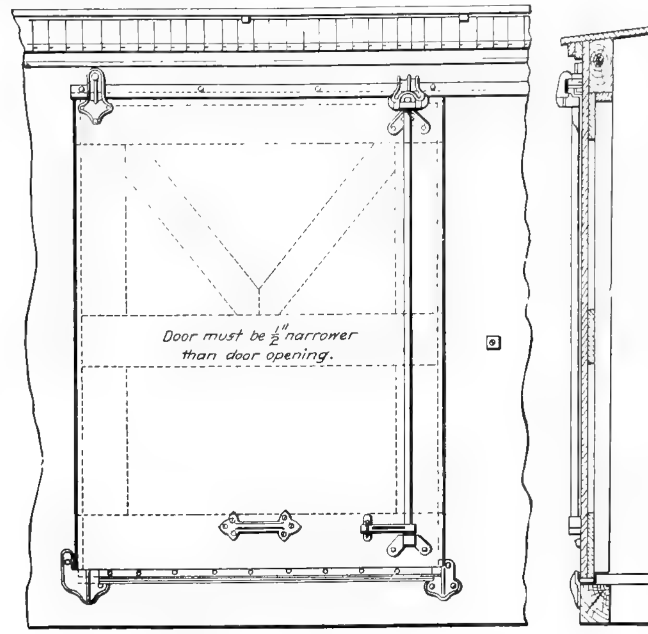


Fig. 831—Western Flush Car Door.

Western Railway Equipment Company.

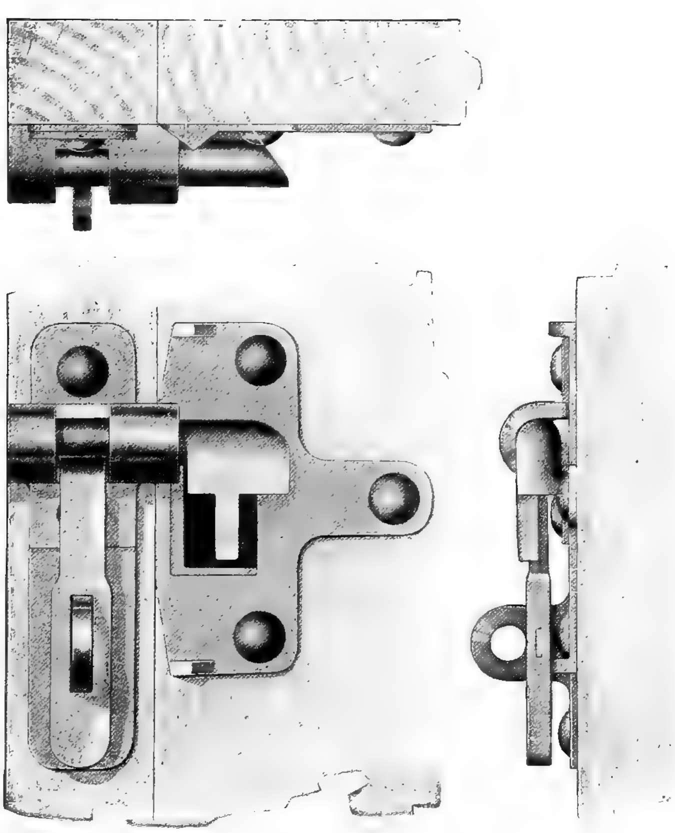


Fig. 832—Automatic Car Door Lock. Railway Utility Company.

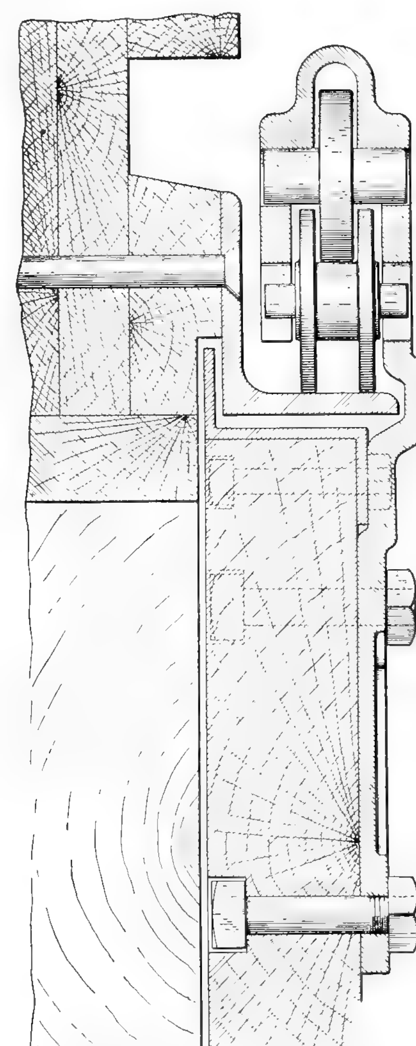


Fig. 833—Cross Section Through Utility Double Roller Car Door Hanger. Railway Utility Company.

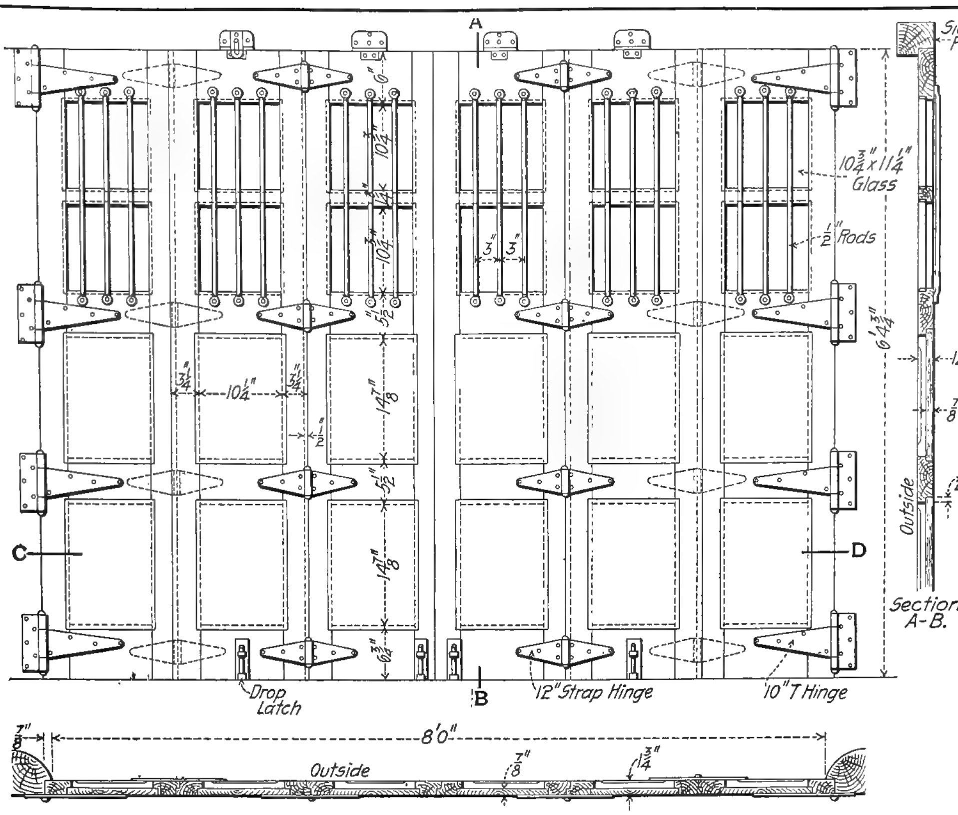


Fig. 834—Folding Side Door for Central of New Jersey Horse Car.

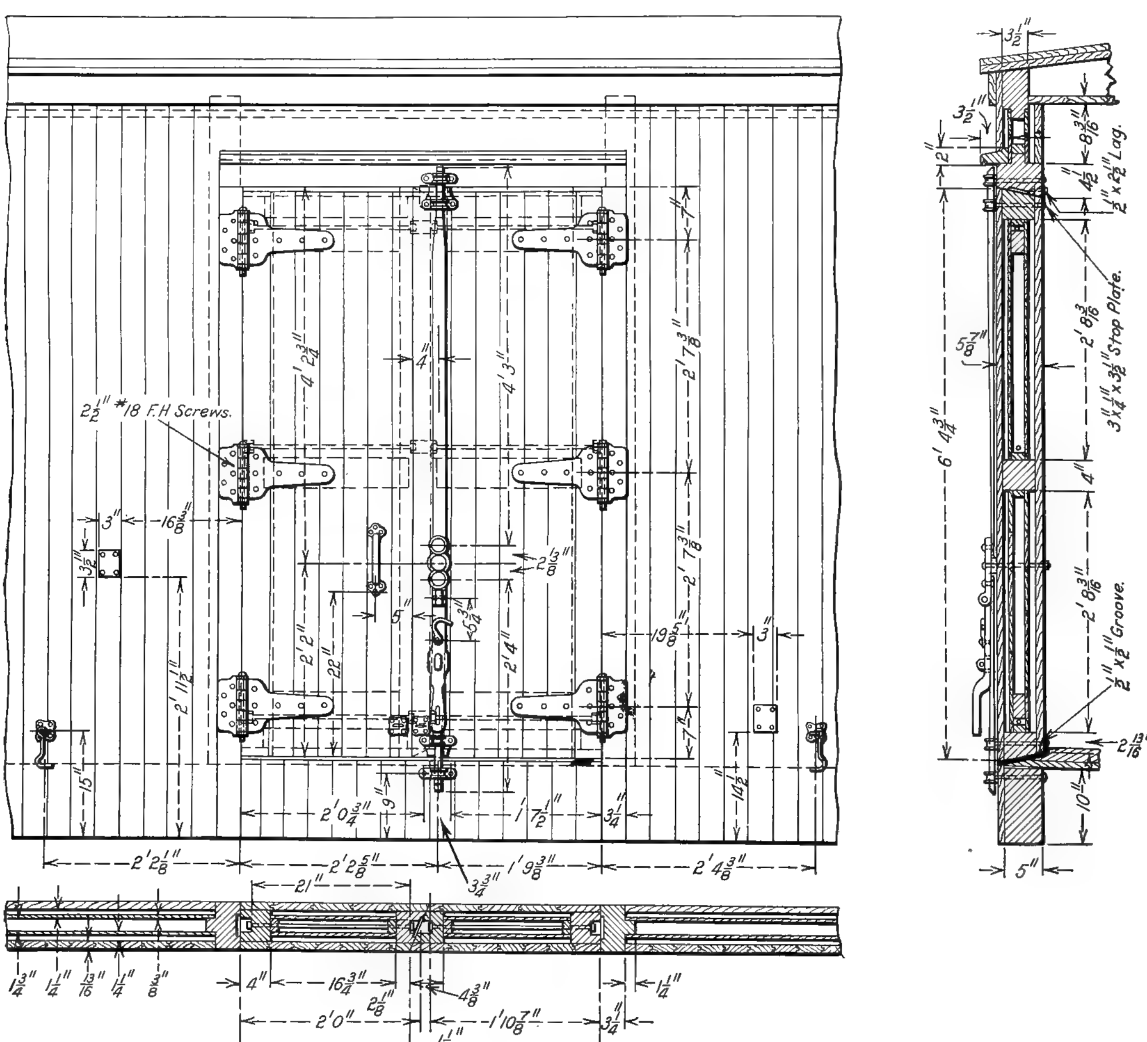


Fig. 835—Refrigerator Car Door. Milwaukee Refrigerator Transit & Car Company.

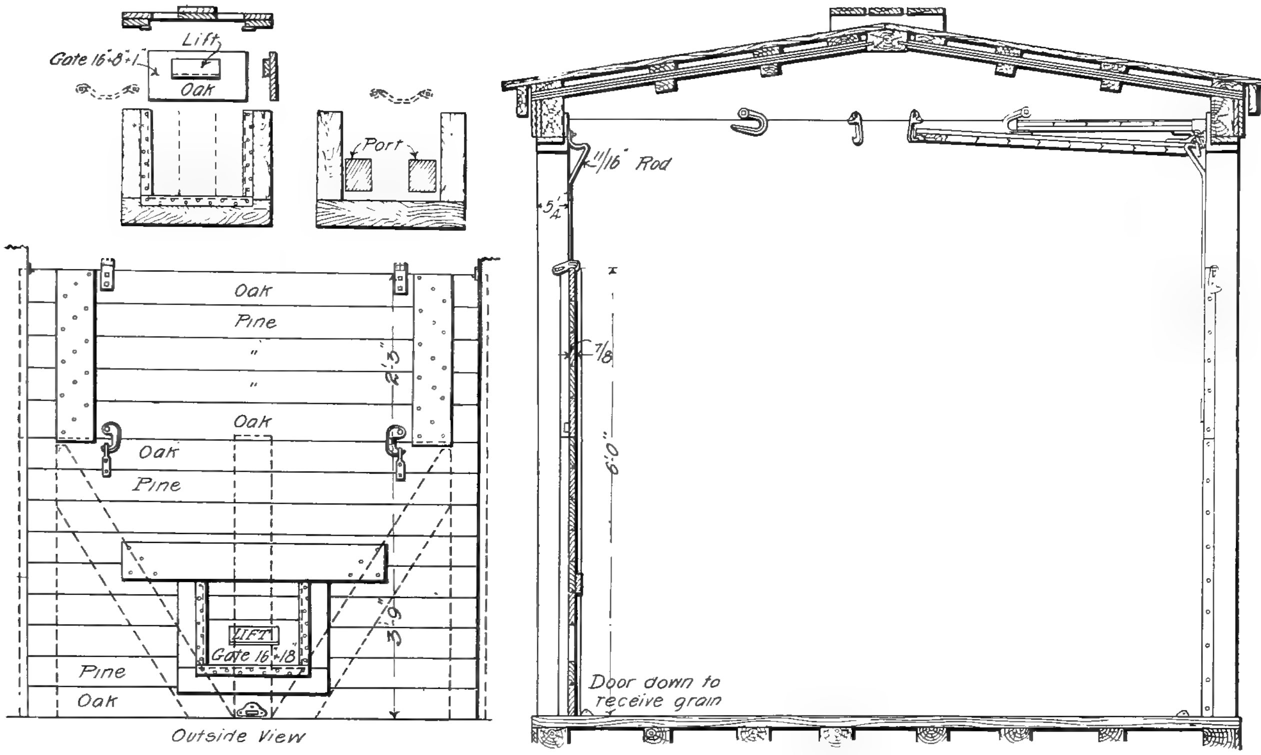


Fig. 836—Details and Application of Chicago Grain Door. Chicago Car Door Company.

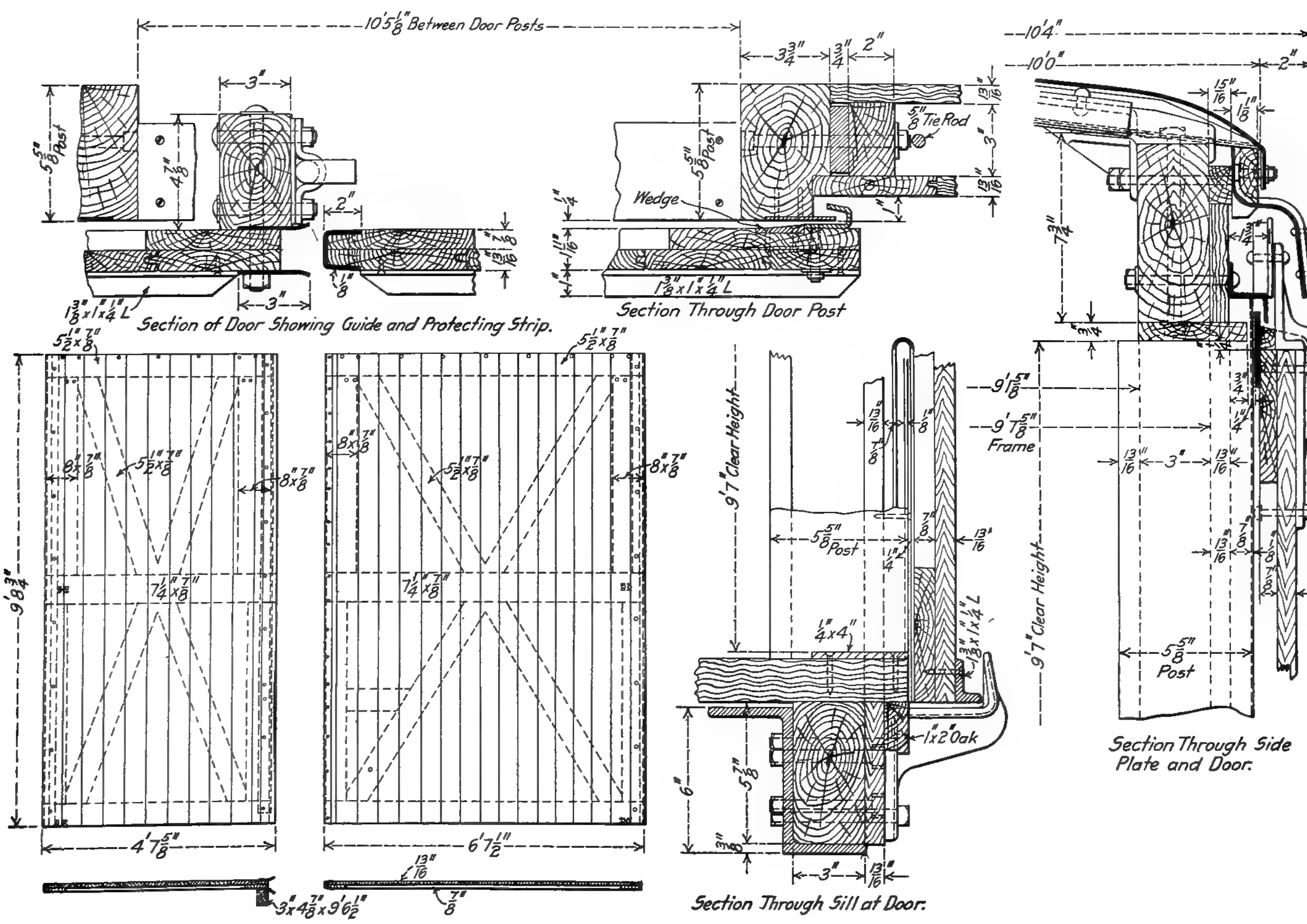


Fig. 837—Side Door for Chicago, Milwaukee & St. Paul Automobile Car.

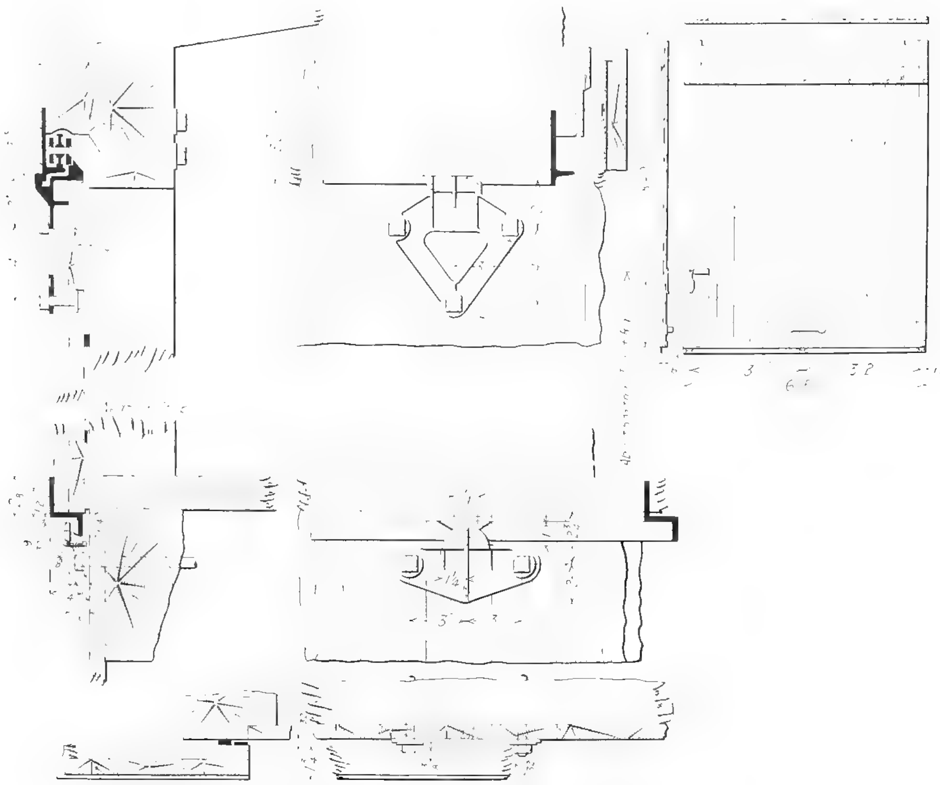


Fig. 838 Details of Application of Detroit Door. Hutchins Car Roofing Company.

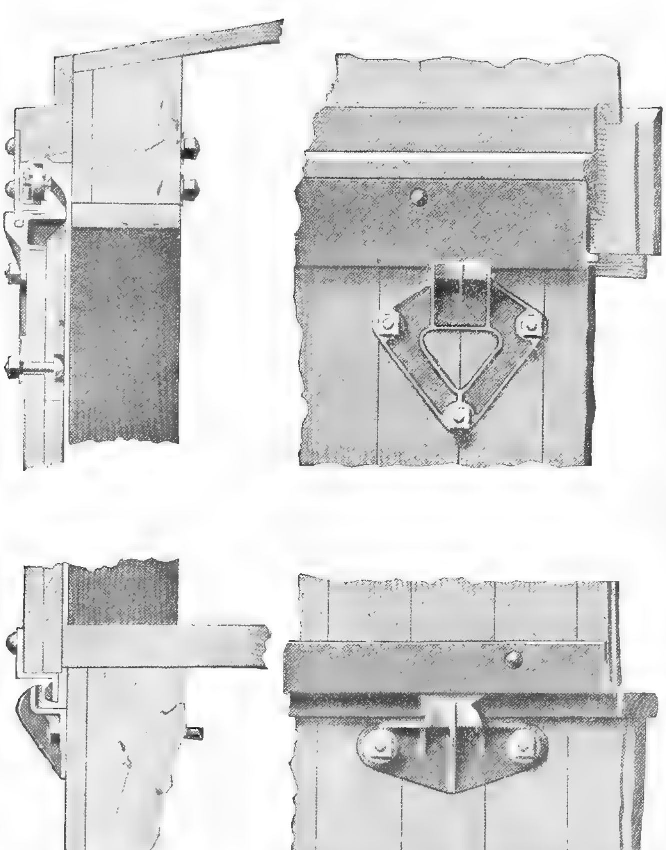


Fig. 839 -Detroit Door Fixtures. Hutchins Car Roofing Company.

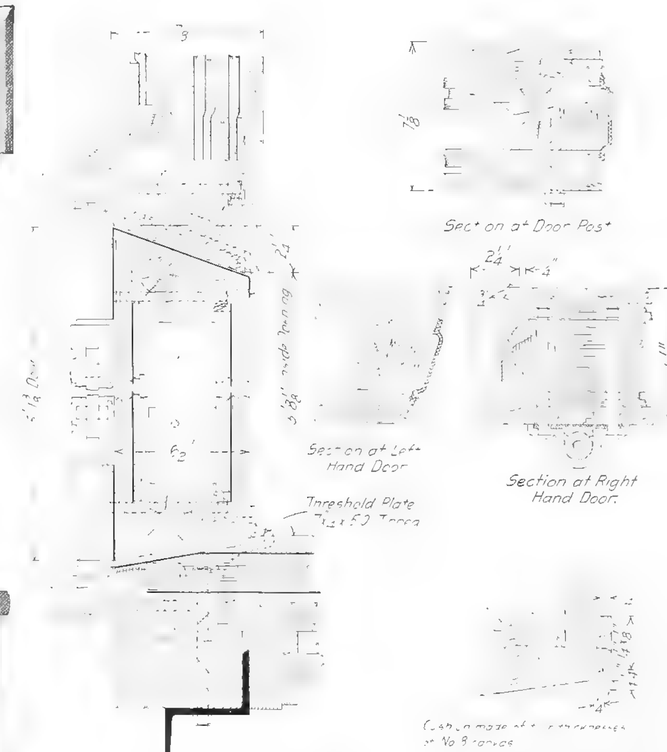


Fig. 840—Section Through Doors, Merchants' Despatch Transportation Company Dairy Car.

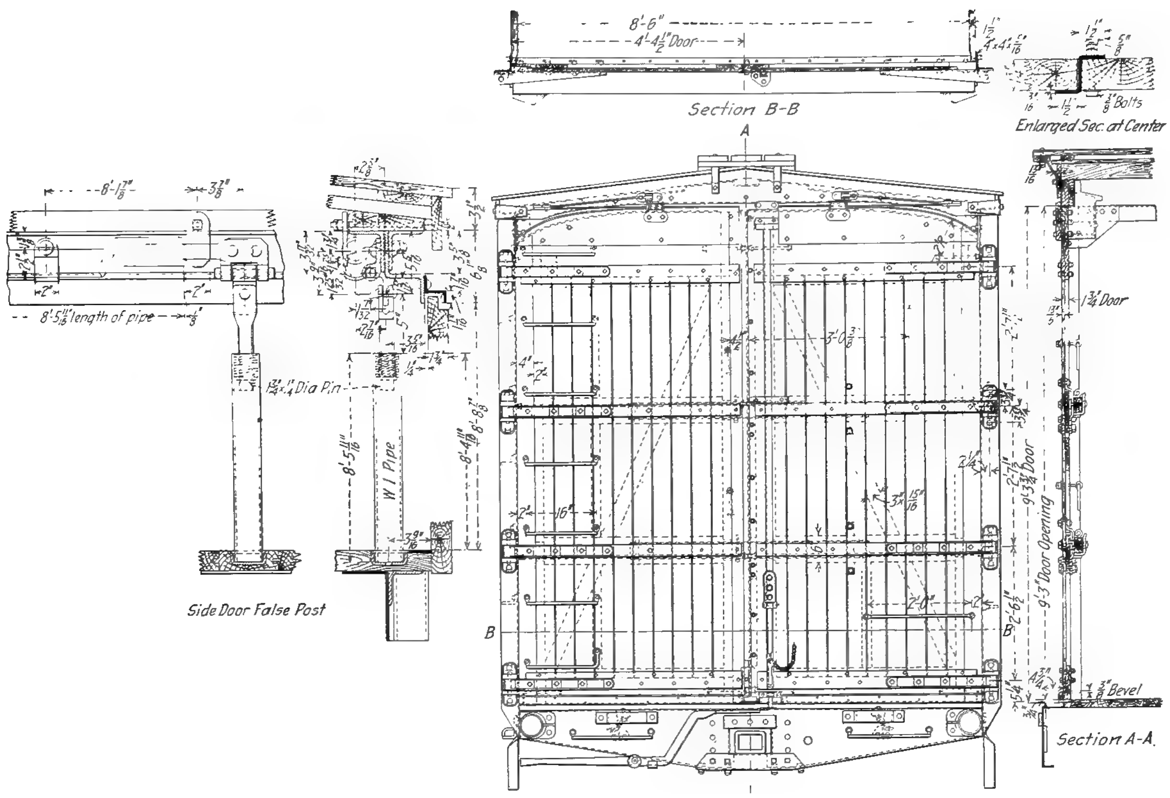


Fig. 841—End Door and False or Movable Post for Side Door of Erie Railroad Automobile Box Car. American Car & Foundry Company.

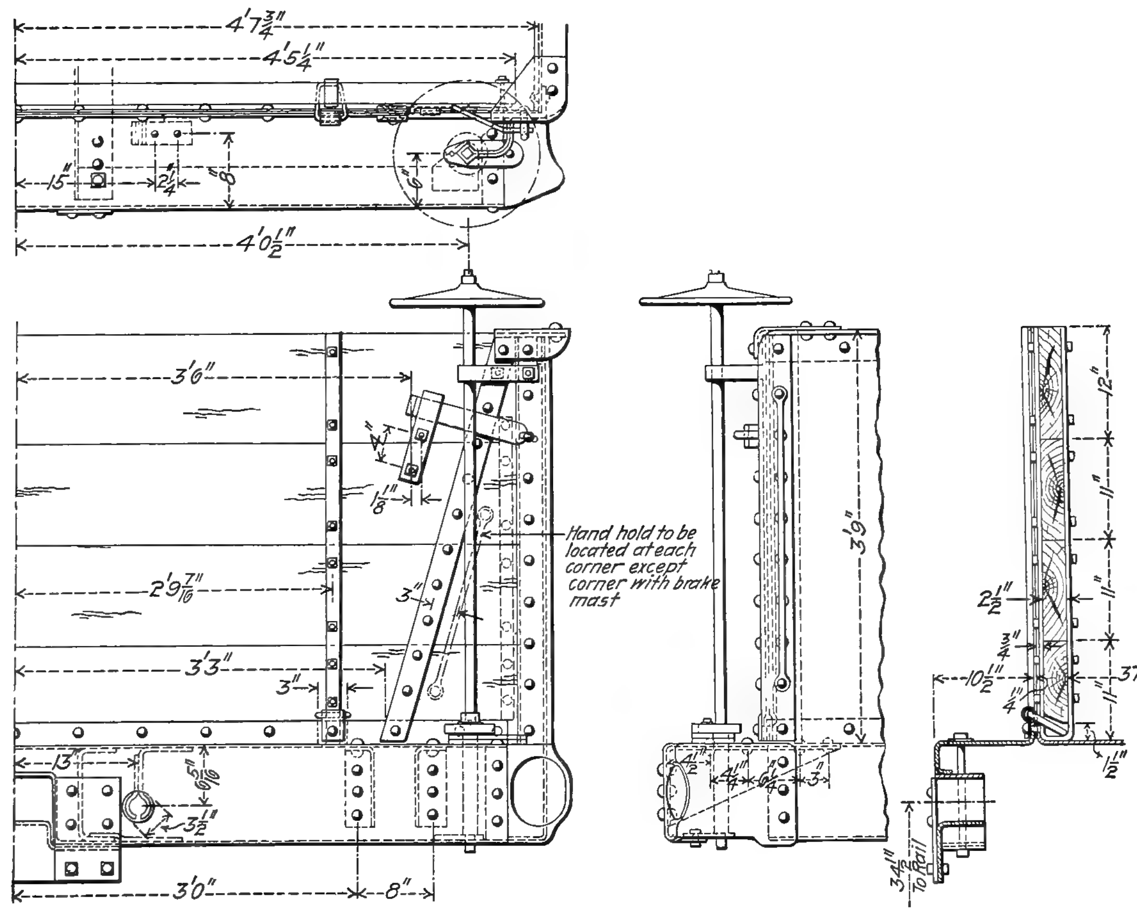


Fig. 842—Drop End Door for Pennsylvania Railroad Gondola Car.

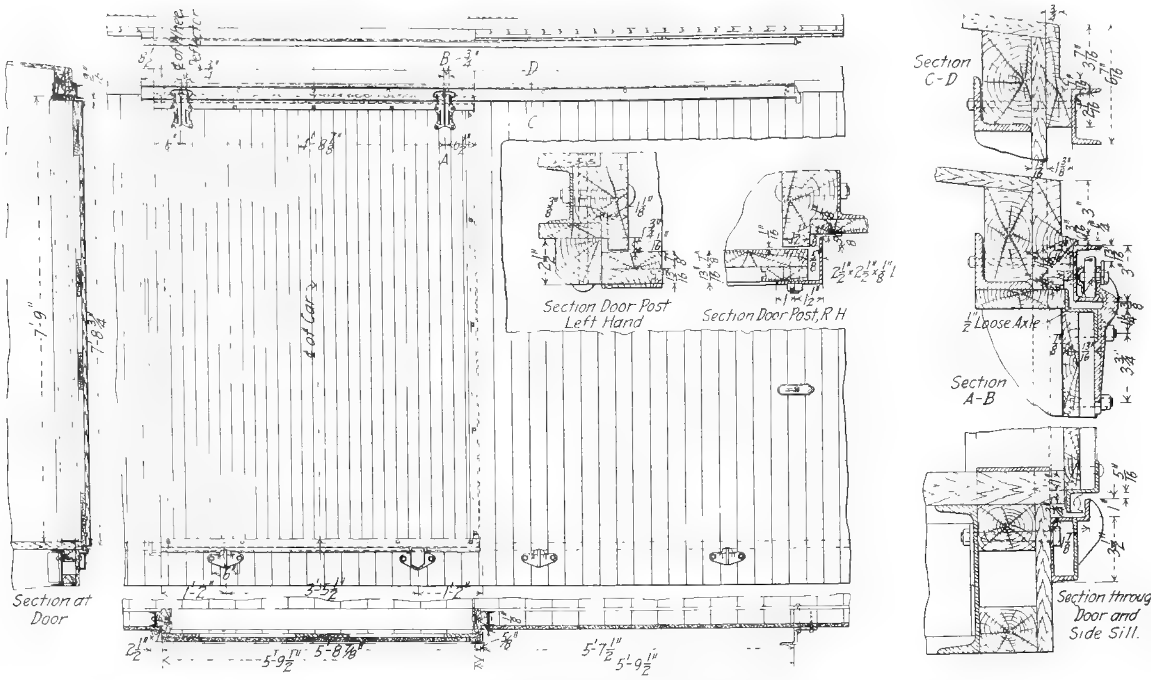


Fig. 843—Jones Peerless Door for Box Cars. Jones Car Door Company.

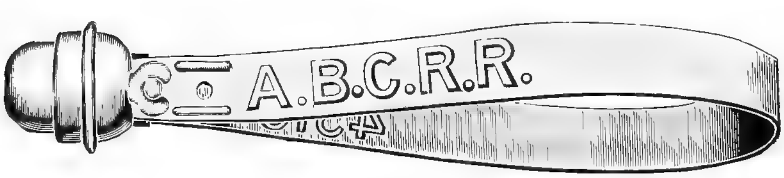


Fig. 844—Safety Snap Car Seal. E. J. Brooks & Co.

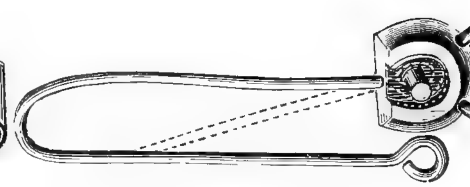


Fig. 845—Horse Shoe Car Seal. E. J. Brooks & Co.

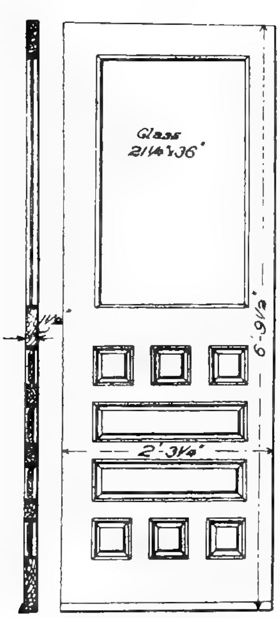


Fig. 846—Wooden End Door for Norfolk & Western Coaches.

Parts of Doors.
See Fig. 847.

1 *Door Post or Jamb*
2 *Door Mullion*
4 *Top Door Rail*
5 *Bottom Door Rail*
6 *Middle or Lock Door Rail*
7 *Parting Door Rail*
8 *Door Stile*
10 *Lower or Twin Door Panels*
11 *Middle Door Panel*
12 *Upper Door Sash*
13 *Lower Door Sash*

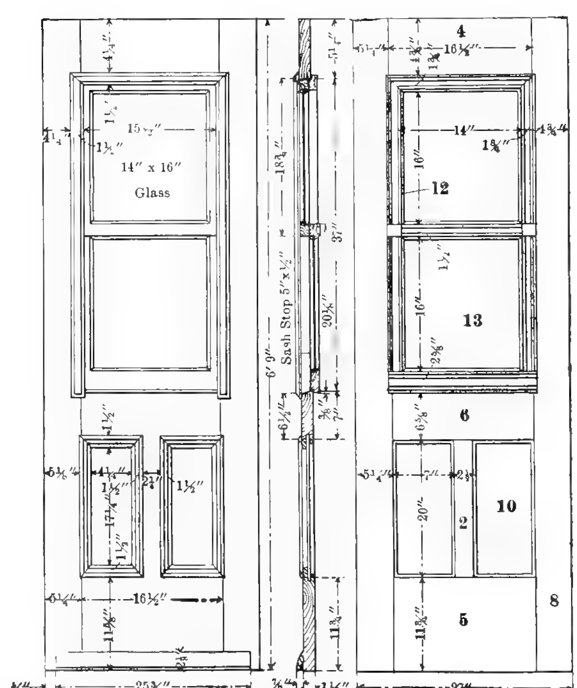


Fig. 847—Wooden End Door for New York, New Haven & Hartford Coaches.

Sliding Doors. End Door

Fig. 848—Steel Doors for Hudson & Manhattan Tunnel Cars Hale & Kilburn Company.

Fig. 849—Steel End Door for Steel Coaches. Hale & Kilburn Company.

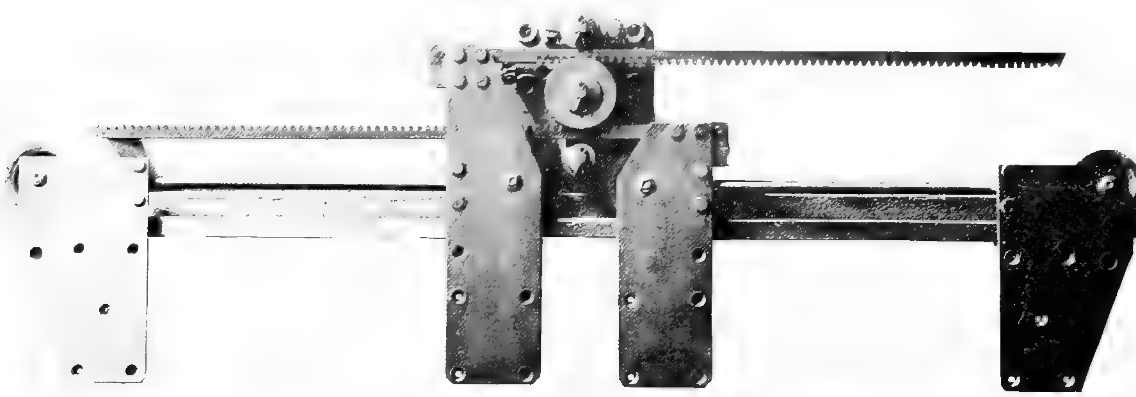


Fig. 850—Double Sliding Door Fixture. James L. Howard & Company.

Inside. Outside.

Fig. 851—Steel Vestibule, End and Saloon Doors for Pennsylvania Railroad Steel Coaches Hale & Kilburn Company.

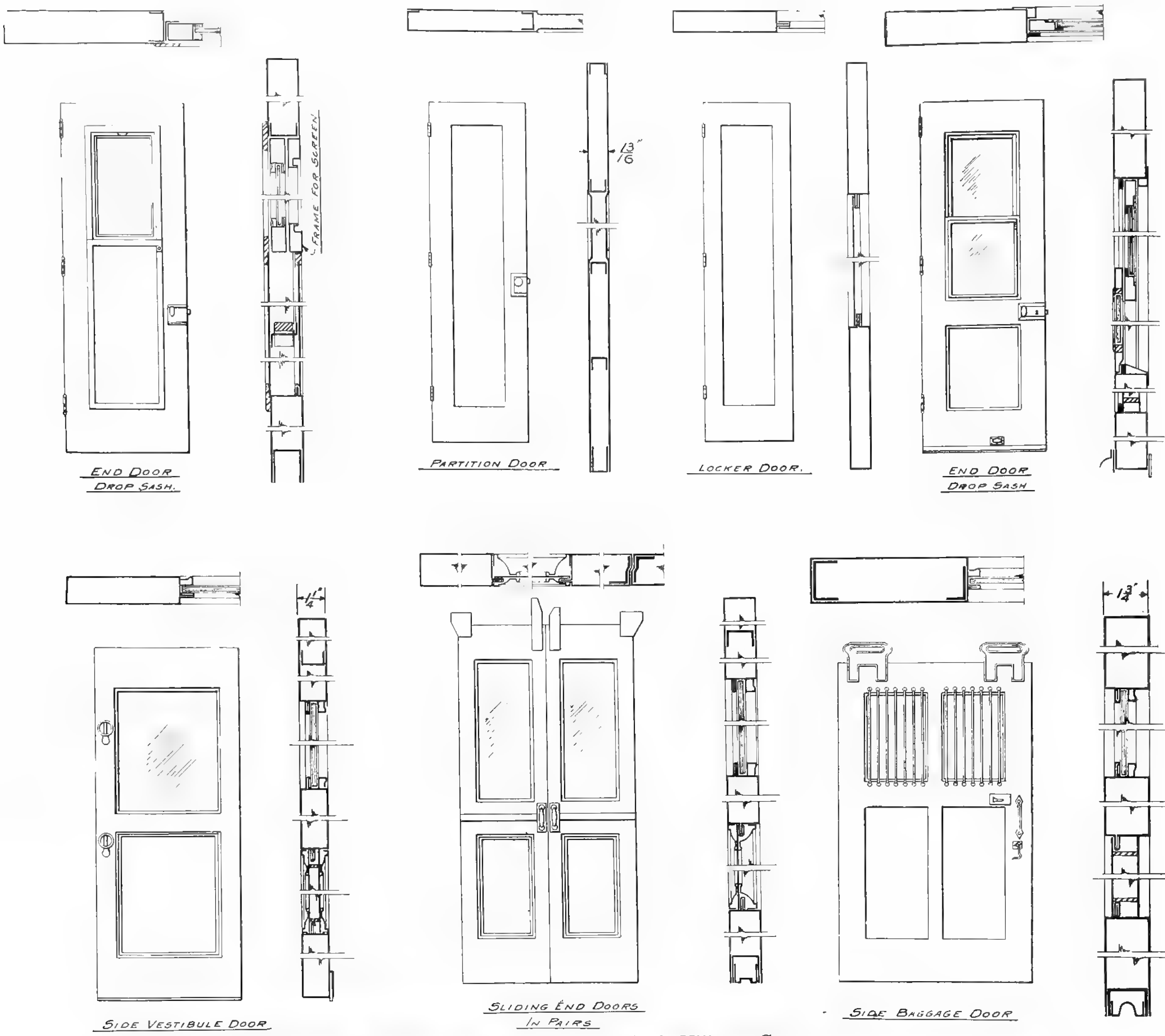


Fig. 852—Hollow Metal Doors. Hale & Kilburn Company.

Fig. 853—Hollow Steel Doors for Steel Subway Cars. Grinden Art Metal Company.

Fig. 854—Hollow Steel Baggage Car Door. Grinden Art Metal Company.

Fig. 855—Acme Steel Vestibule Door with Panel.

Fig. 856—Acme Steel Vestibule Side Door, without Panel.

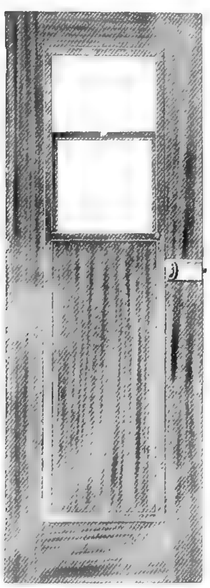


Fig. 857—End Steel Door, Showing Drop Sash and Lower Half of Door of Panel Construction.

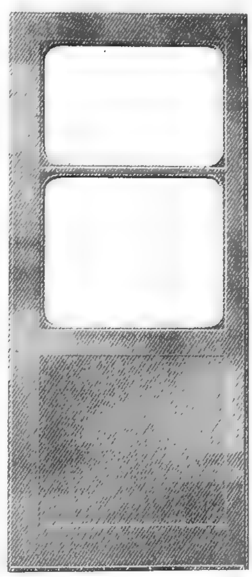


Fig. 858—Acme Steel Sliding Side Door, Arranged for Two Lights of Glass, with Round Corners and Beading.

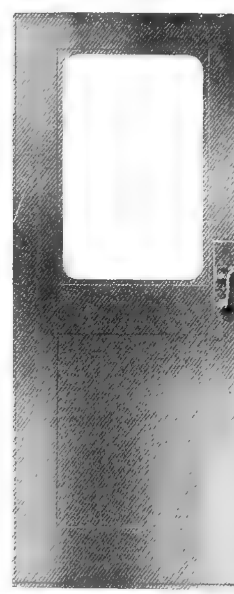


Fig. 859—Body End Panel Door with Round Corners and Glass Beading.

Fig. 860—Motorman's Steel Cab Door, with Curtain Grooves and Roller Box.

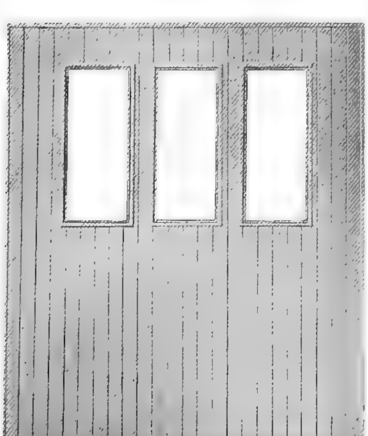


Fig. 861—Peerless Steel Baggage Car Door.

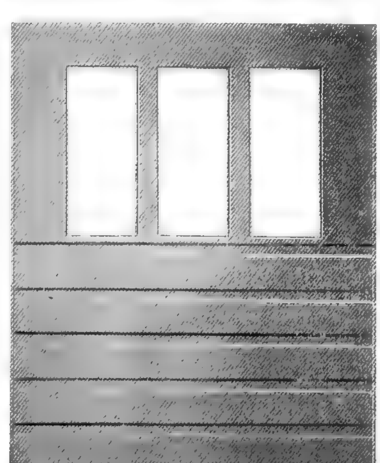


Fig. 862—Faultless Baggage Car Door.

Fig. 863—Faultless Baggage Car Door.

Acme Supply Company.

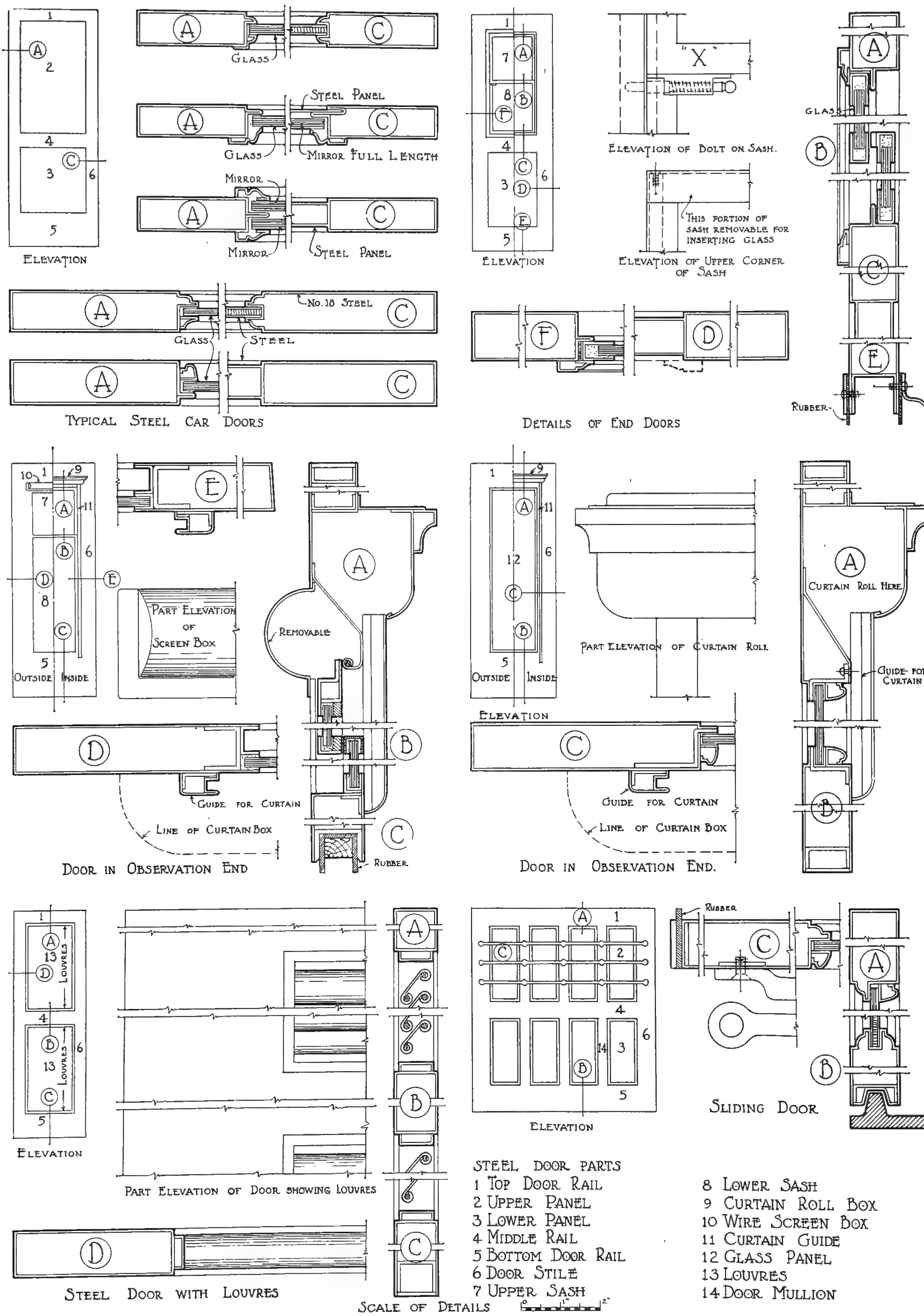


Fig. 864—Steel Doors and Parts for Passenger Train Cars. Dahlstrom Metallic Door

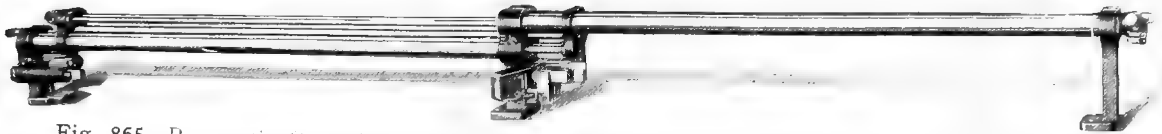


Fig. 865—Pneumatic Operating Apparatus for Sliding Doors. Consolidated Car Heating Company

Fig. 866—Four Button Push Switch for Remote Control of Magnetic Air Valves for Pneumatic Door Operators. Consolidated Car Heating Company

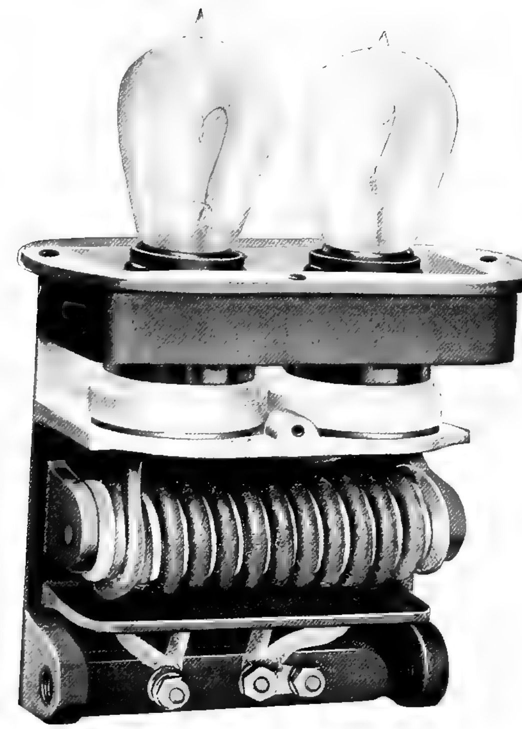


Fig. 867—Signal Light Box with Cover Removed for Motorman's Automatic Starting Signal, Indicating All Doors of Train Closed. Consolidated Car Heating Company.

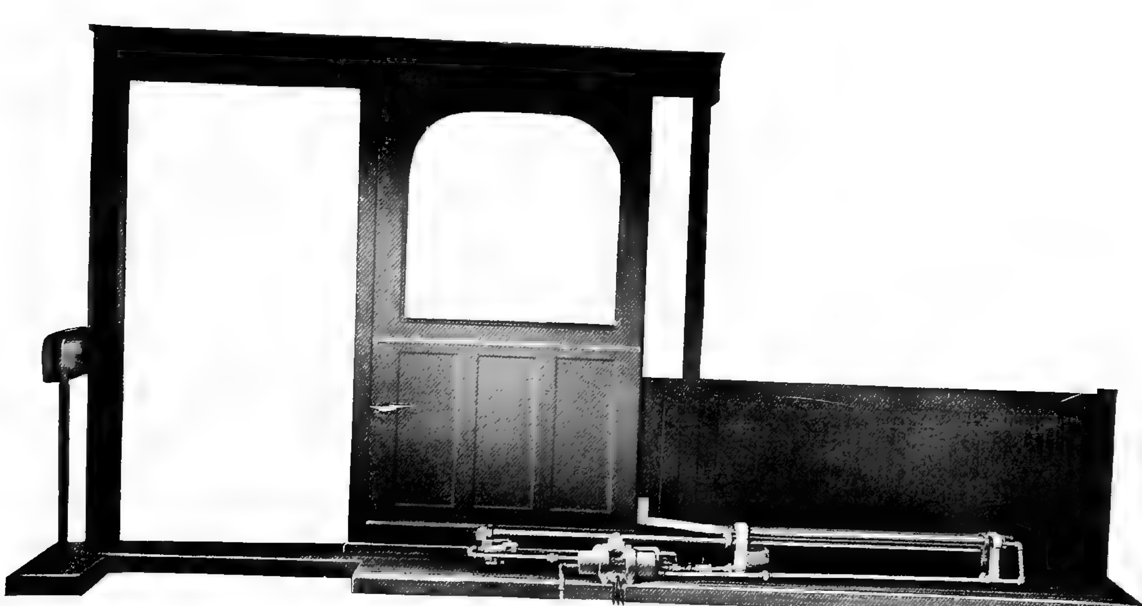


Fig. 868—Pneumatic Door Operator and Magnetic Valve, Showing Application to Car Door. Consolidated Car Heating Company.

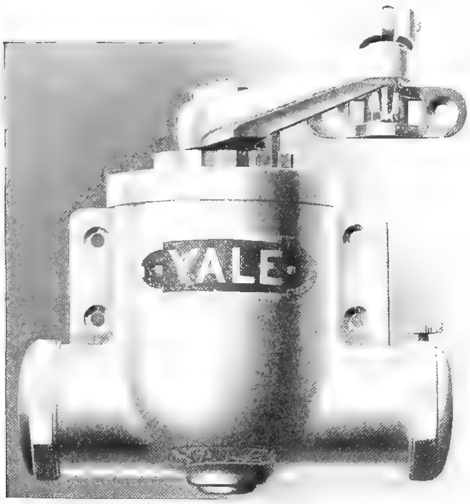


Fig. 869—Yale Door Closer. Yale & Towne Manufacturing Company.

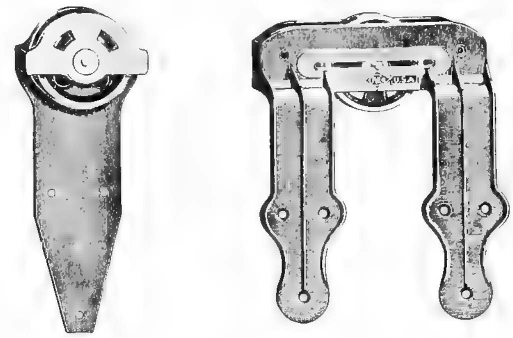


Fig. 870 -Sliding Door Hangers. Russell & Erwin Manufacturing Company.

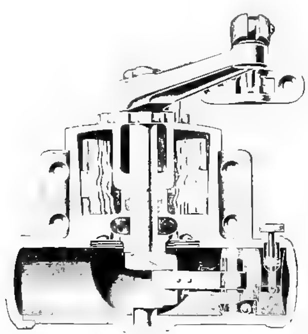


Fig. 871—Interior of Yale Door Closer, Model Y. Yale & Towne Manufacturing Company.

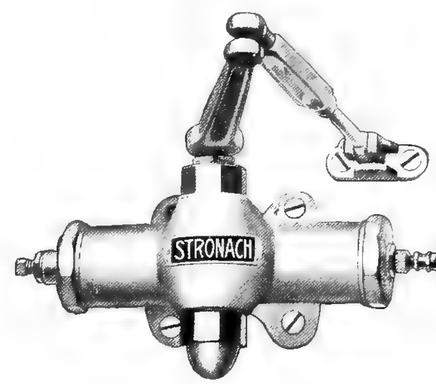


Fig. 872—Stronach Car Door Check. Railway Supply & Curtain Company.

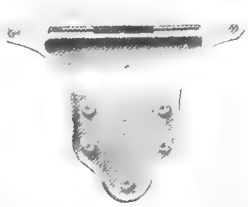


Fig. 873 -Baggage Car Sliding Door Hanger James L. Howard & Company.

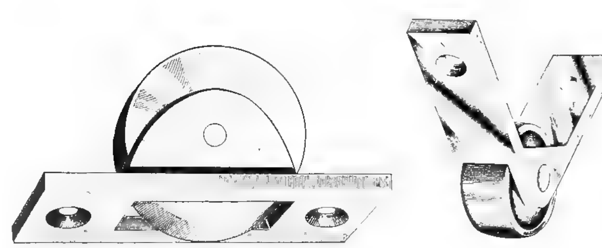


Fig. 874—Door Bottom and Corner Rollers. Dayton Manufacturing Company.

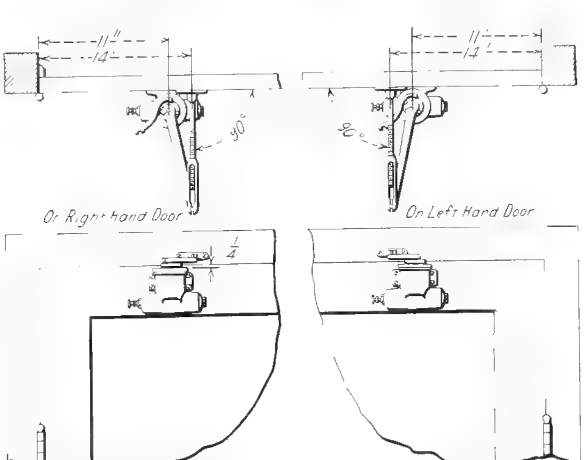


Fig. 875—Application of Russwin Door Check. Russell & Erwin Manufacturing Company.

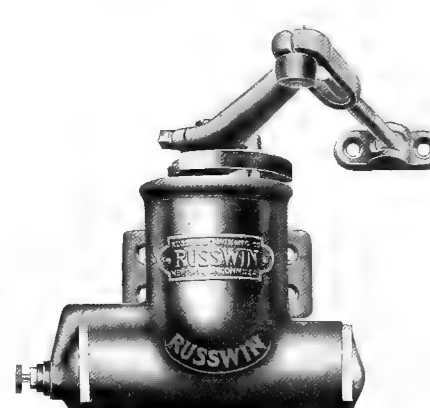


Fig. 876—Russwin Door Check. Russell & Erwin **Manufacturing Company.**

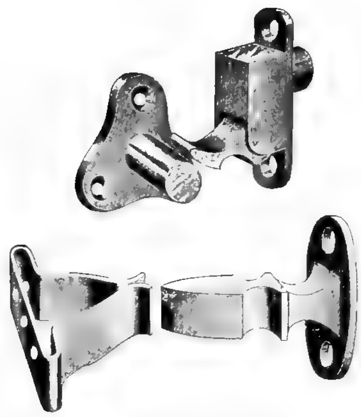


Fig. 877—Door Holders. Adams & Westlake Company.

Fig. 878—Door Stop. Russell & Erwin Manufacturing Company.

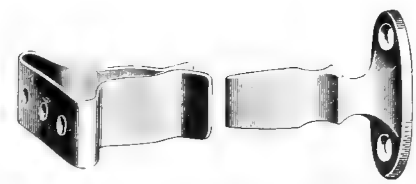


Fig. 879—Door Holder. Russell & Erwin Manufacturing Company.

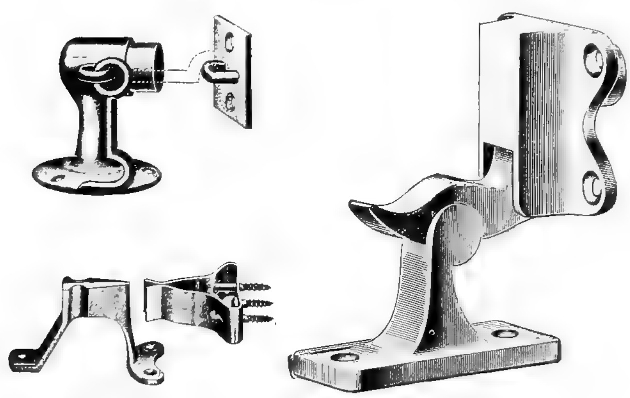


Fig. 880—Door Stops and Holders. Russell & Erwin Manufacturing Company.

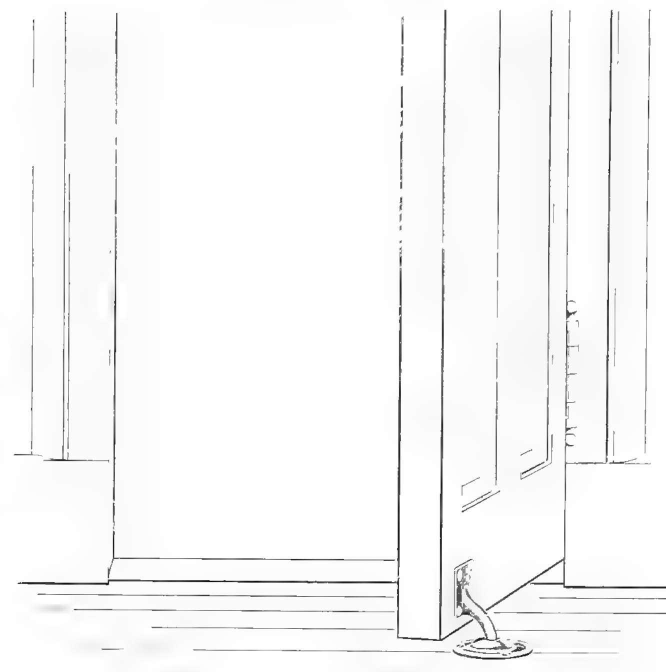


Fig. 881—Sherburne Patented Car Door Holder. Sherburne & Company.

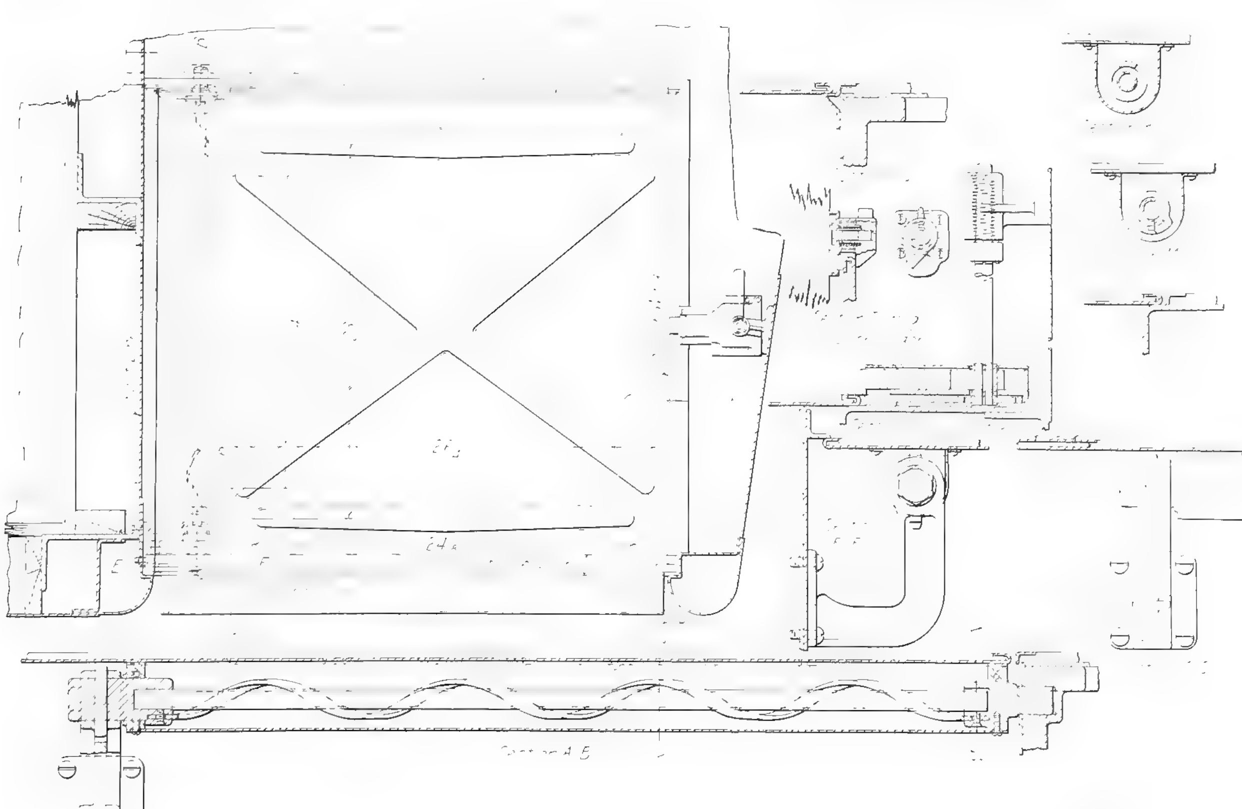


Fig. 882—Spring Hinge for Steel Vestibule Trap Doors. Transportation Utilities Company.

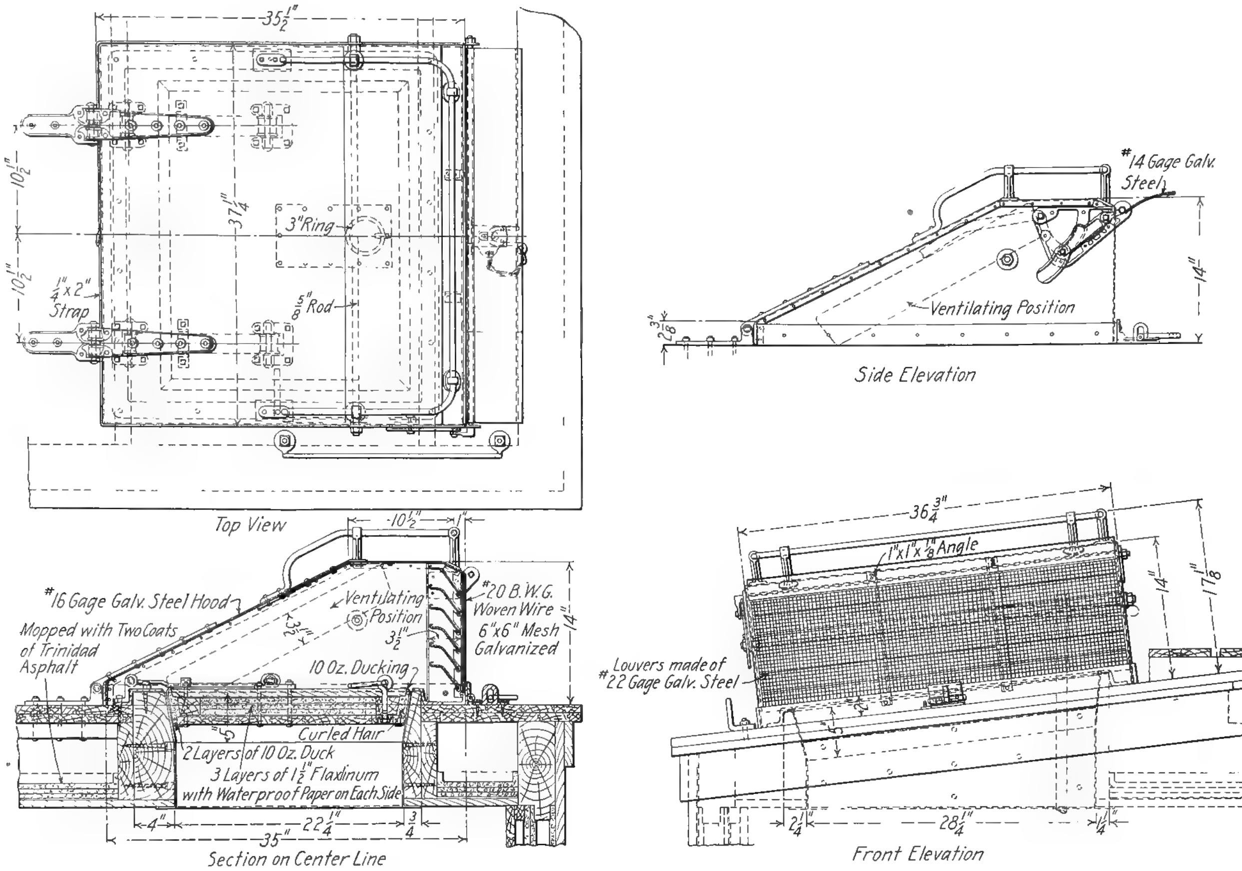


Fig. 883—Bohn Standard Ventilator and Plug for Refrigerator Cars. White Enamel Refrigerator Company.

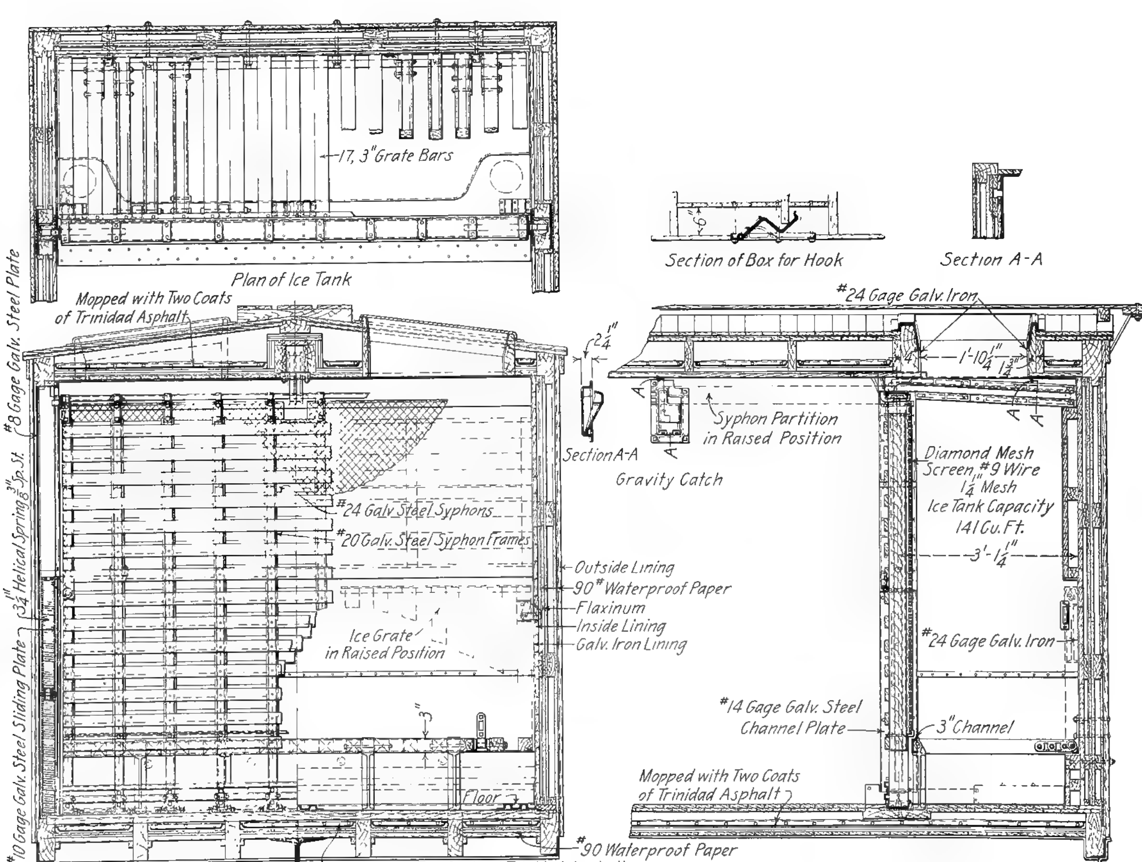


Fig. 884—Bohn Standard Collapsible Bulkhead for Refrigerator Cars. White Enamel Refrigerator Company

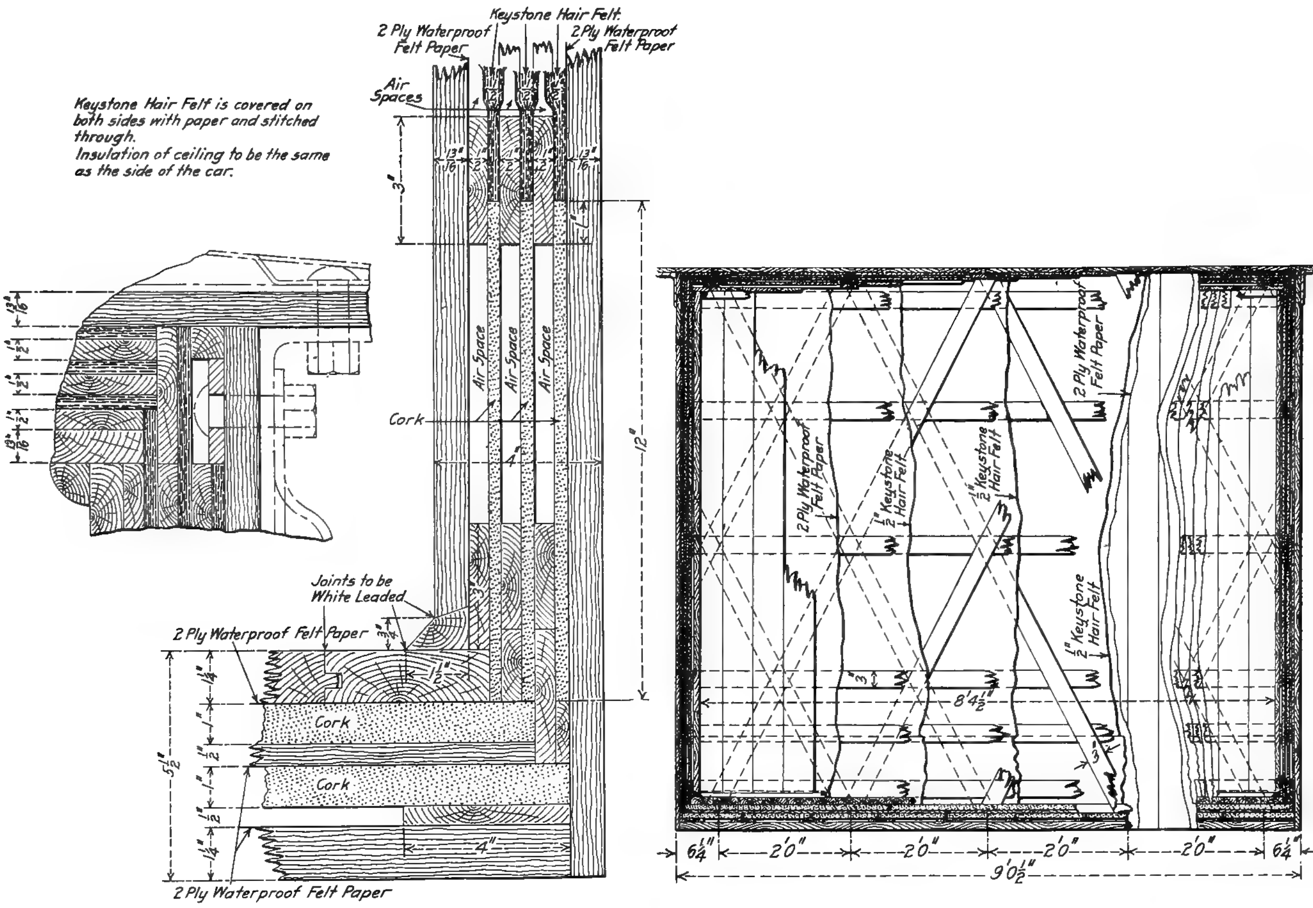


Fig. 885—Insulation Details for Pennsylvania Railroad Steel Frame Refrigerator Cars.

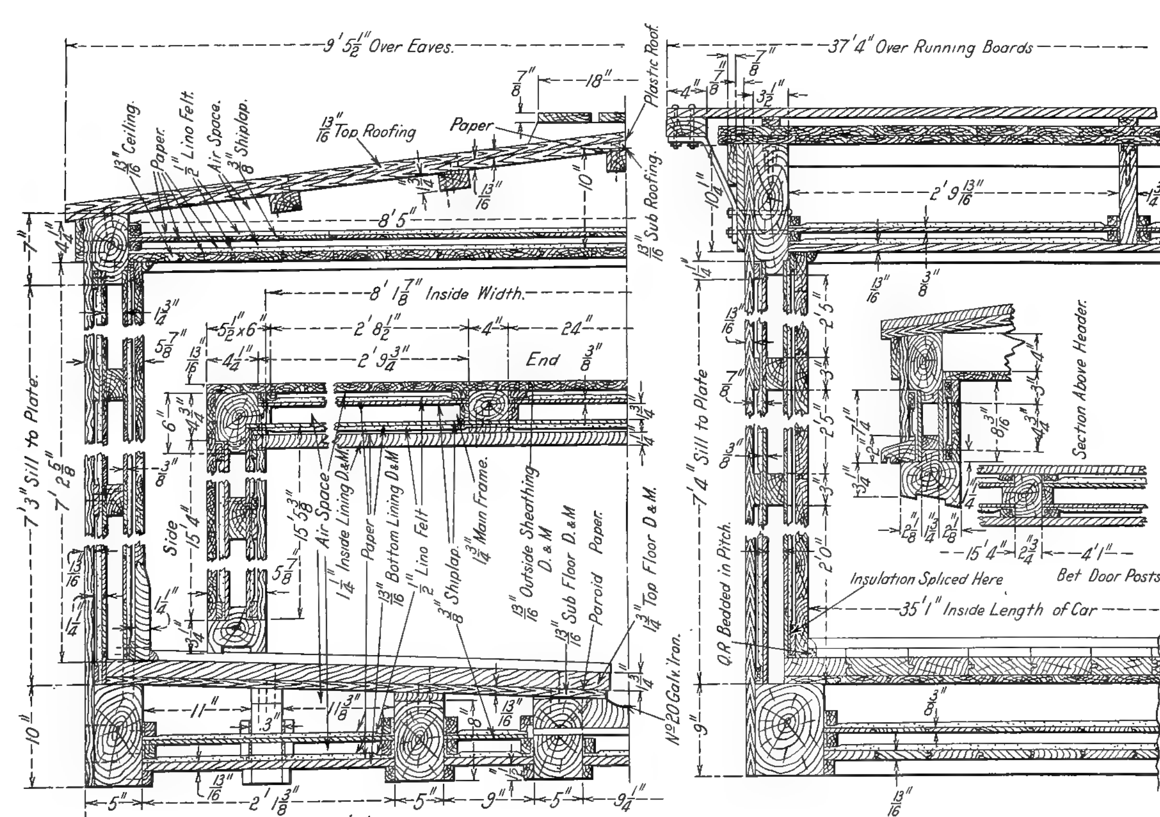


Fig. 886—Refrigerator Car Insulation Details. Milwaukee Refrigerator Transit & Car Company.

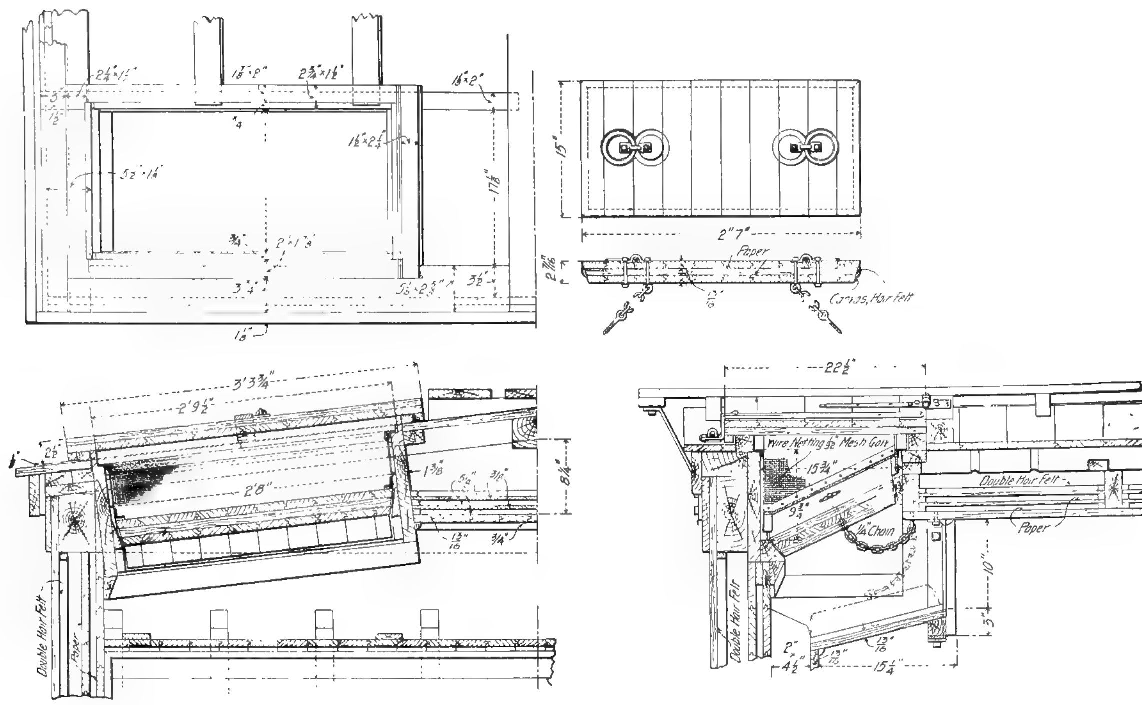


Fig. 887—Details of Ventilators for New York Central Produce Car.

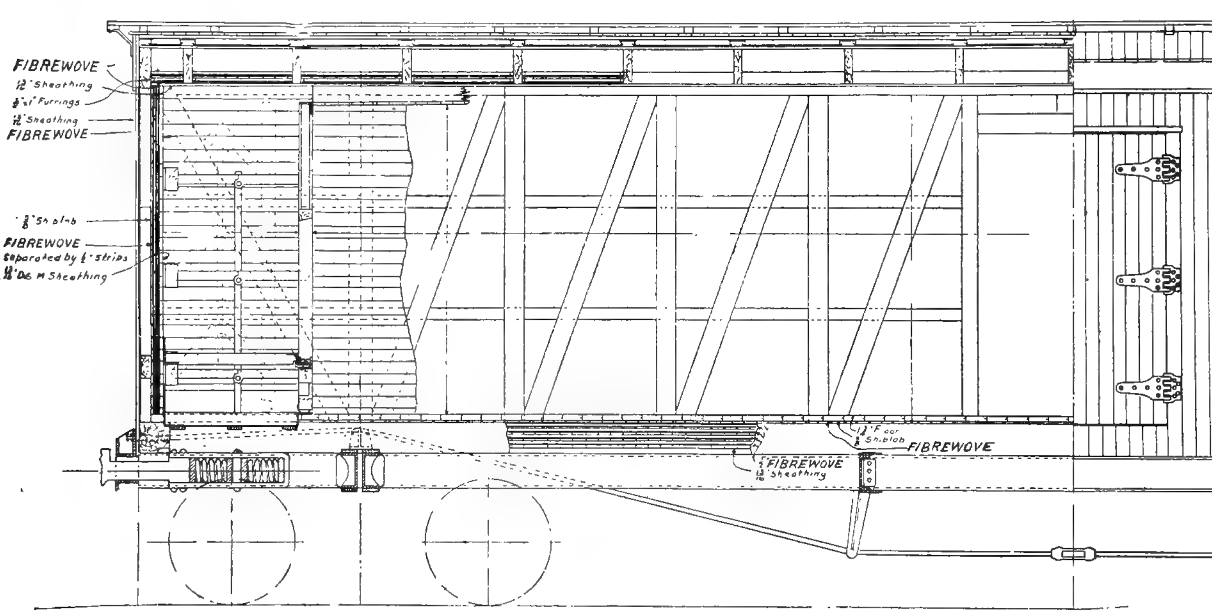


Fig. 888—Application of Fibrewove Insulating Paper to Refrigerator Car. Philip Carey Company.

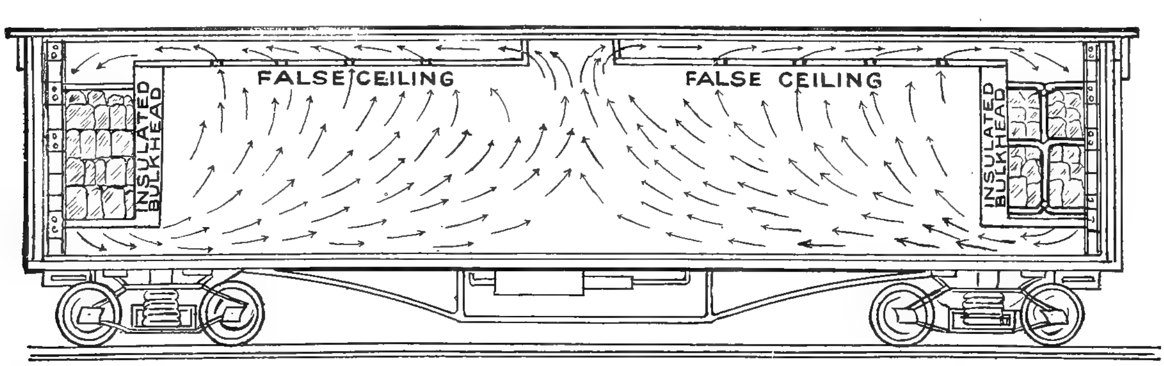
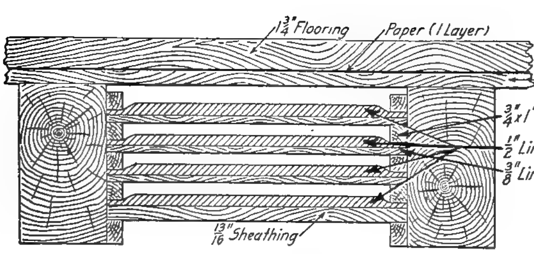
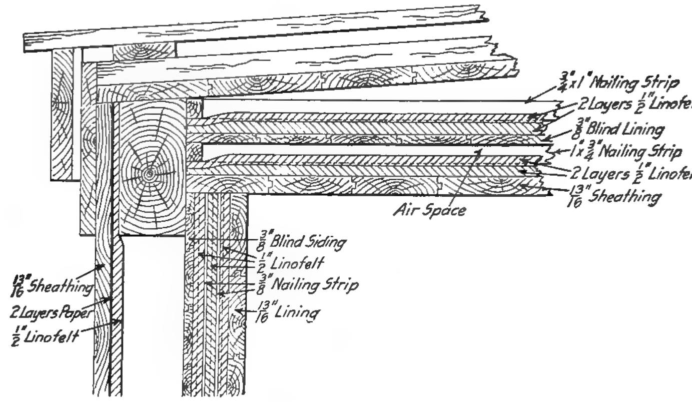


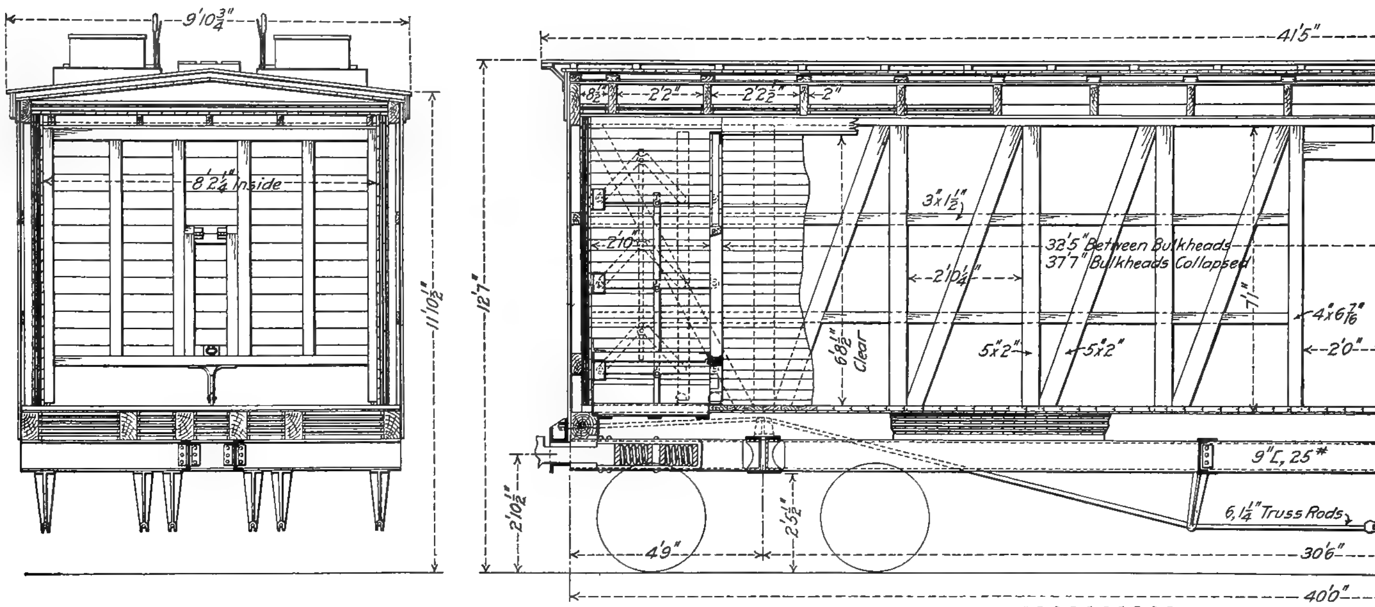
Fig. 889—Diagram of Refrigerator Car, Union Fibre Company's Patent System, Showing Air Circulation.



Floor.

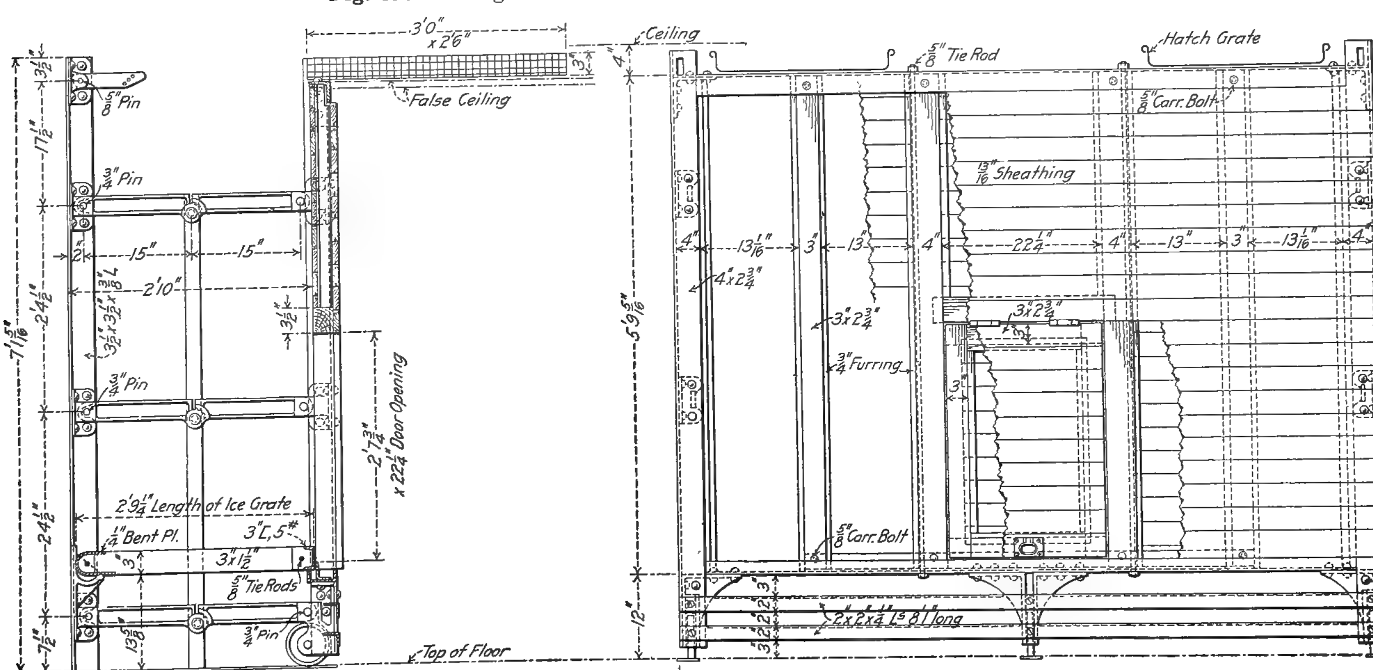


Roof.



Car Body.

Fig. 890—Refrigerator Car Insulation. Union Fibre



Cross Section. Elevation Showing Framing. Front Elevation.

Fig. 891—Collapsible Ice Bunker for Refrigerator Car. Union Fibre Company.

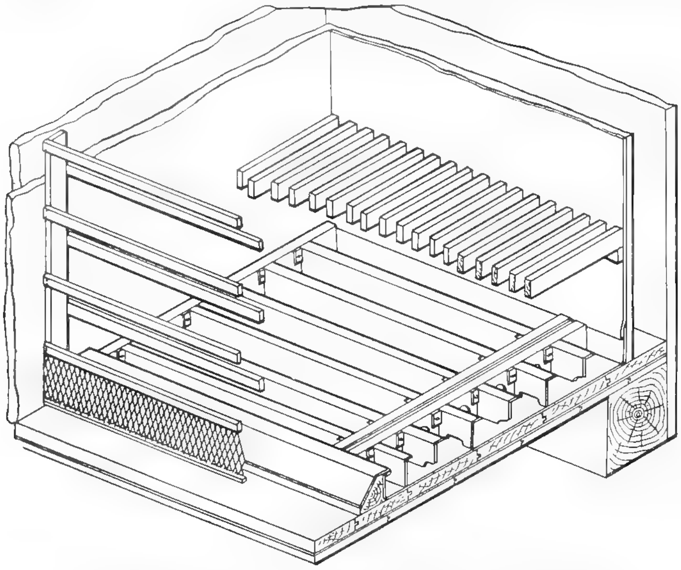


Fig. 892 Non-Splash Drip Pan for Collapsible Ice Bunker. Union Fibre Company.

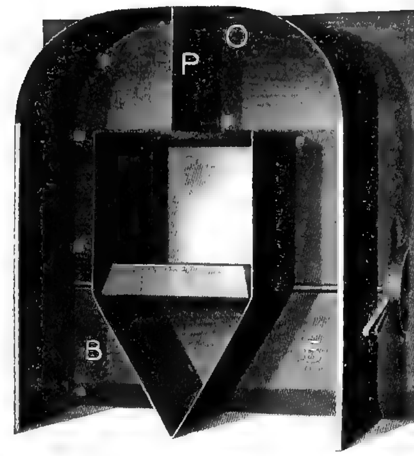


Fig. 893 —Leeds Ventilator for Refrigerator Cars, with Top Removed. B, B are Air Passages; Plate P Prevents Air from Circulating Around Ventilator; O Shows Position of Drainage Hole. Plug K is Shown Open for Admission of Air to Ice Tank or Bunker.

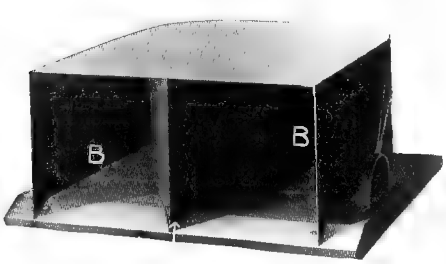


Fig. 894—Leeds Ventilator for Refrigerator Cars. Arrow Indicates Deflector Which Carries Air into Passages, B, B. Union Fibre Company.

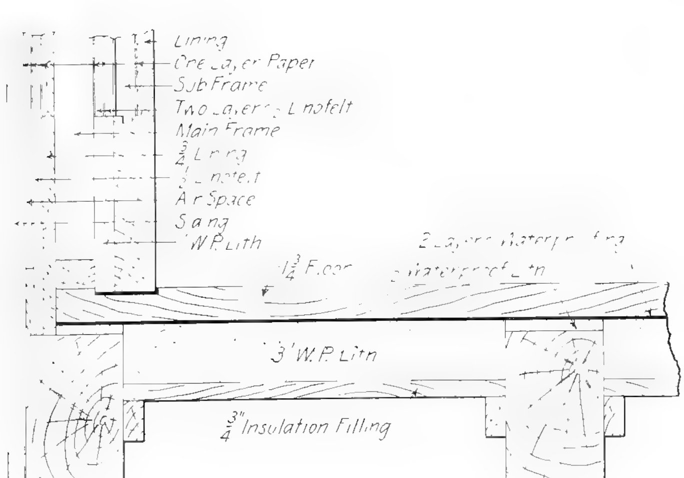


Fig. 895—Detail of Improved Refrigerator Car Insulation. Union Fibre Company.

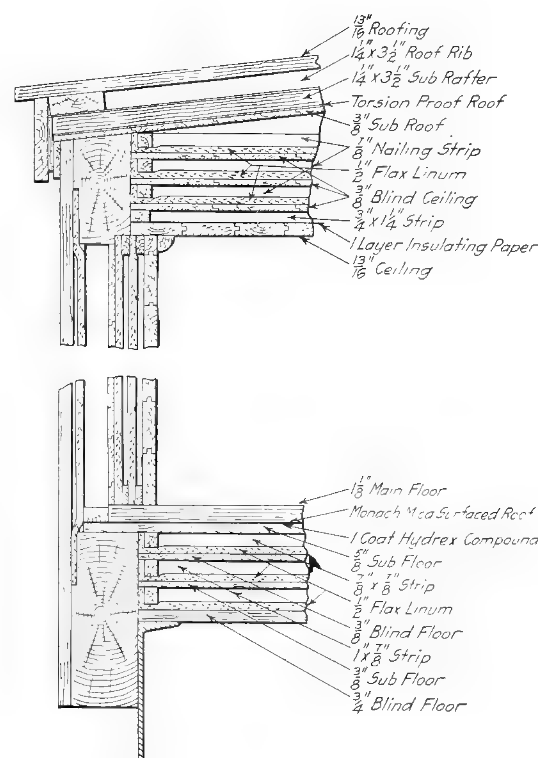


Fig. 896—Section Through Sides of Illinois Central Provision Car.

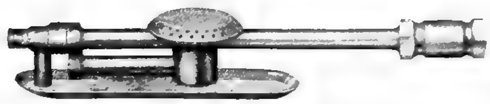


Fig. 897—Alcohol Burner for Alcohol Heating & Lighting Company's Heaters.

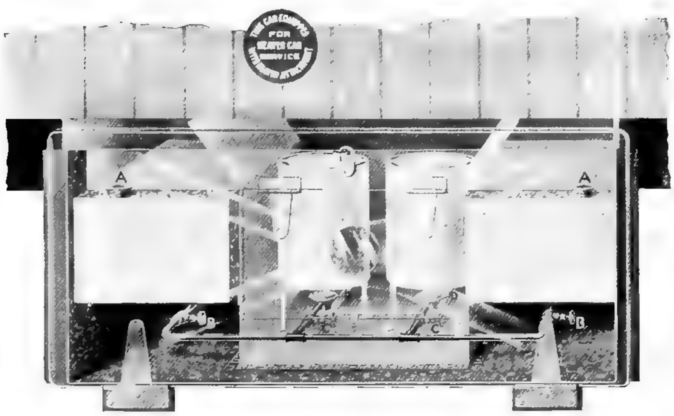


Fig. 898—Heater Box as Applied to Refrigerator Car, Showing Location of Heater Drums and Alcohol Supply Tanks.

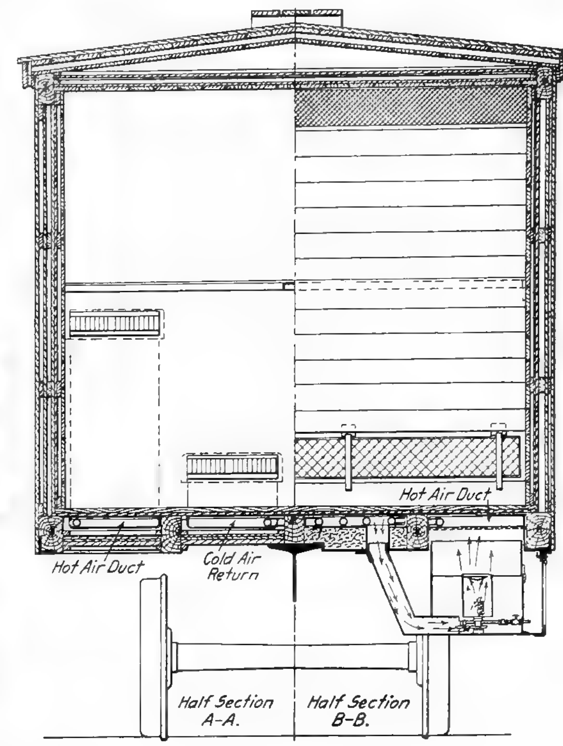


Fig. 899—Cross Sections of Refrigerator Car Shown in Fig. 852, Showing Application of Heater.

Alcohol Heating & Lighting Company.

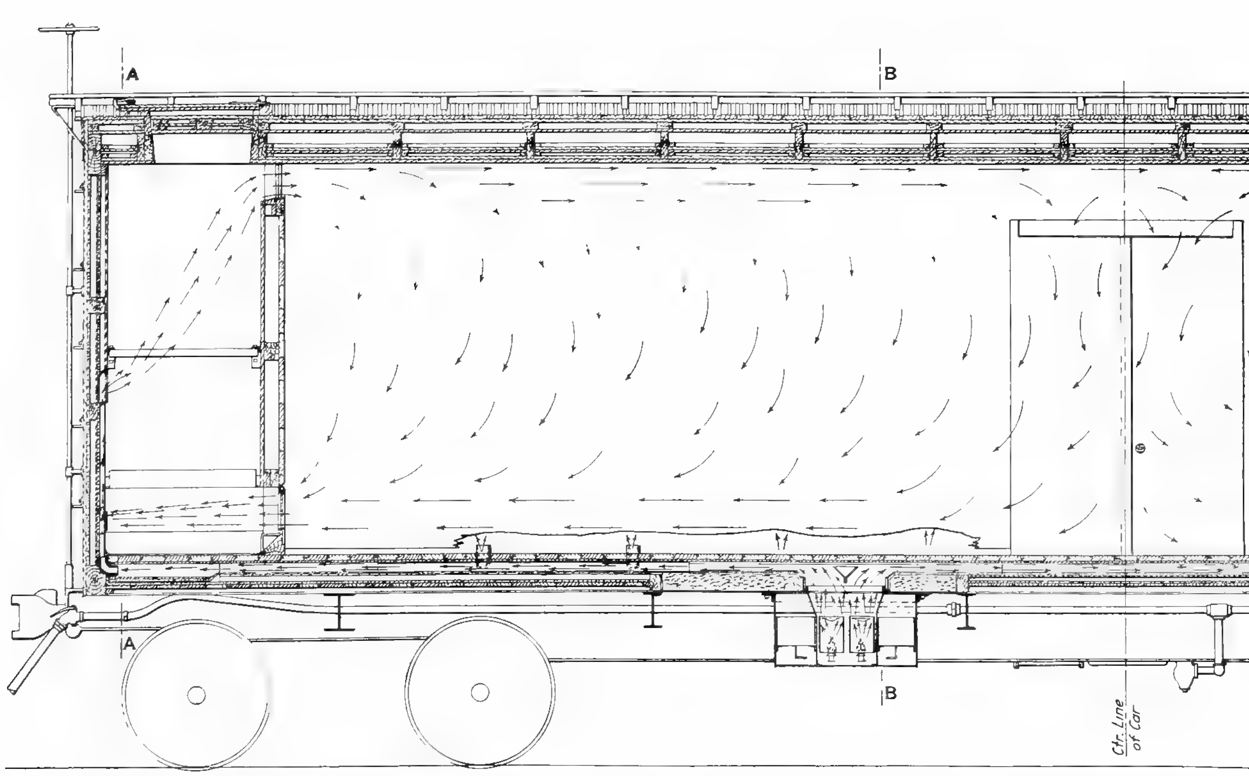


Fig. 900—Section Through Refrigerator Car Equipped with the Alcohol Heating & Lighting Company's Heating System, Showing Location of Heater and Passages, and Flow of Air Currents.

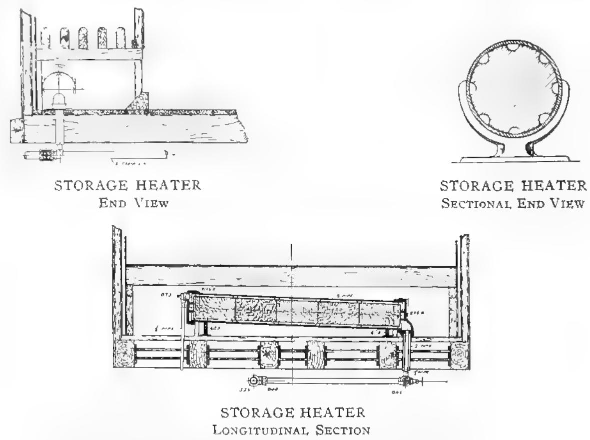


Fig. 901 Gold's Improved Storage Heater for Use in Refrigerator Cars During Cold Weather. Gold Car Heating & Lighting Company.

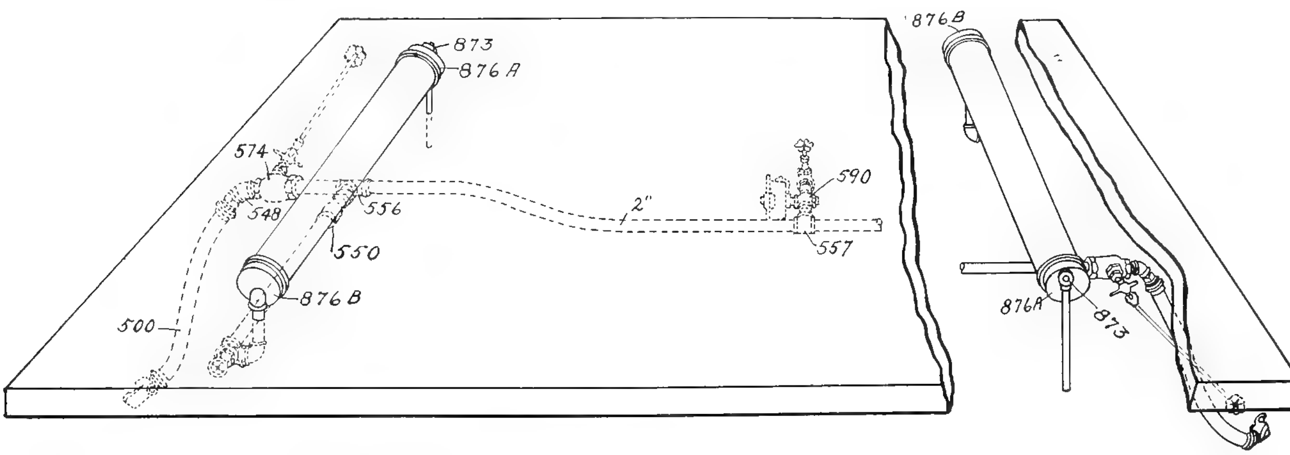


Fig. 902—Piping Arrangement for Gold's Improved Storage Heaters.

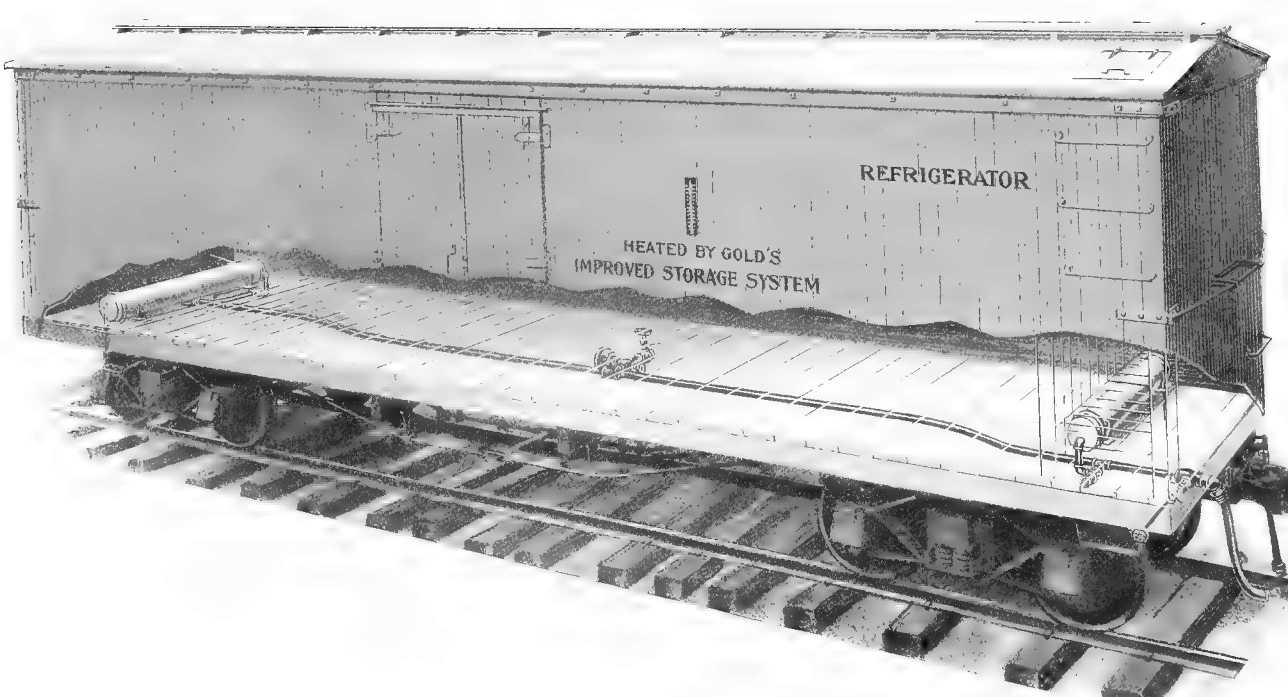


Fig. 903—Gold's Improved Storage Heaters as Applied to a Refrigerator Car. Gold Car Heating & Lighting Company.

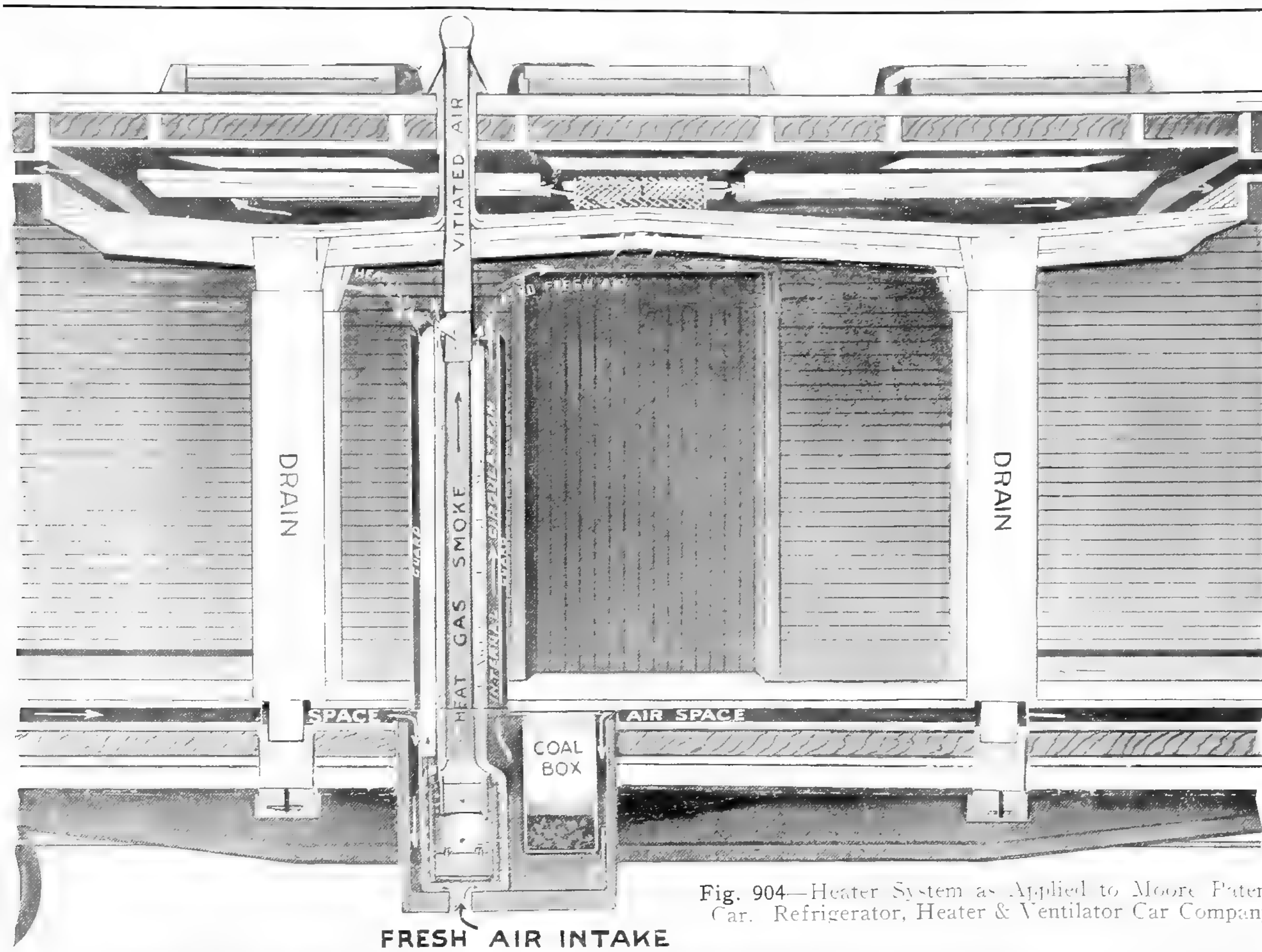


Fig. 904—Heater System as Applied to Moore Patent Car. Refrigerator, Heater & Ventilator Car Company.

Fig. 905—Interior View of 36-ft. Moore Patent Car. Refrigerator, Heater & Ventilator Car Company.

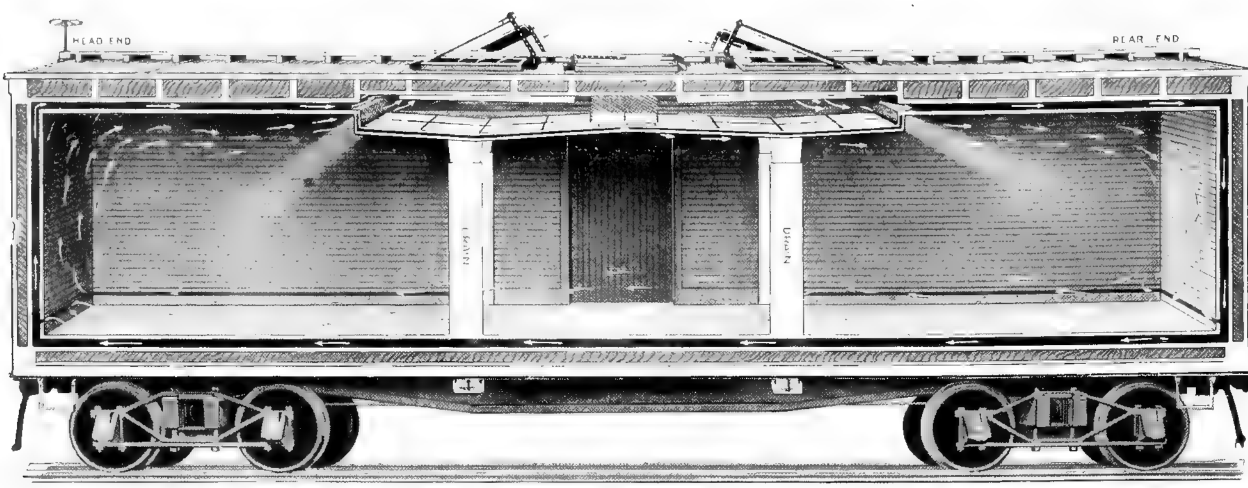


Fig. 906—Air Circulation in Moore Patent Car When Arranged for Ventilation

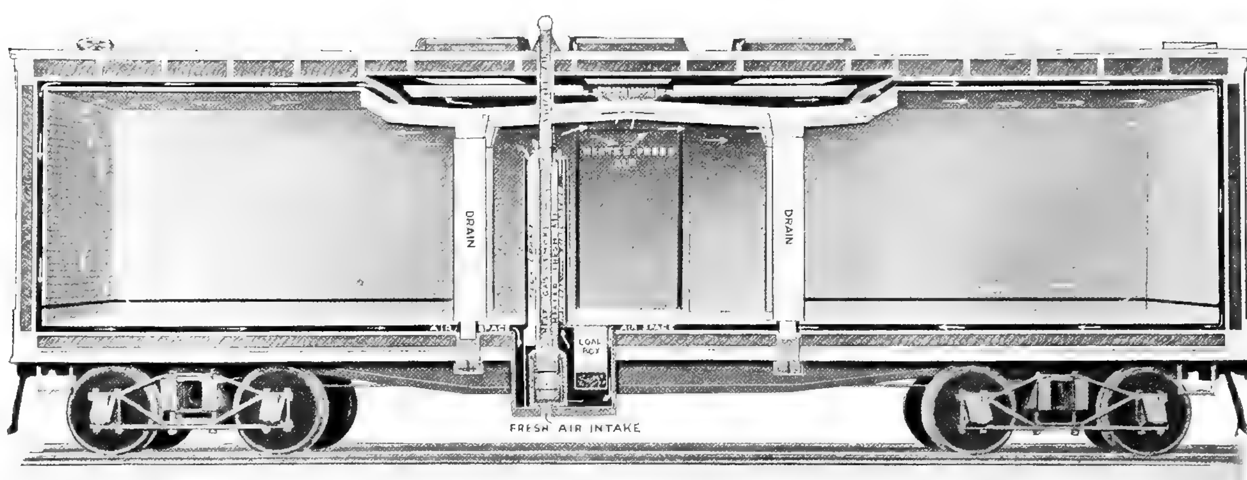


Fig. 907—Air Circulation in Moore Patent Car When Arranged for Heating.

Fig. 908—Air Circulation in Moore Patent Car When Arranged for Refrigeration.
Refrigerator, Heater & Ventilator Car Company.

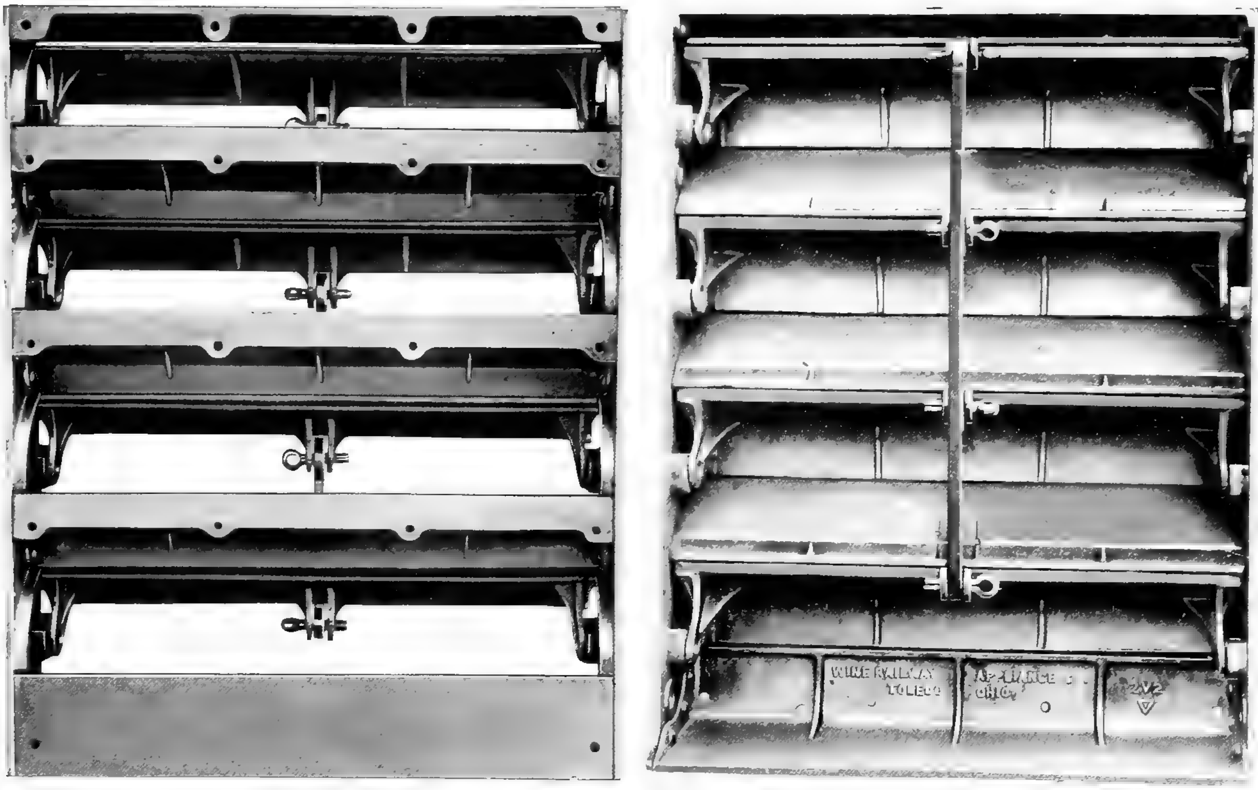


Fig. 909 Wine Car Ventilating Shutter Wine Railway Appliance Company

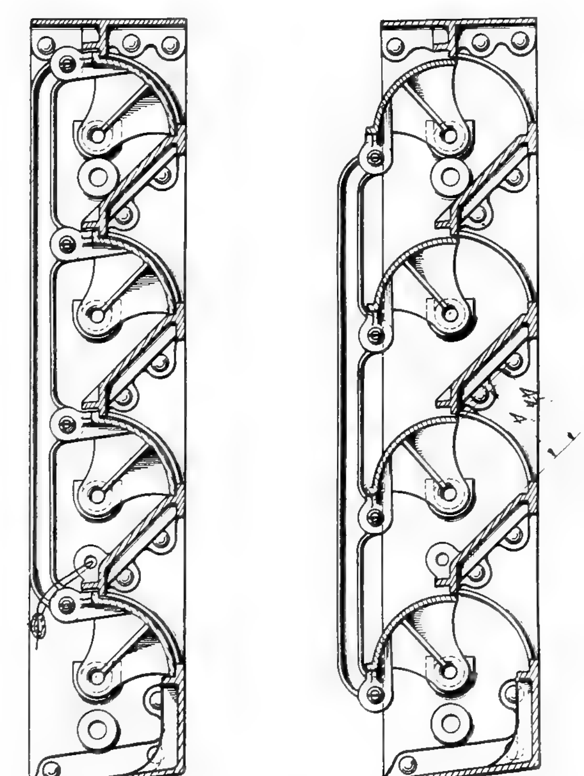


Fig. 910—Sections Through Wine Ventilating Shutter.

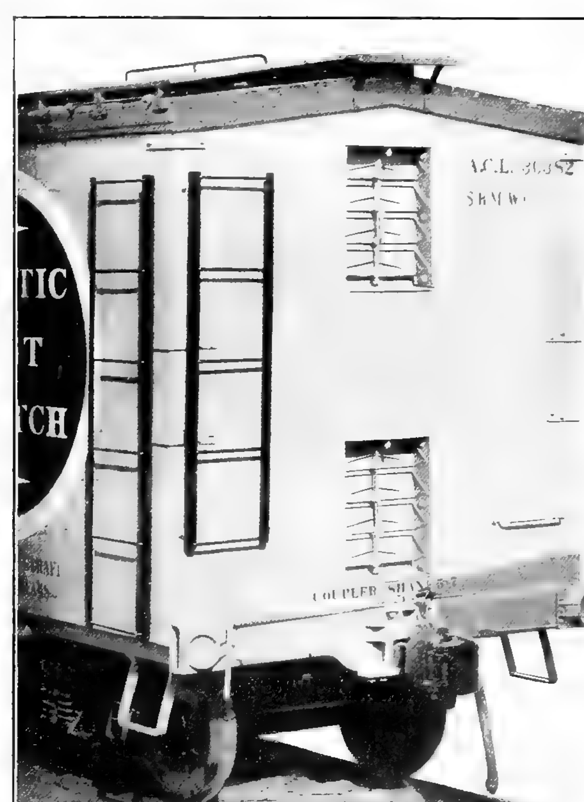


Fig. 911—Car Equipped with Wine Ventilating Shutter and Steel Ladders.

Wine Railway Equipment Company

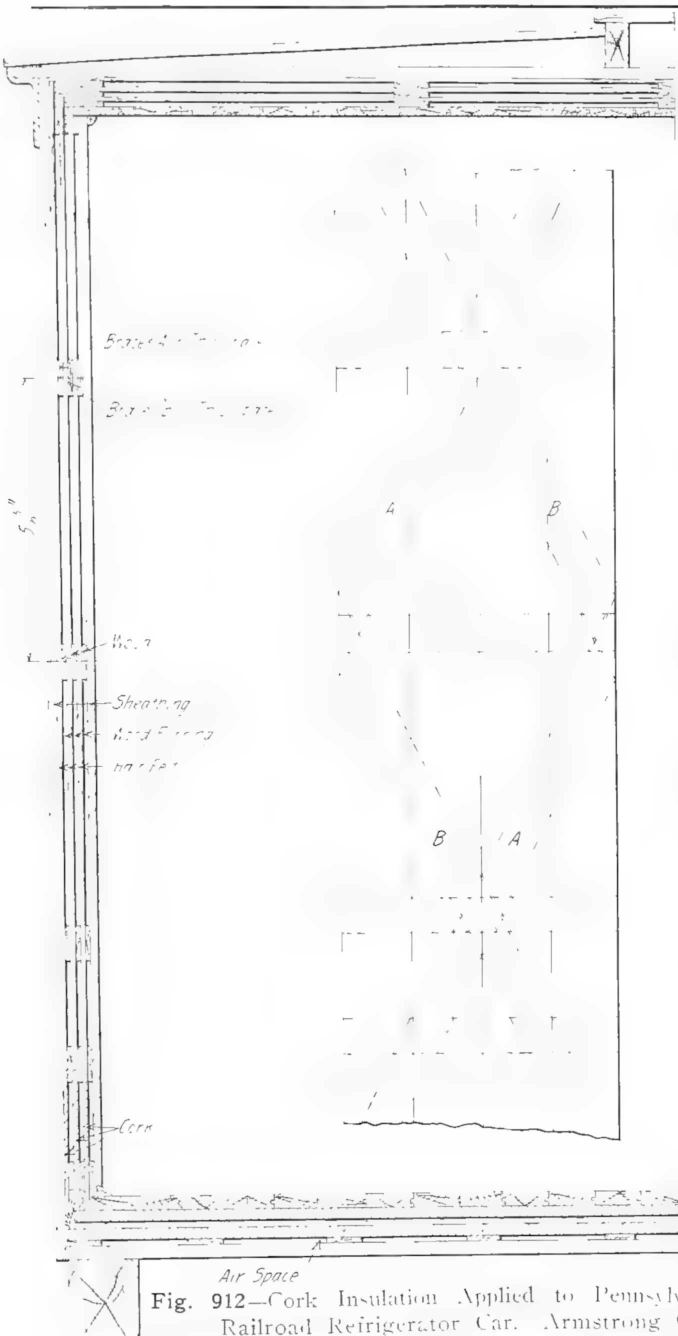


Fig. 912—Cork Insulation Applied to Pennsylvania Railroad Refrigerator Car. Armstrong Cork Company.

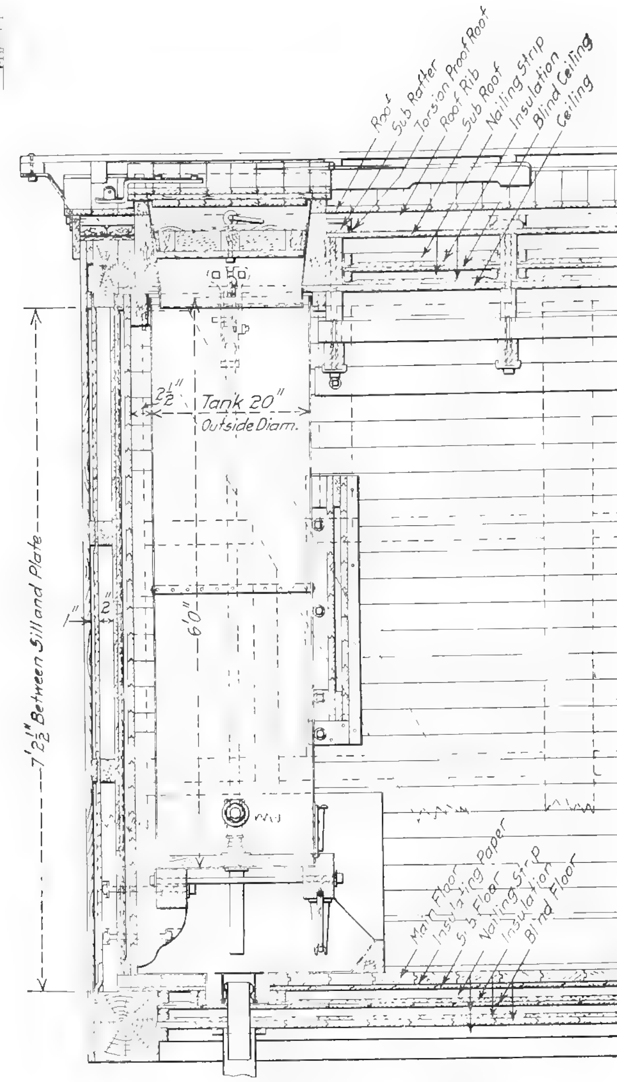


Fig. 913—Tank End of American Car & Foundry Company Standard Beef Car.

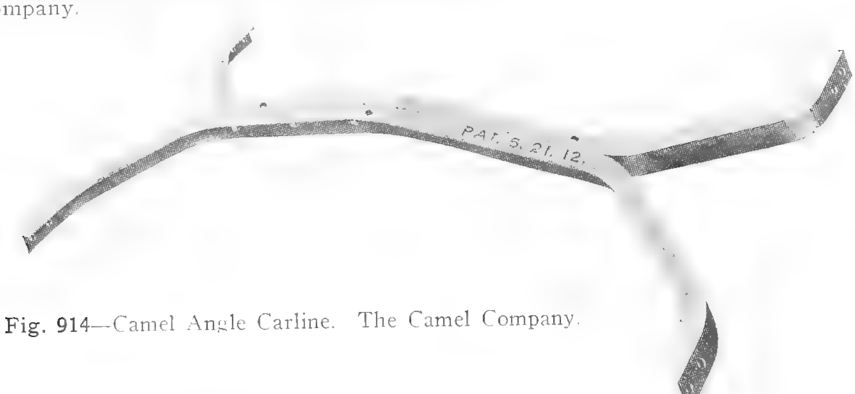


Fig. 914—Camel Angle Carline. The Camel Company.

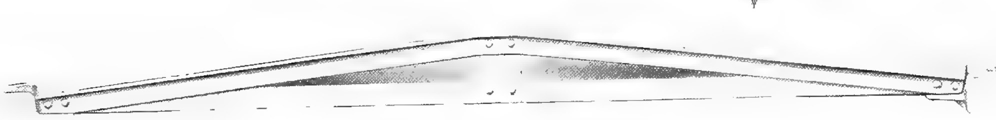


Fig. 915—Western Steel Carline. Western Railway Equipment Company.

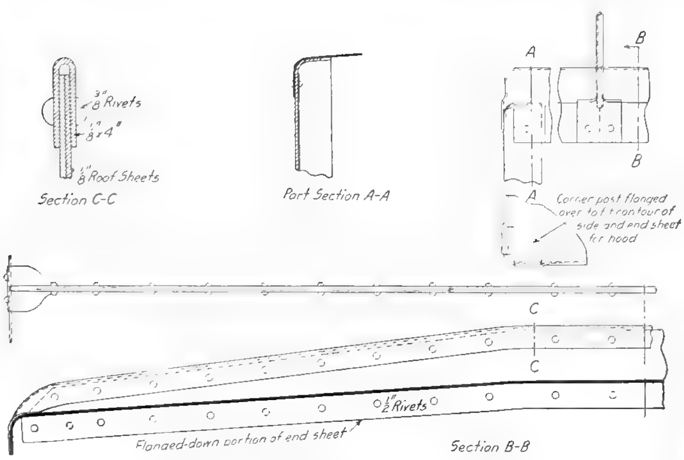


Fig. 916—Details of Steel Roof for Summers All-Steel Box Car.

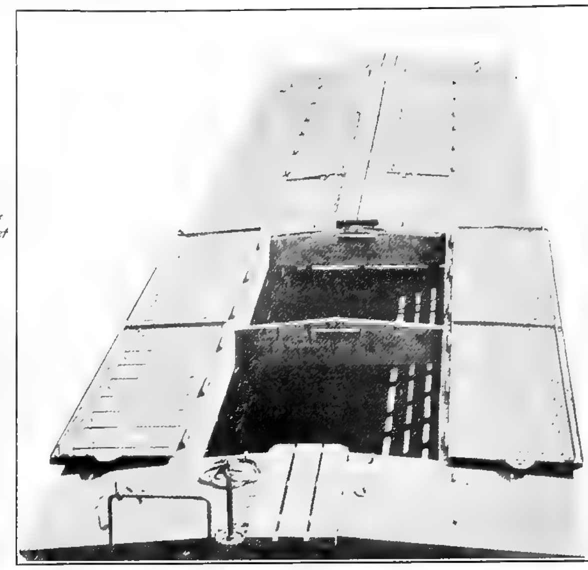


Fig. 917—Roof of General Service Car. National Dump Car Company

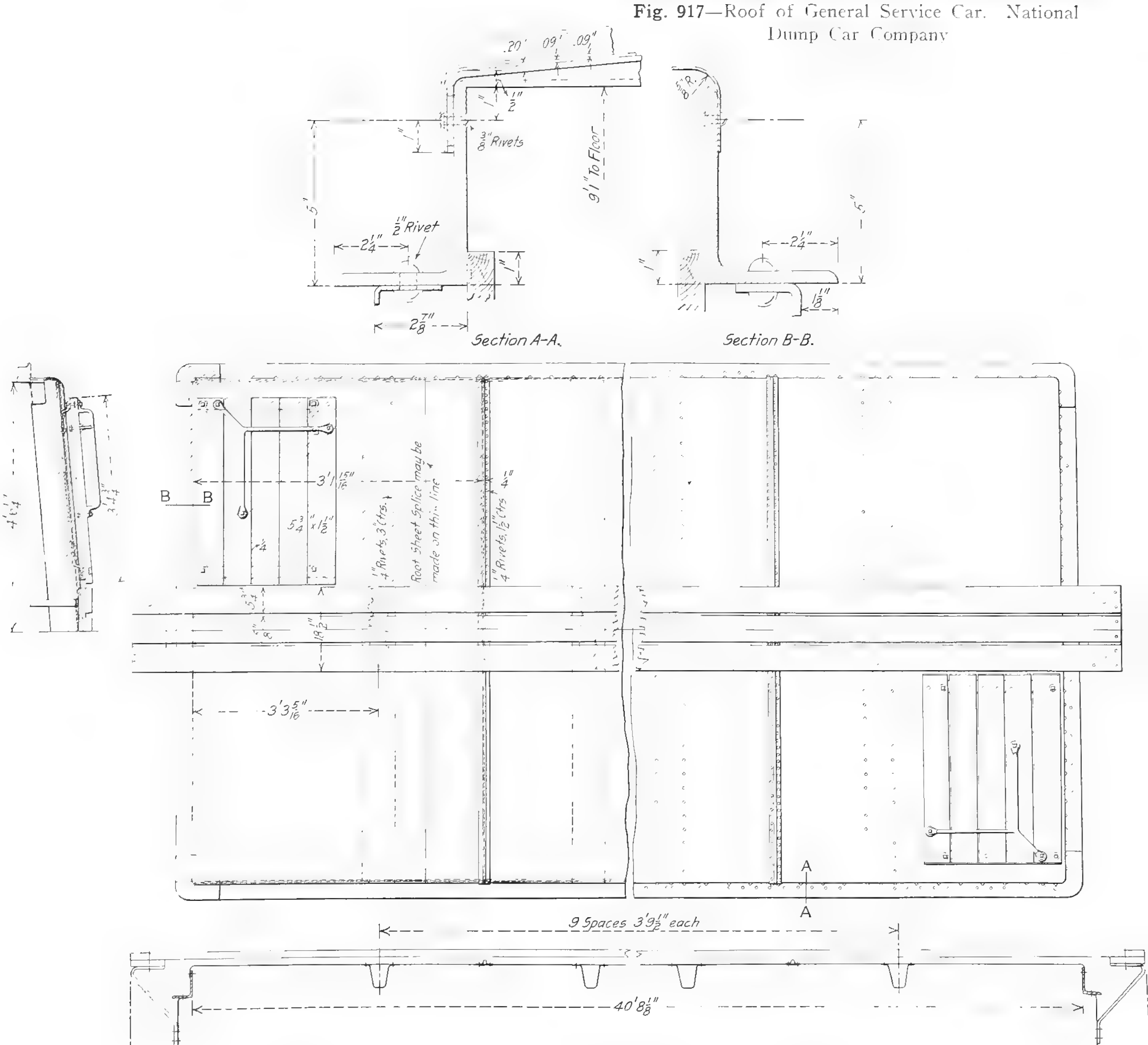


Fig. 918—Roof of Pennsylvania Railroad Steel Box Car Shown in Fig. 7.

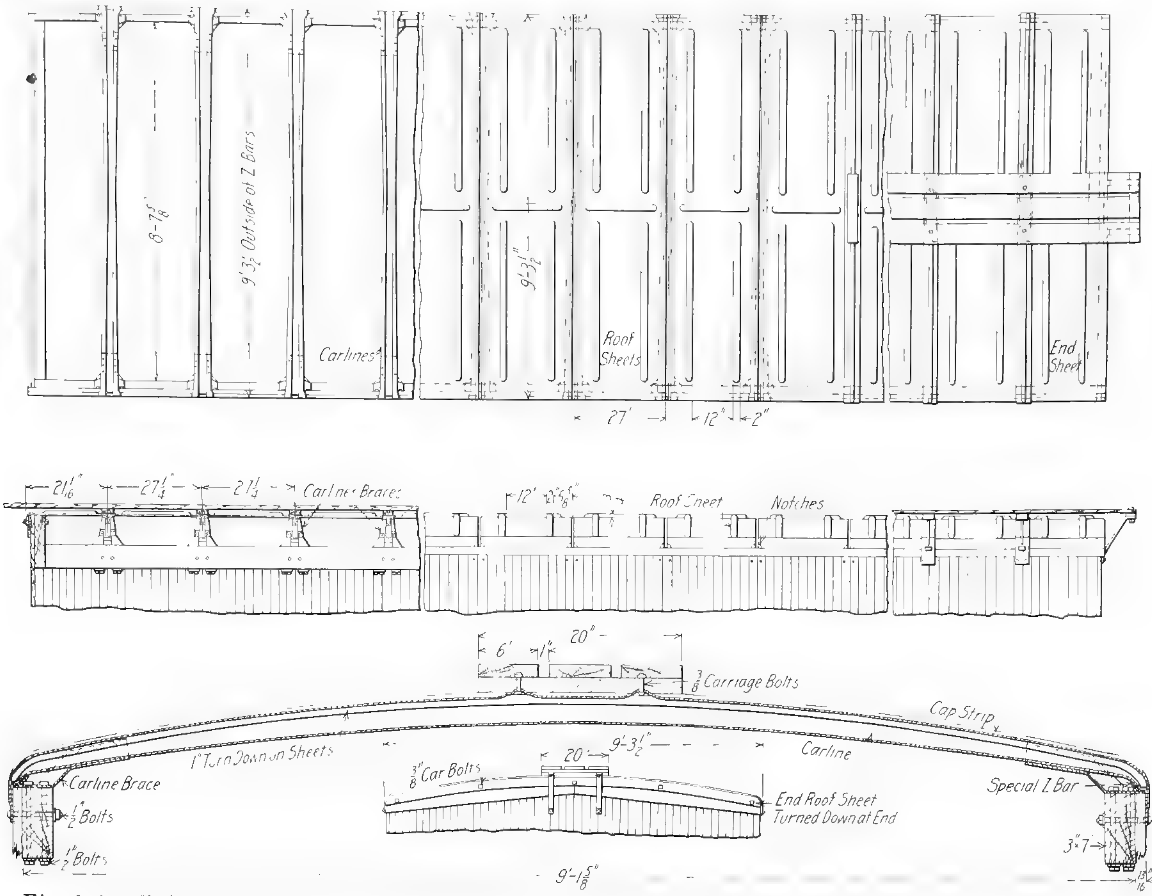


Fig. 919—Christy Steel Car Roof Applied to Atchison, Topeka & Santa Fe Box Car. American Car Roof Company

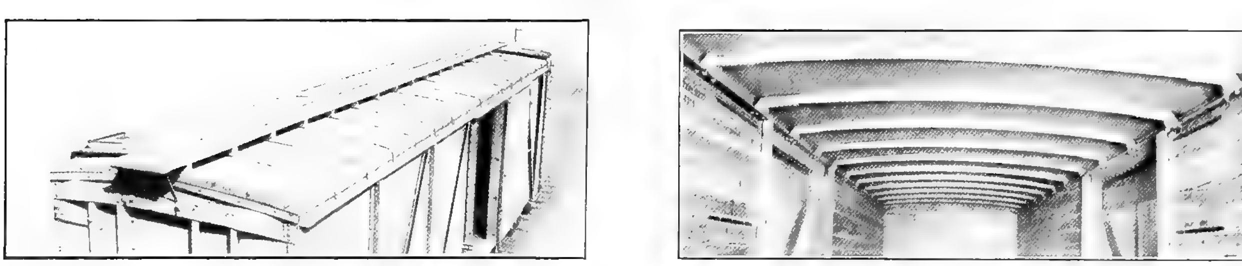


Fig. 920—Christy Steel Roof. American Car Roof Company

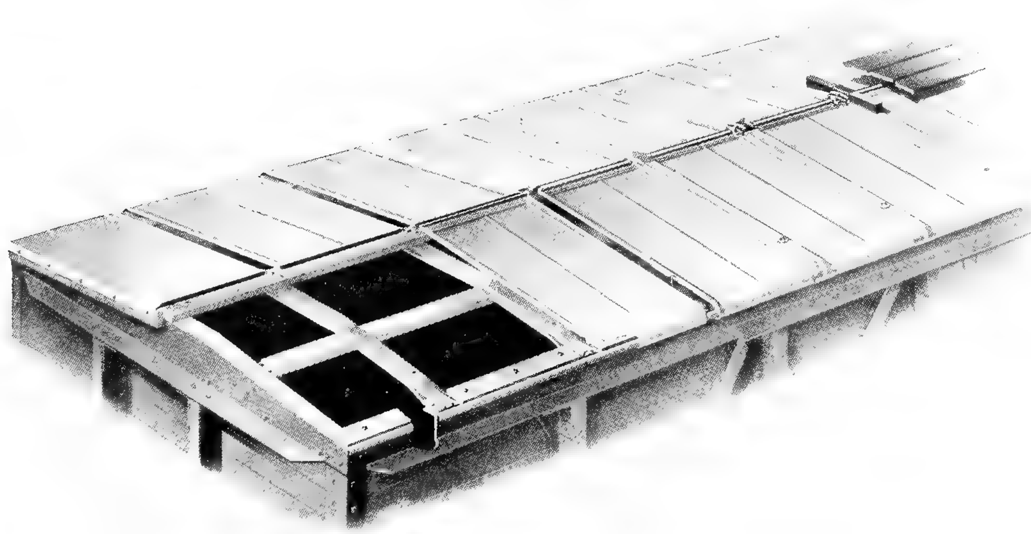


Fig. 921—Hutchins All-Steel Steel Carline Roof Applied to Steel Frame Car. Hutchins Car Roofing Company.

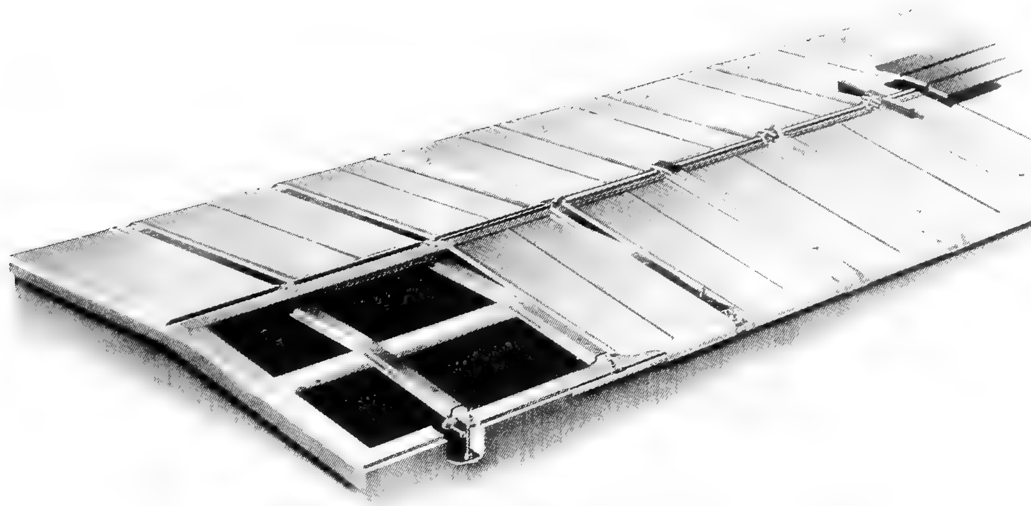


Fig. 922—Hutchins All-Steel Steel Carline Roof Applied to Wooden Car. Hutchins Car Roofing Company.

Fig. 922A—National Standard Roofing for Freight and Passenger Cars. Transportation Utilities Company.

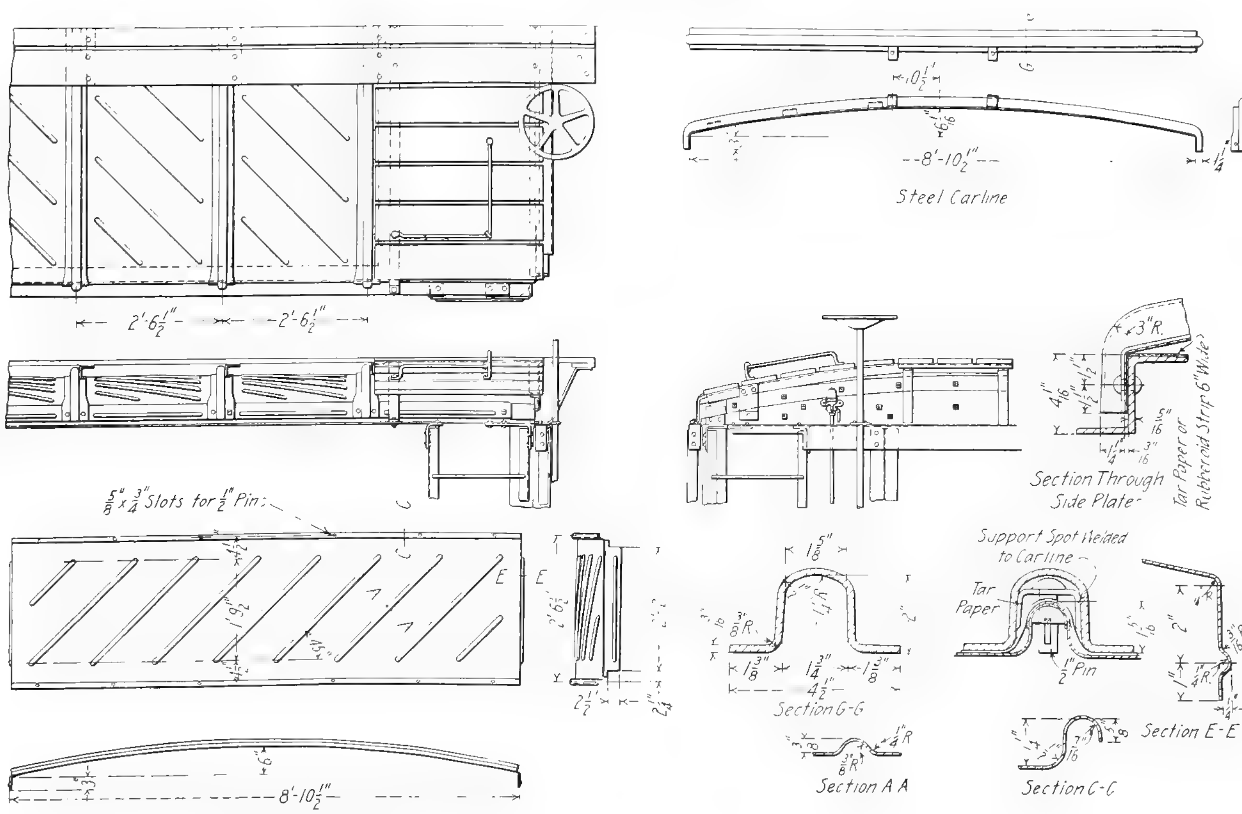


Fig. 923—Hutchins Camber All-Steel Roof. Hutchins Car Roofing Company.

Fig. 924—Hutchins Camber All-Steel Roof.

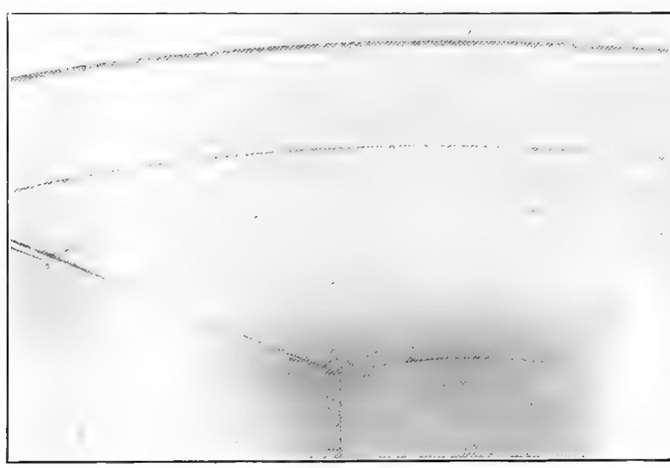


Fig. 925—Interior of Car Equipped with Hutchins Camber All Steel Roof.

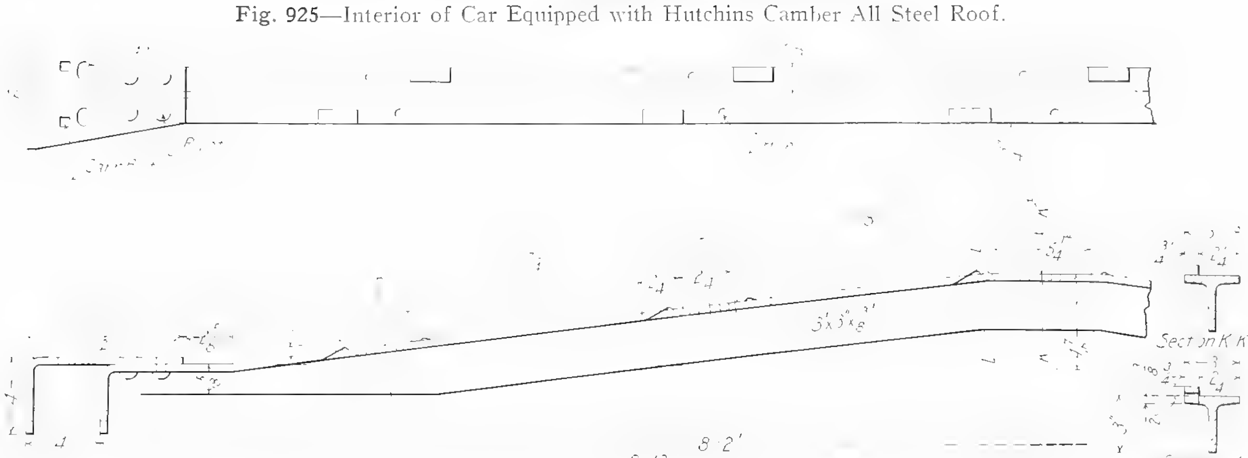
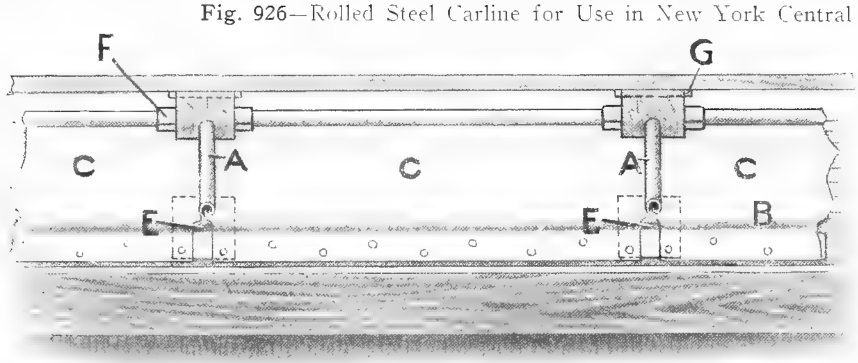


Fig. 926—Rolled Steel Carline for Use in New York Central Lines Car Repairs.



Parts of Hutchins Type D Roof.

A *Lock Roll Joint*
B *Torsion Eave Bead*
C *Galvanized Roofing Sheets*
E *Galvanized Joint Eave Filler Piece*
F *Galvanized Center Hood*
G *Galvanized Saddle Cover*

Fig 927—Hutchins Type D Outside Metal Roof. Hutchins Car Roofing Company.

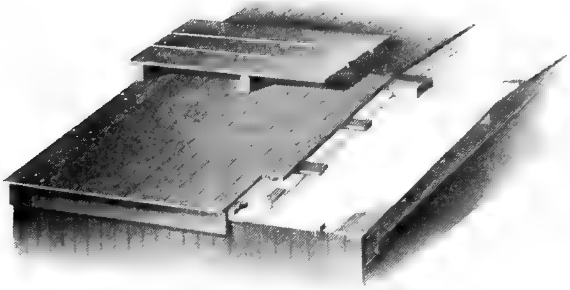


Fig. 928—Hutchins Air Space Sectional Plastic Car Roof.

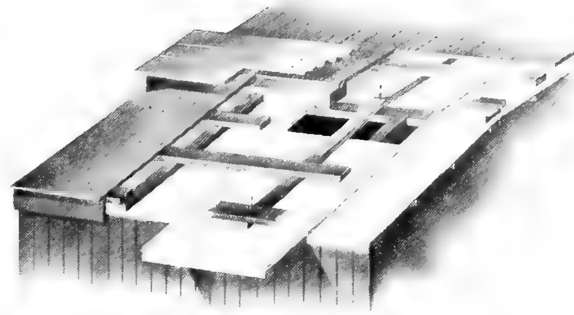


Fig. 929—Hutchins All-Metal Inside Roof.

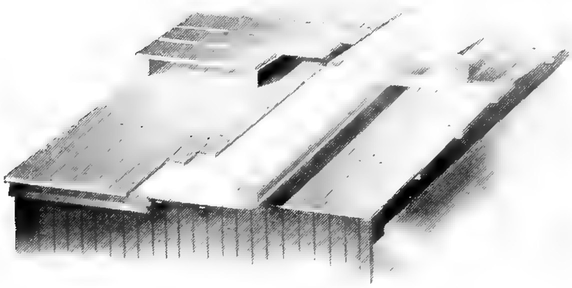


Fig. 930—Hutchins Plastic Car Roof.

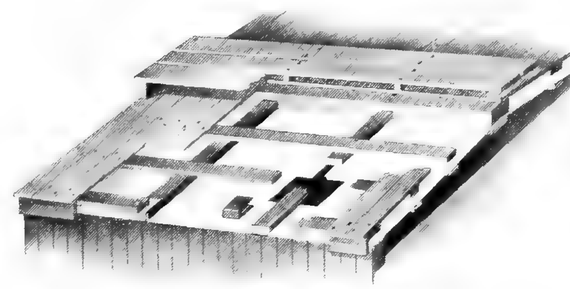


Fig. 931—Hutchins Sectional Metal Inside Roof.

Hutchins Car Roofing Company.

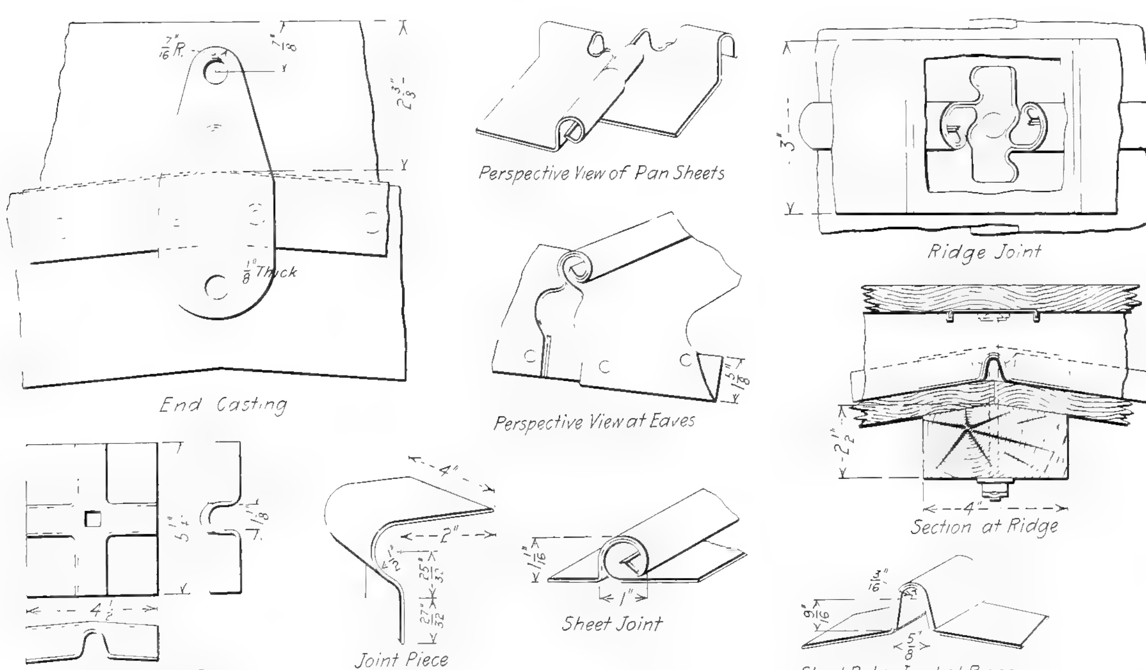


Fig. 932—Details of Hutchins Type D Outside Metal Roof. See also Fig. 927. Hutchins Car Roofing Company.

Fig. 933—Type L Carline for Use with Steel Side Plates. Cleveland Car Specialty Company.

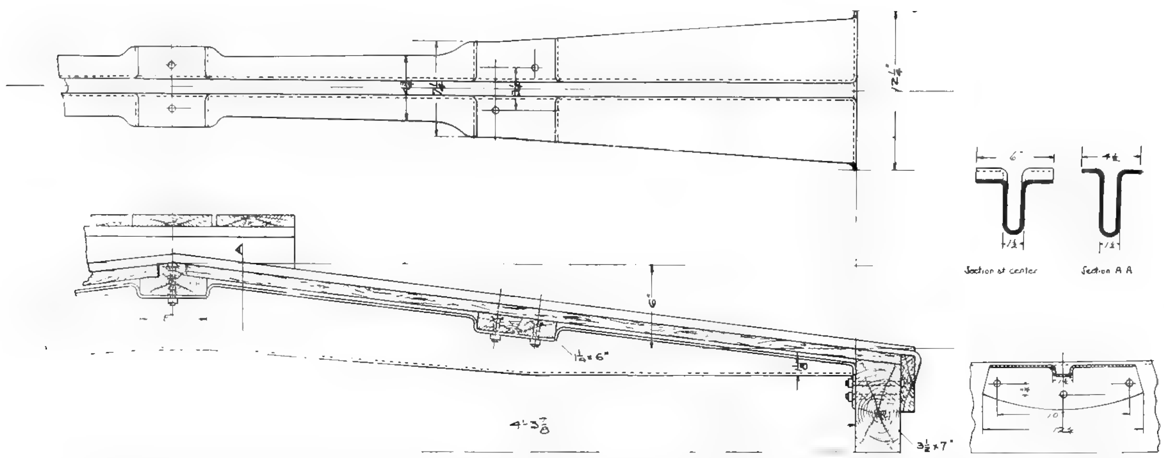


Fig. 934 Cleveland Type B Pressed Steel Carline with Wide Ends Cleveland Car Specialty Company.

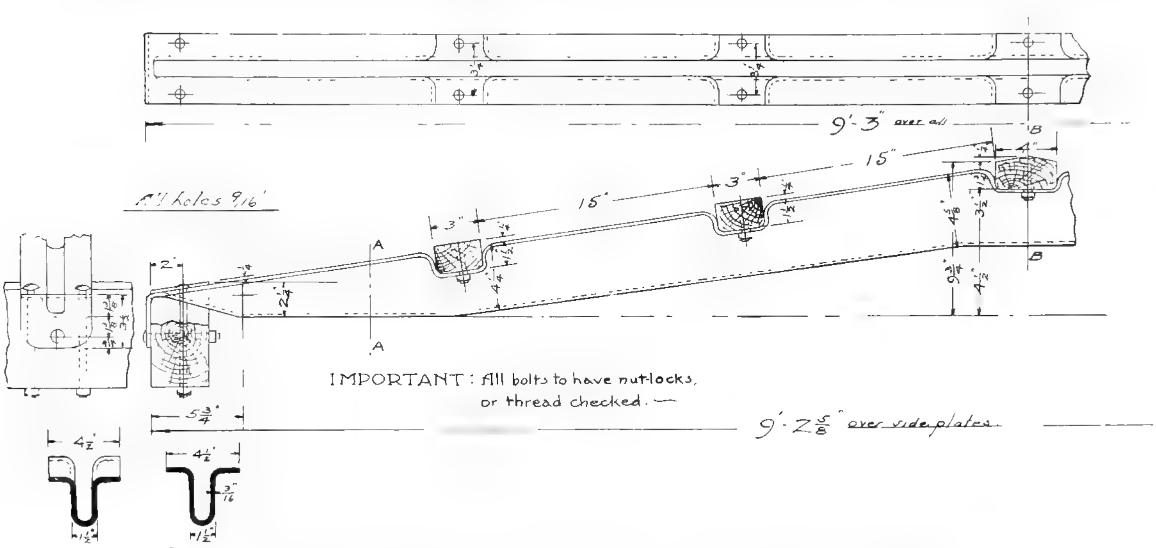


Fig. 935--Cleveland Type B Pressed Steel Carline, Heavy Pattern with Diminishing Ends. Cleveland Car Specialty Company.

Fig. 936 -Cleveland Pressed Steel Carline. Cleveland Car Specialty Company.

Fig. 937 -Cleveland Pressed Steel Channel Carline for Outside Roofs. Cleveland Car Specialty Company.

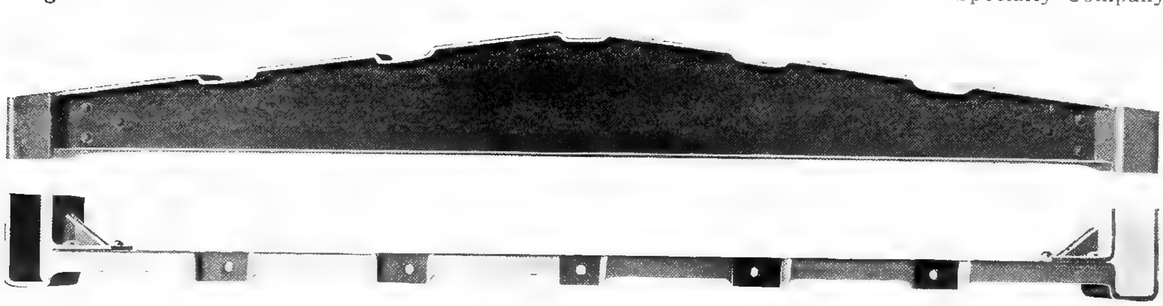


Fig. 938—Pressed Steel End Plate. Cleveland Car Specialty Company.

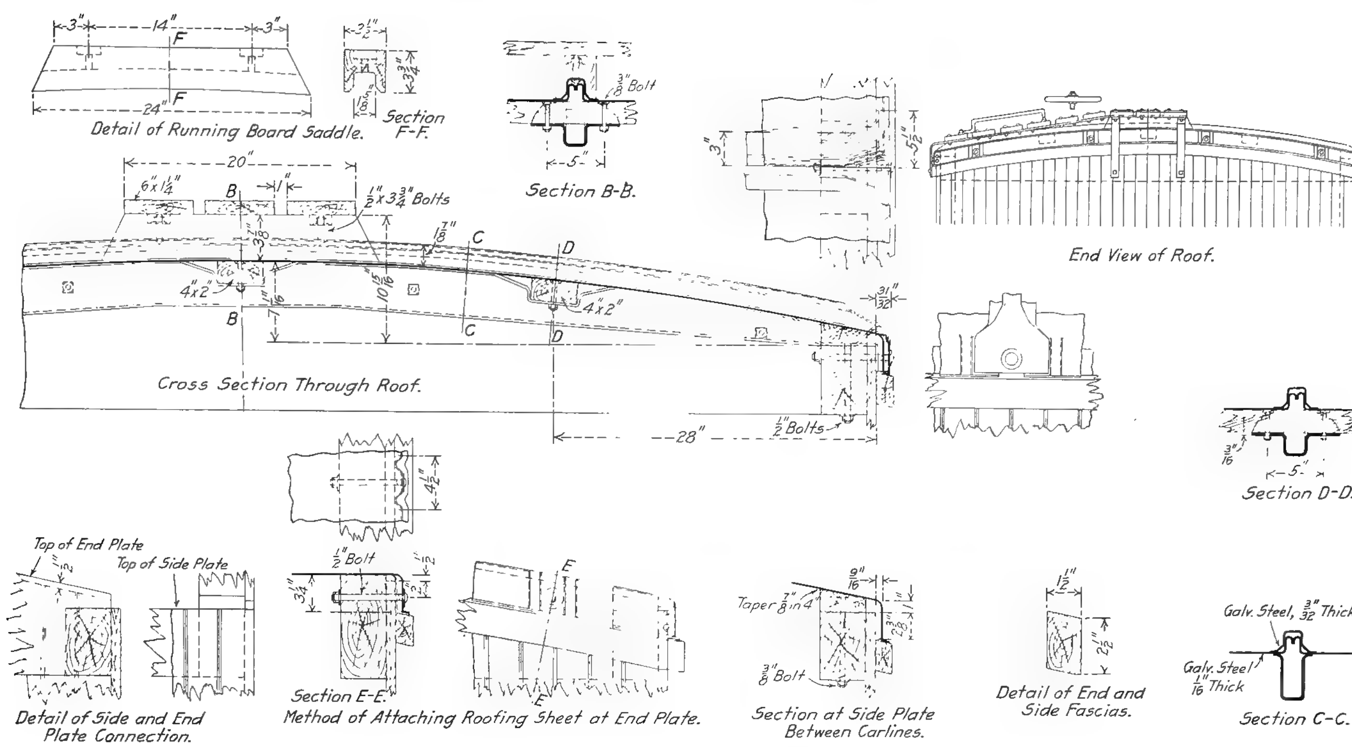


Fig. 939—Franklin Freight Car Roof.

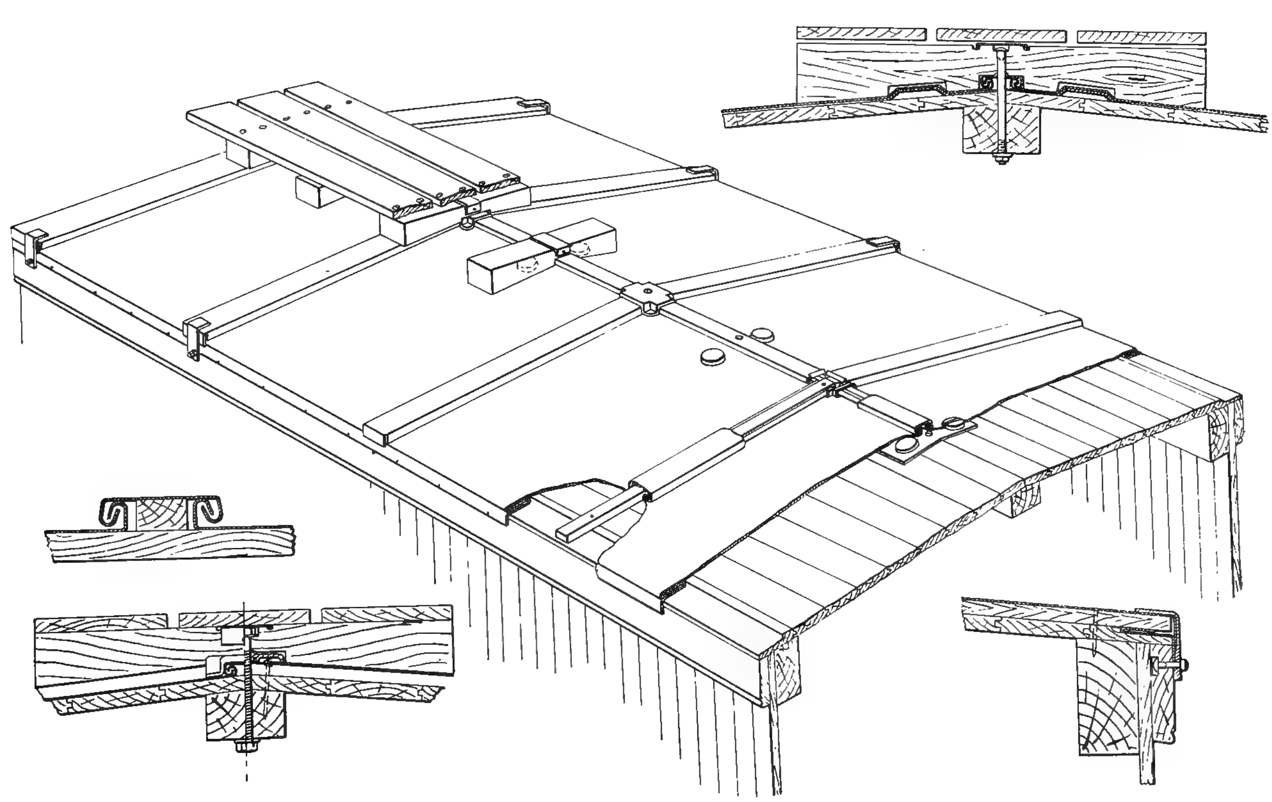


Fig. 940—Murphy XLA Flexible Roof. Standard Railway Equipment Company.

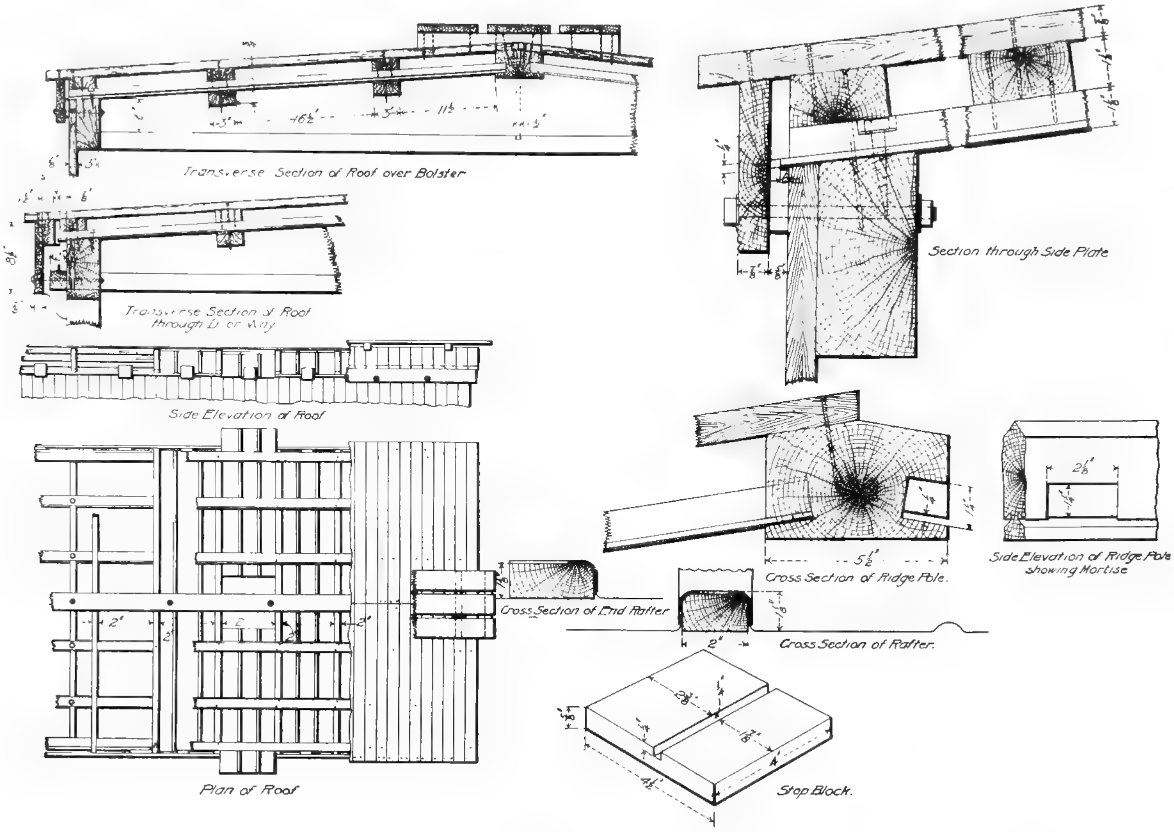


Fig. 941—Chicago Improved Winslow Roof. Chicago-Cleveland Car Roofing Company.

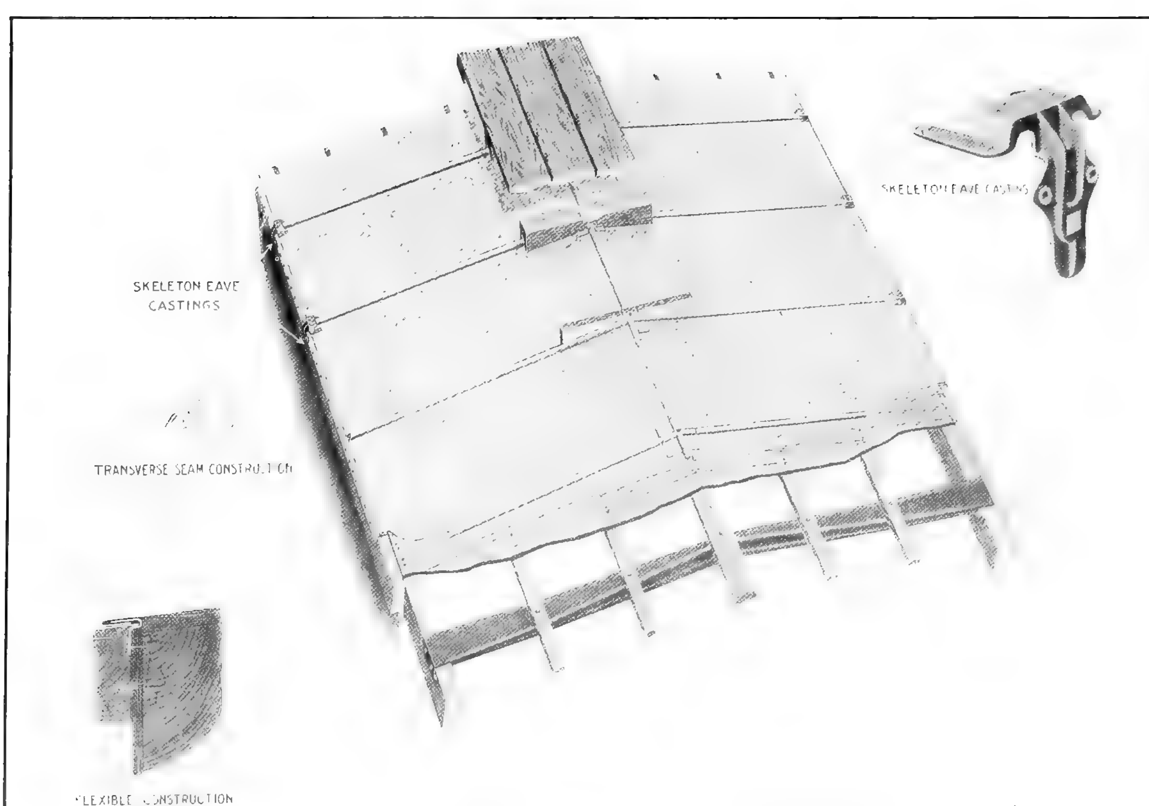


Fig. 942—Chicago Flexible Outside Metal Roof No. 20-A-1. Chicago-Cleveland Car Roofing Company.

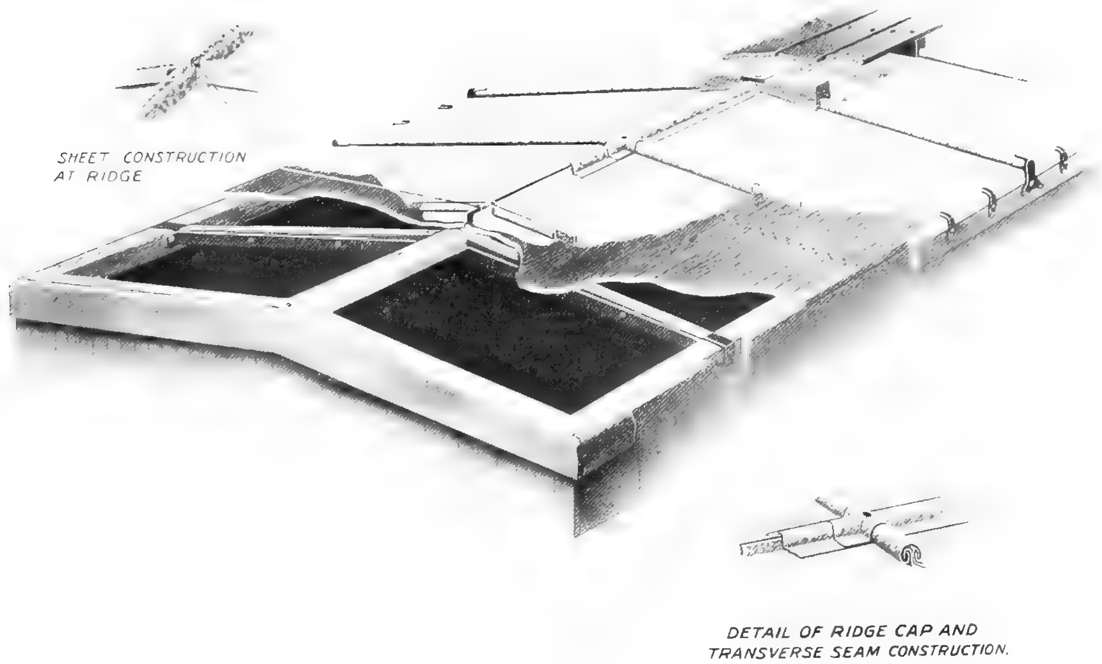


Fig. 943—Rus-L Flexible Outside Metal Roof No. 19. Chicago-Cleveland Car Roofing Company.

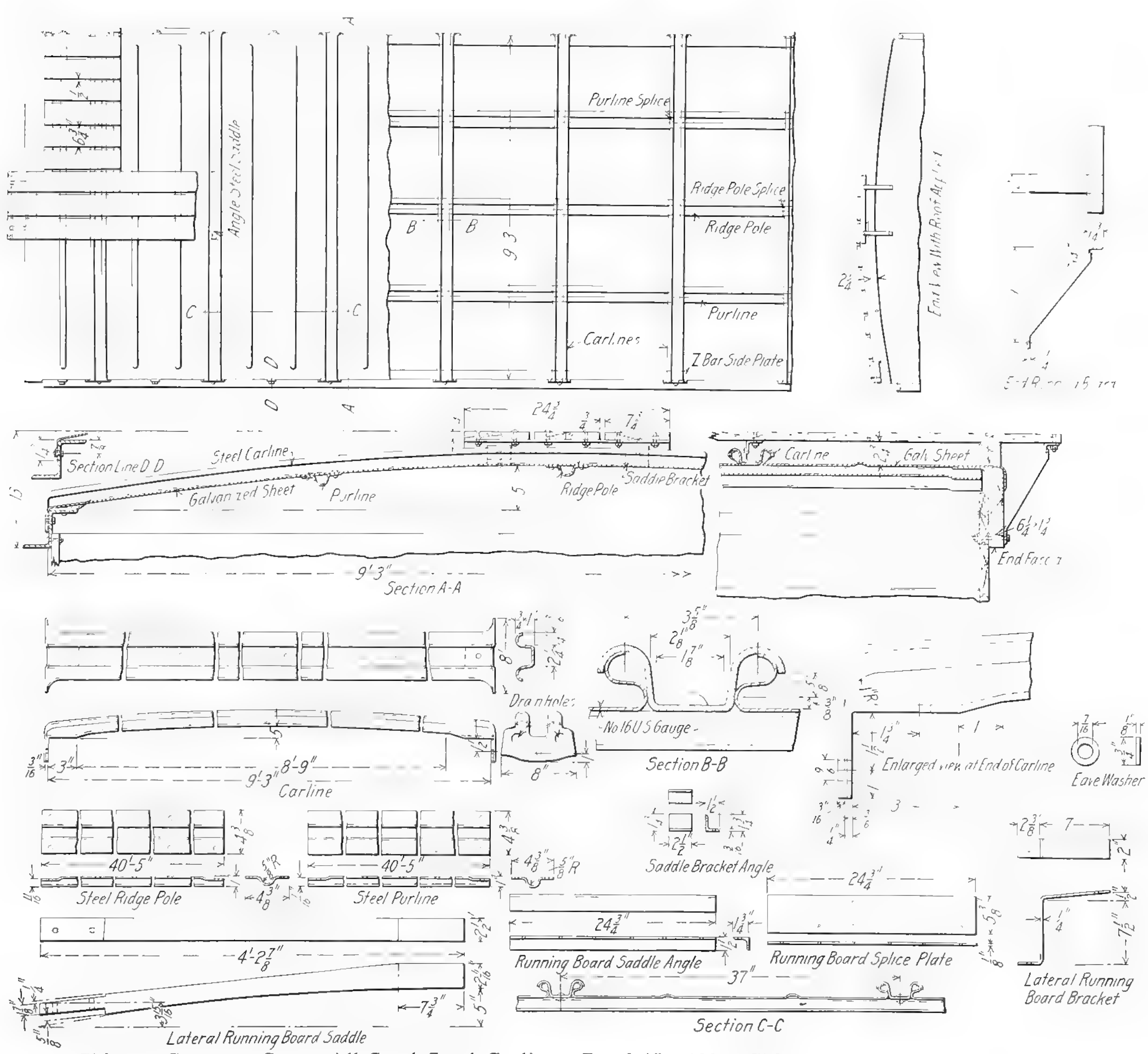


Fig. 944—Chicago Common-Sense All-Steel Steel Carline Roof No 100. Chicago-Cleveland Car Roofing Company.

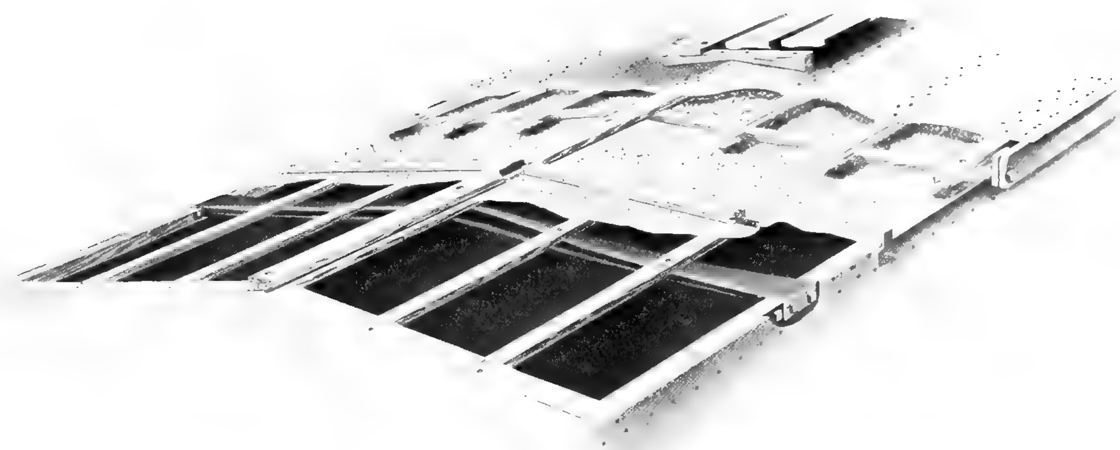


Fig. 945 Chicago Improved Inside Metal Roof No. 2 Chicago-Cleveland Car Roofing Company.

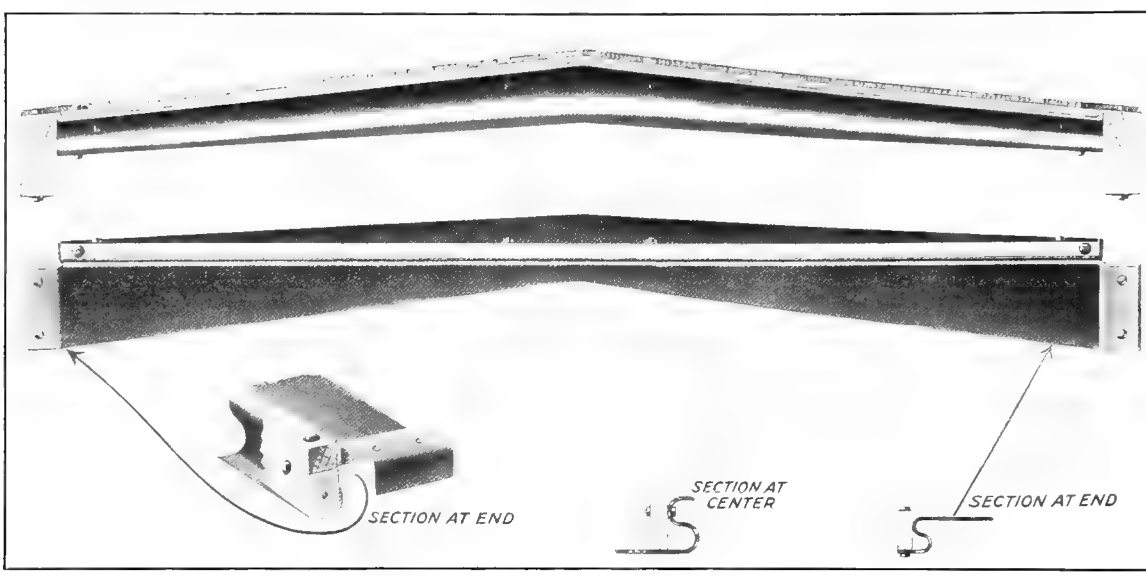


Fig. 946—Chicago Corrugated Pressed Steel Carline. Chicago-Cleveland Car Roofing Company.

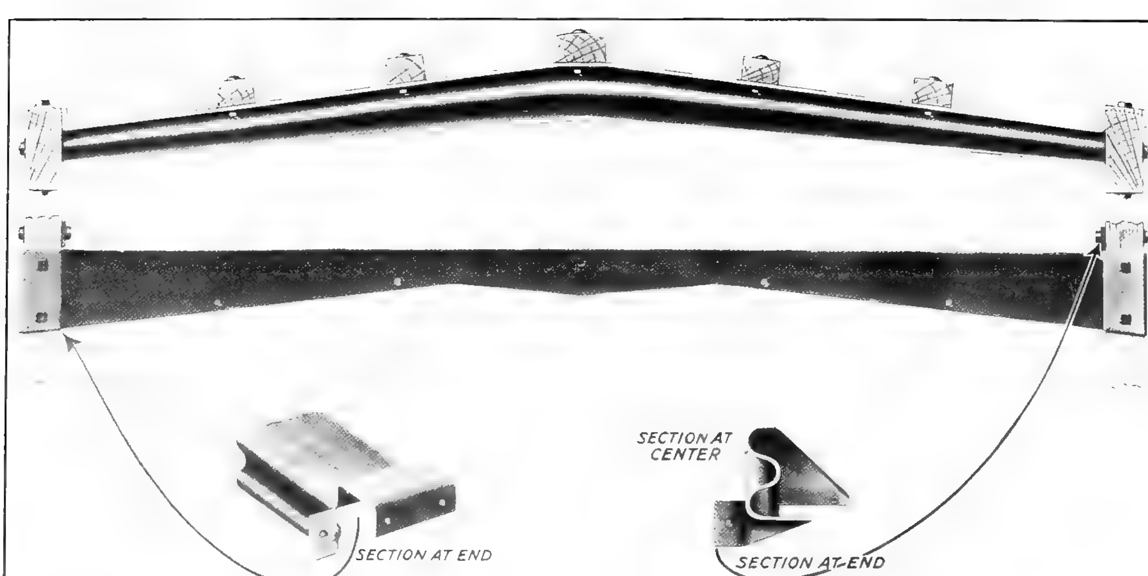


Fig. 947—Chicago Corrugated Pressed Steel Carline. Chicago-Cleveland Car Roofing Company.

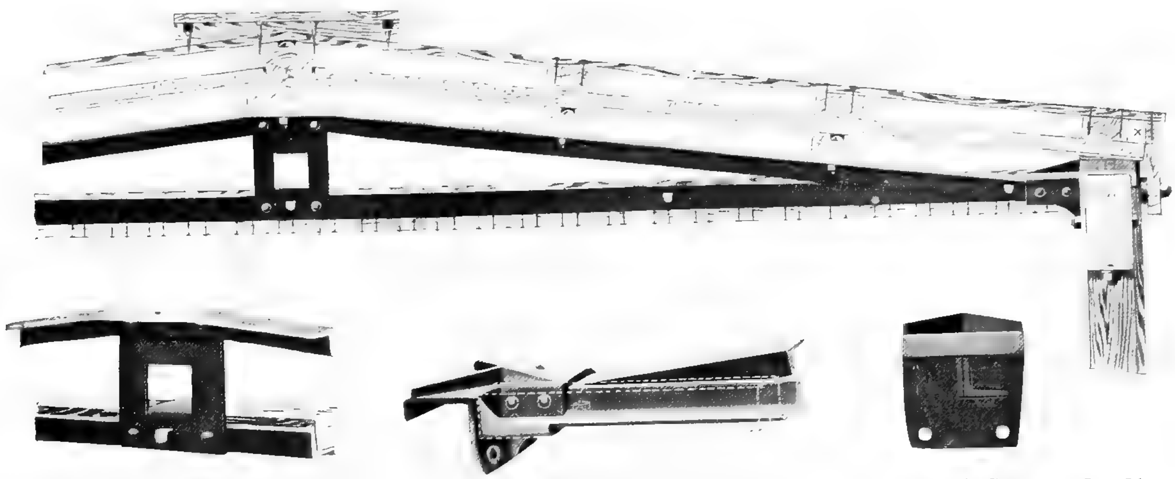


Fig. 948—General Arrangement for Box and Refrigerator Cars of Chicago Trussed Steel Carline No. 21. Chicago-Cleveland Car Roofing Company.

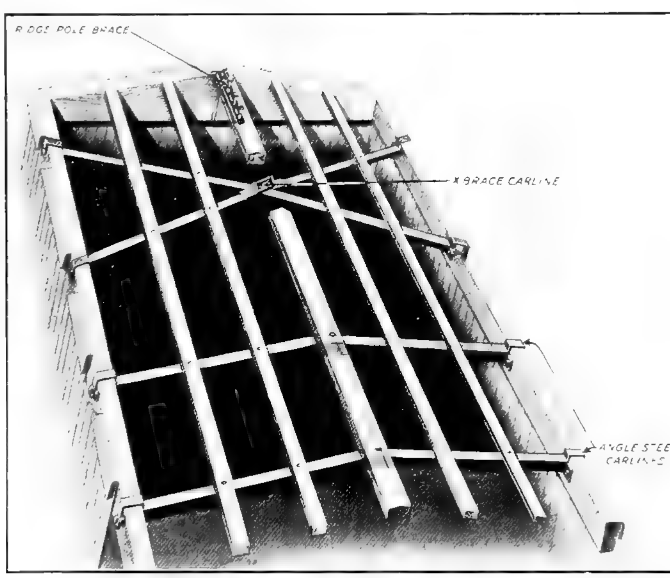


Fig. 949—Model System of Roof Bracing. Chicago-Cleveland Car Roofing Company.

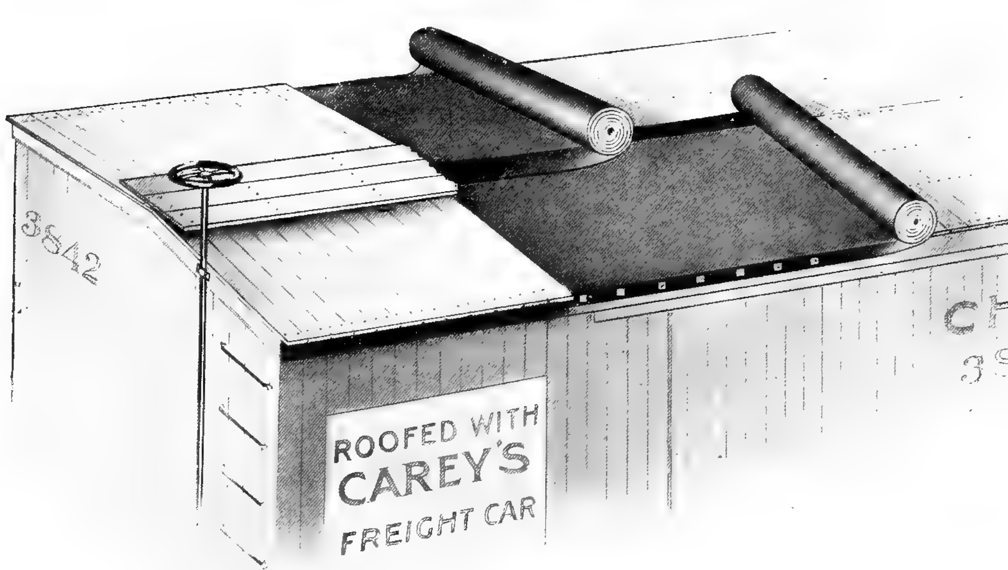


Fig. 950—Application of Carey's Three-Ply Burlap Center Freight Car Roofing. Philip Carey Company.

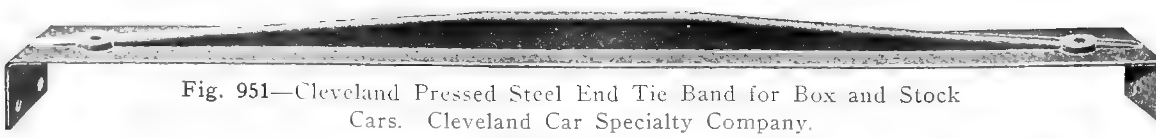


Fig. 951—Cleveland Pressed Steel End Tie Band for Box and Stock Cars. Cleveland Car Specialty Company.

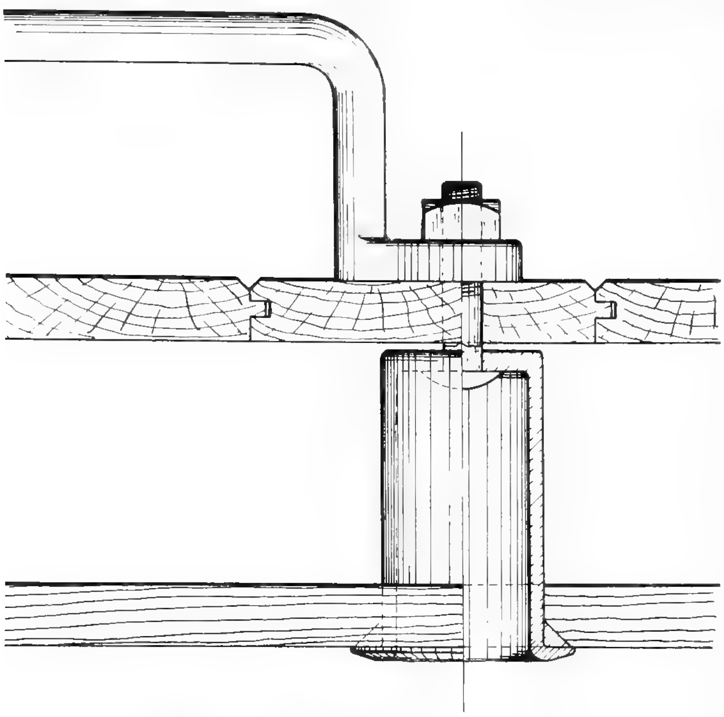


Fig. 952 -Wine Safety Thimble. Wine Railway Appliance Company.

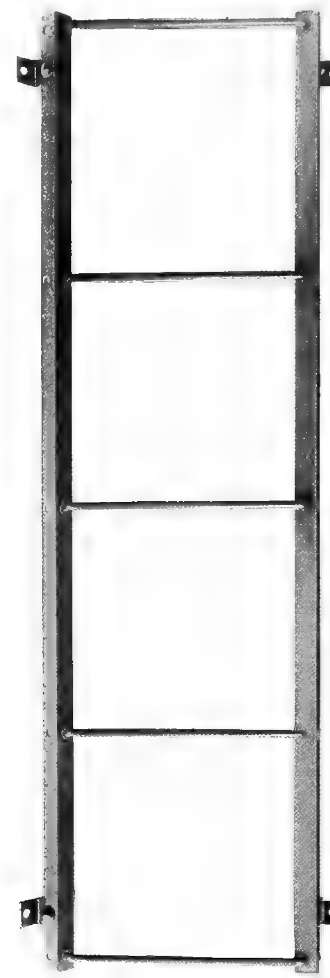


Fig. 953—Wine Steel Ladder. Wine Railway Appliance Company.

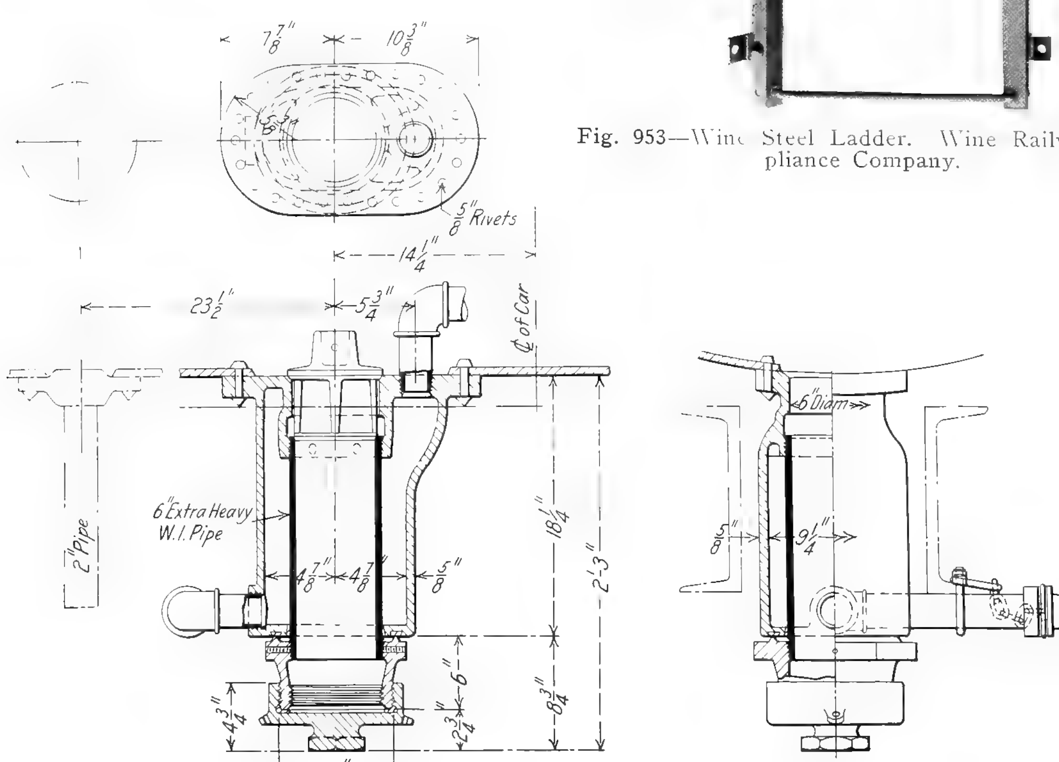


Fig. 954—American Car & Foundry Company 6-in. Steam Jacketed Outlet Valve for Tank Cars.

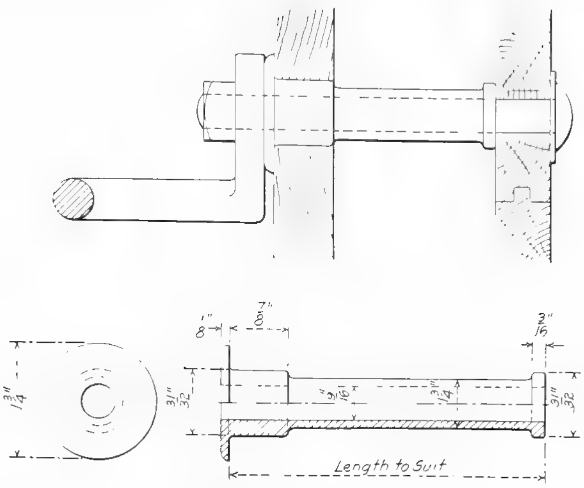


Fig. 955—Safety Appliance Thimble. Waugh Draft Gear Company.

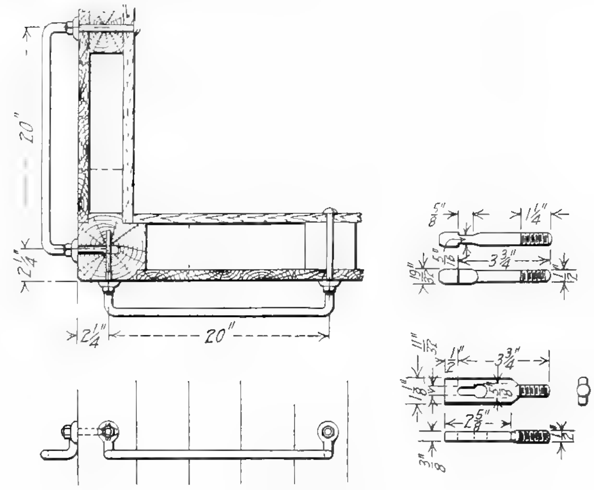


Fig. 956—Security Interlocking Ladder Bolt. D. R. Niederlander.

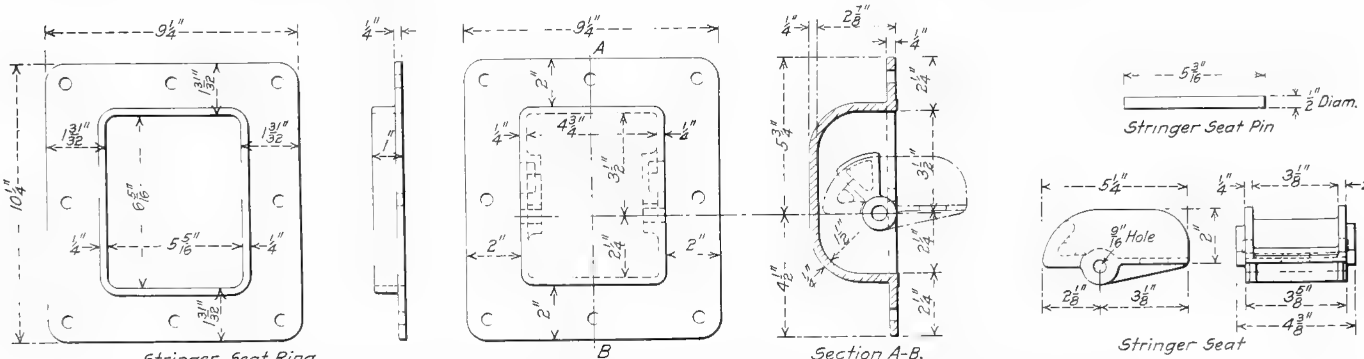


Fig. 957—Upper Deck Stringer Pocket for Union Pacific Steel Automobile Cars.

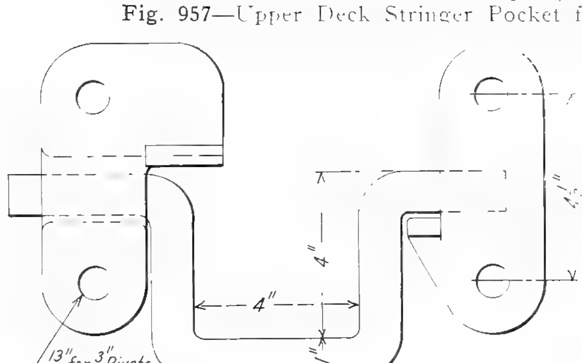


Fig. 958—Collapsible Stake Pocket. U. S. Metal & Manufacturing Company.

Fig. 959—American Car & Foundry Company Collapsible Stake Pocket.

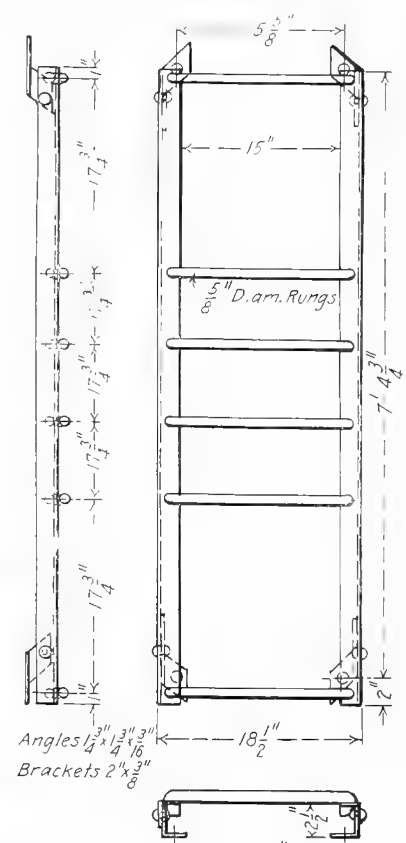


Fig. 960—Safety Appliance Ladder. Allegheny Forging Company.

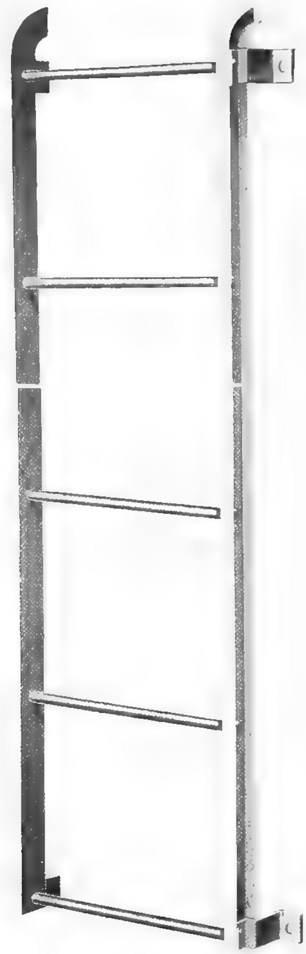


Fig. 961—Acme Steel Freight Car Ladder. Acme Supply Company.

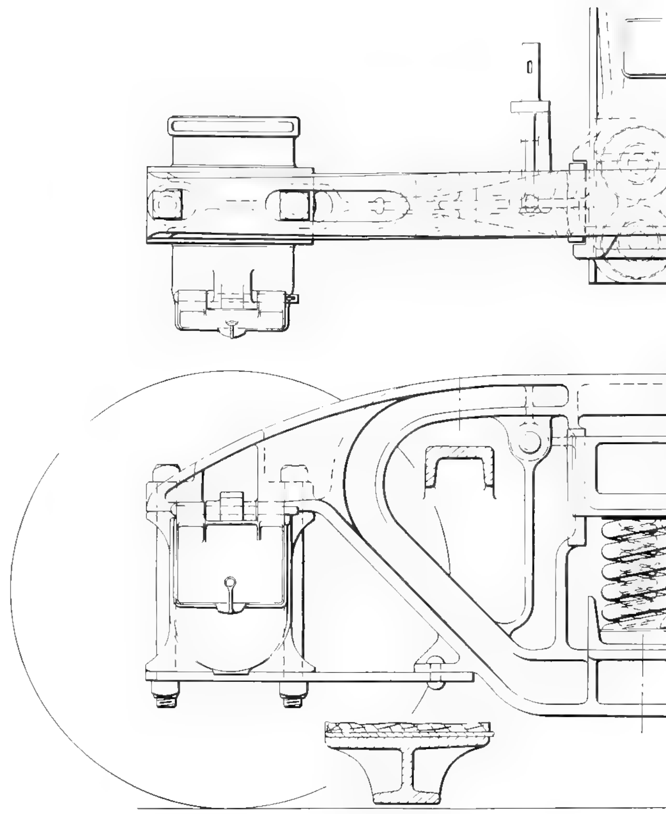


Fig. 962—Gould Truck Frame, Z-Type Bolster and Journal Boxes for 50-Ton Capacity Cars. Gould Coupler Company.

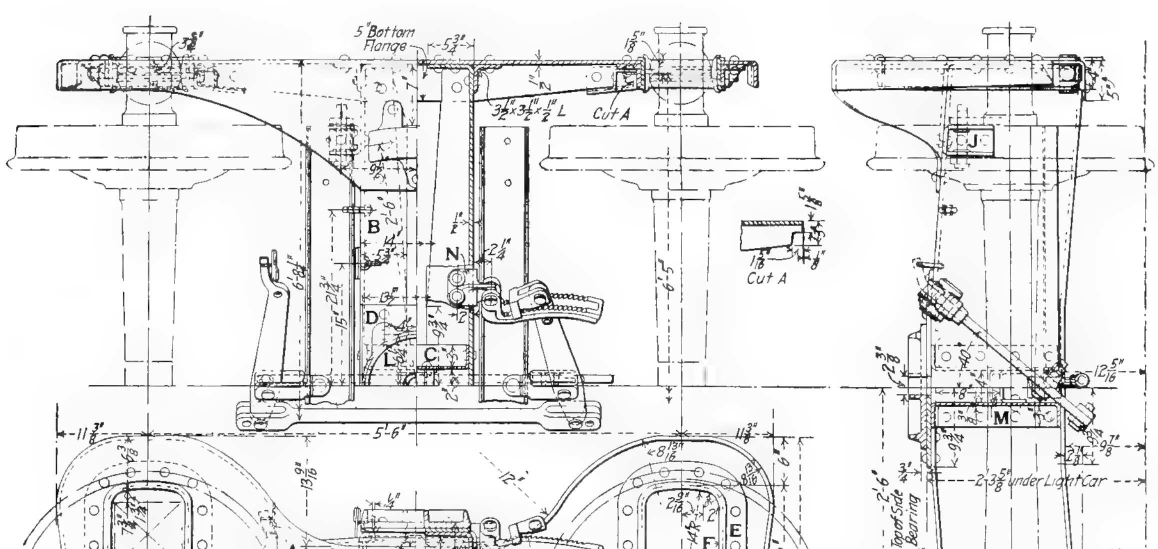


Fig. 963—Fox Truck for 50-Ton Capacity Car. Pressed Steel Car Company.

Parts of Fox Trucks, Figs. 963 and 965.

A *Side*
B *Transom*
C *Transom Reinforcing Angle*
D *Pedestal Angle*
E *Pedestal Wearing Piece*
F *Pedestal Bolt*
G *Spring Plank*
H *Spring Plank Hanger*
I *Spring Plank Hanger Pin*
K *Lower Spring Plank Hanger Pin*
L *Pedestal Bracket*
M *Pedestal Spreader*
N *Side and Transom Connection*
O *Brake Beam End Hanger Bracket*
P *Spring Seat*
Q *Combined Spring Plank Seat and Hanger Arm Bearing*
R *Spring Plank Hanger Bearing*
S *Bolster Channel*
T *Center Plate*
U *Center Plate Support*
V *Reinforcing End Casting*
W *Side Bearing*
X *Spring Cap*
Y *Top Tie Plate*

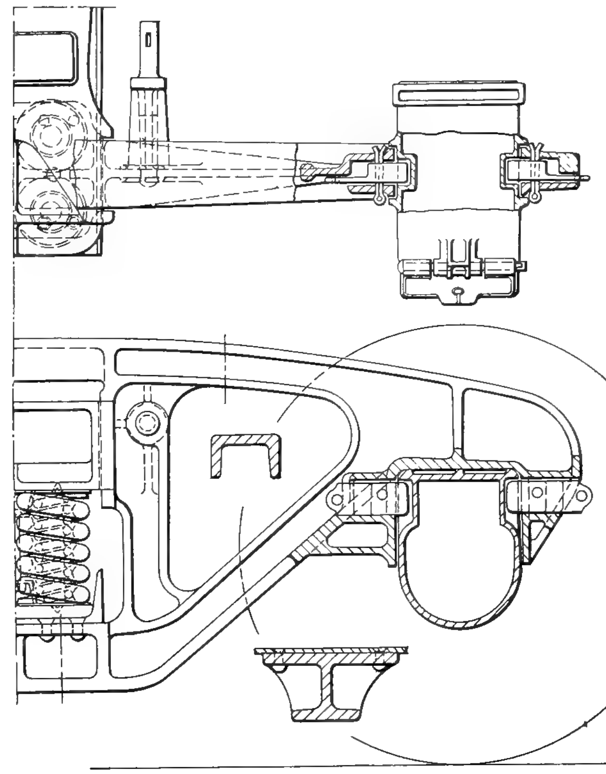


Fig. 964—Gould Improved Cast Steel Truck.

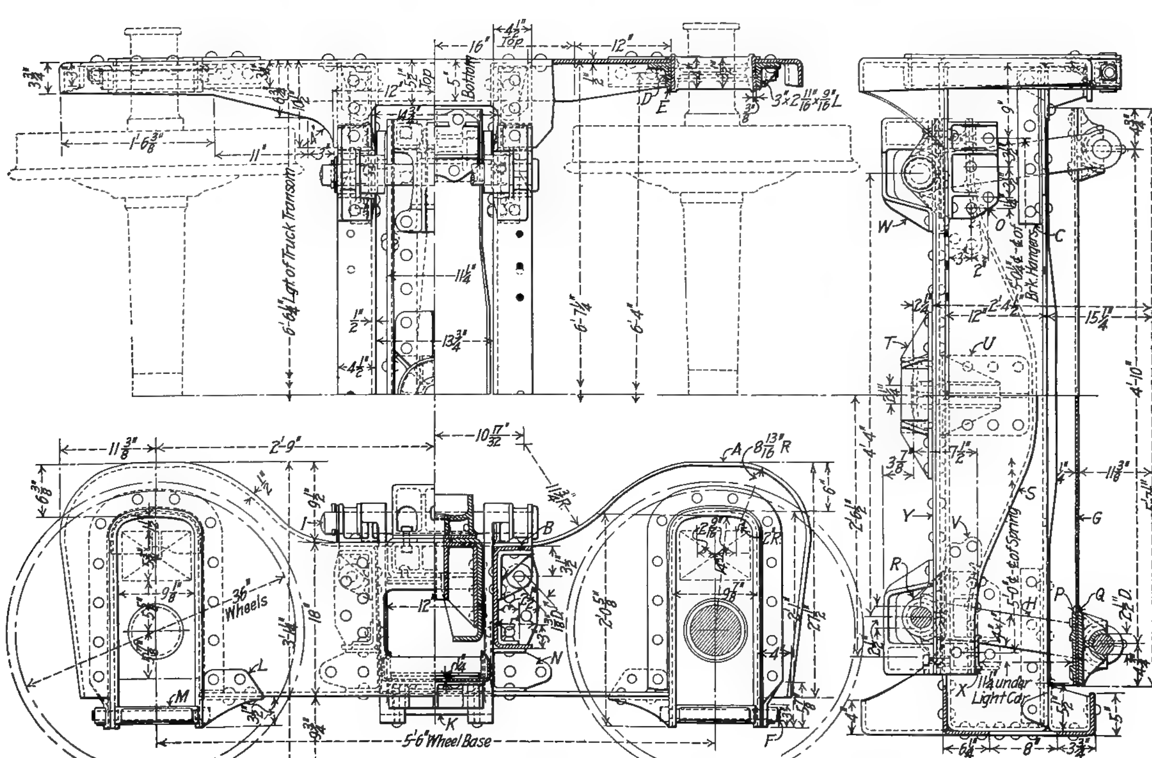


Fig. 965—Fox Truck with Swing Motion Bolster for 40-Ton Capacity Car. Pressed Steel Car Company.

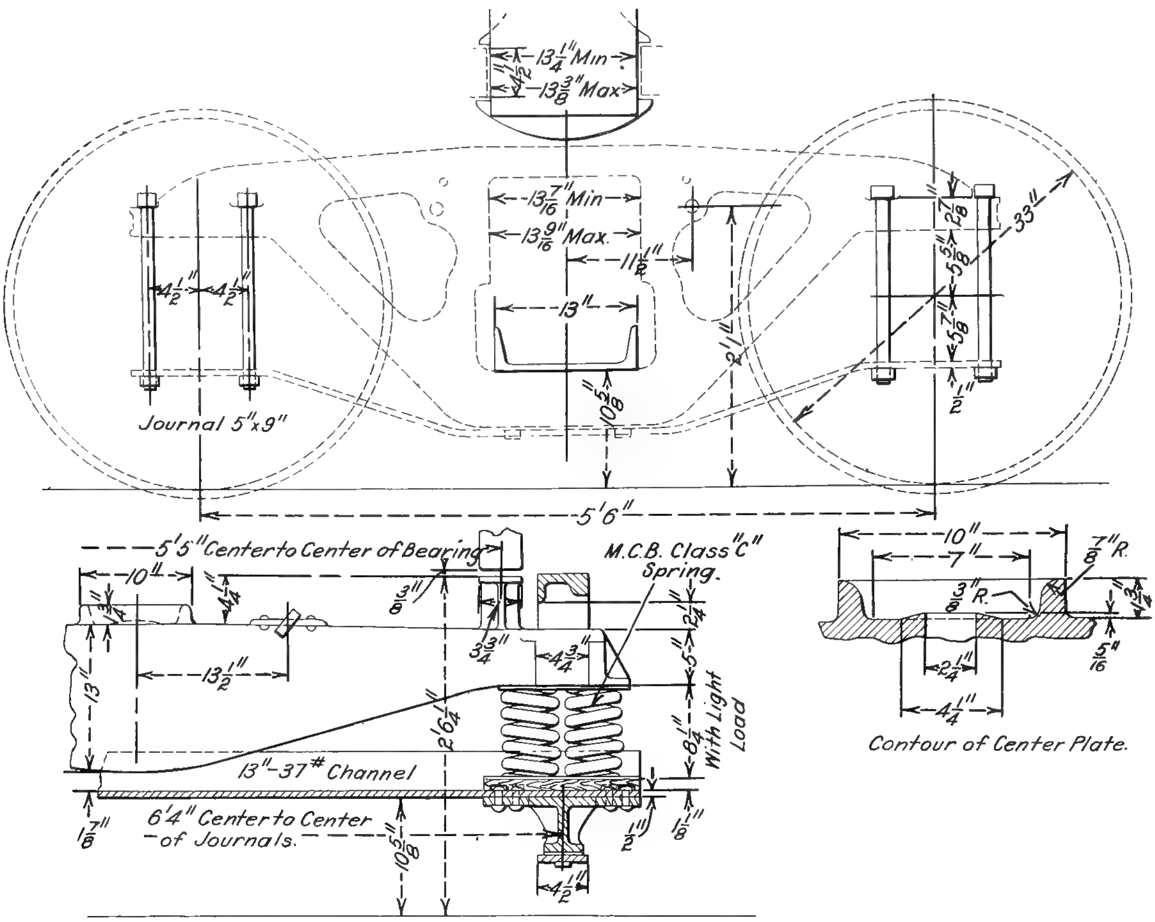


Fig. 966—Truck for New York Central 40-Ton Capacity Box Car.

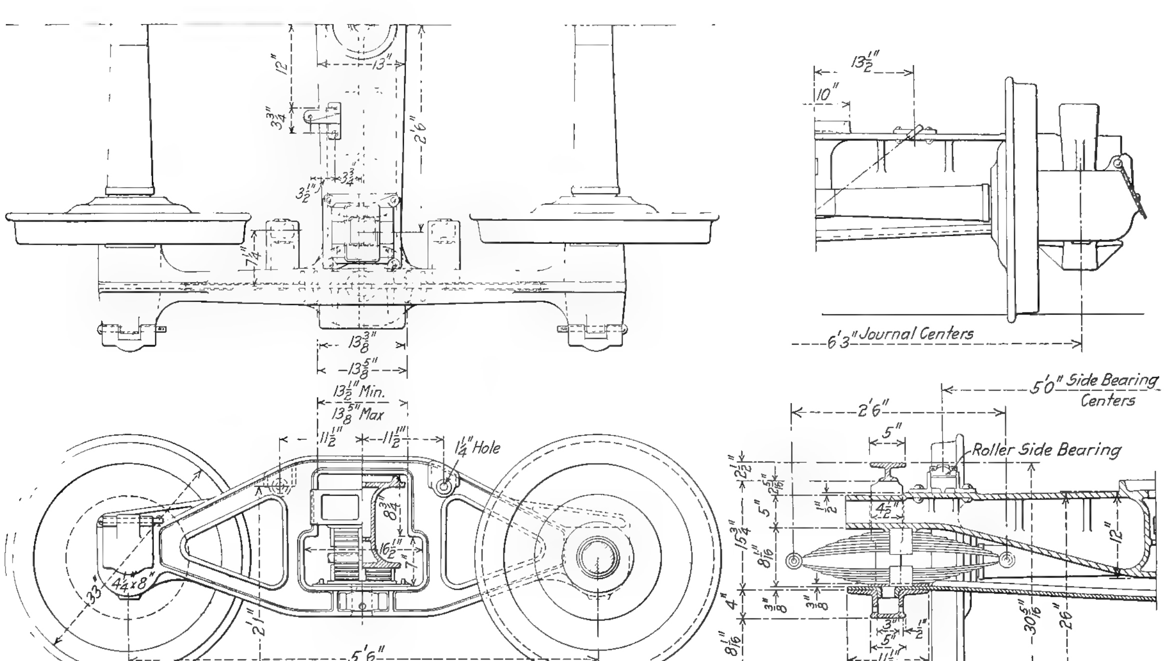


Fig. 967—Bettendorf Cast Steel Truck for Caboose Cars. The Bettendorf Company.

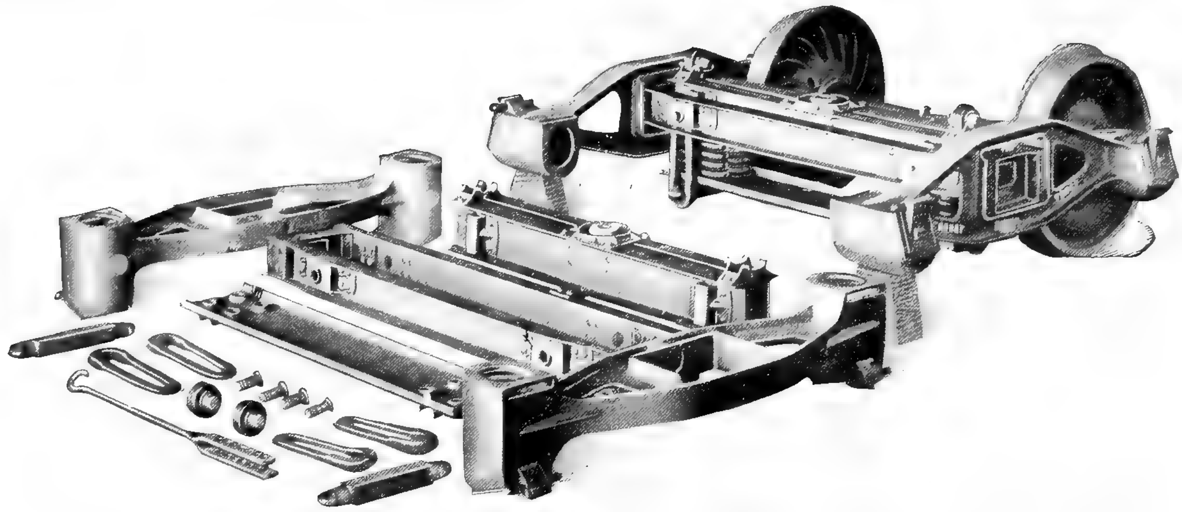


Fig. 968—Parts of Bettendorf Swing Motion Truck. The Bettendorf Company.

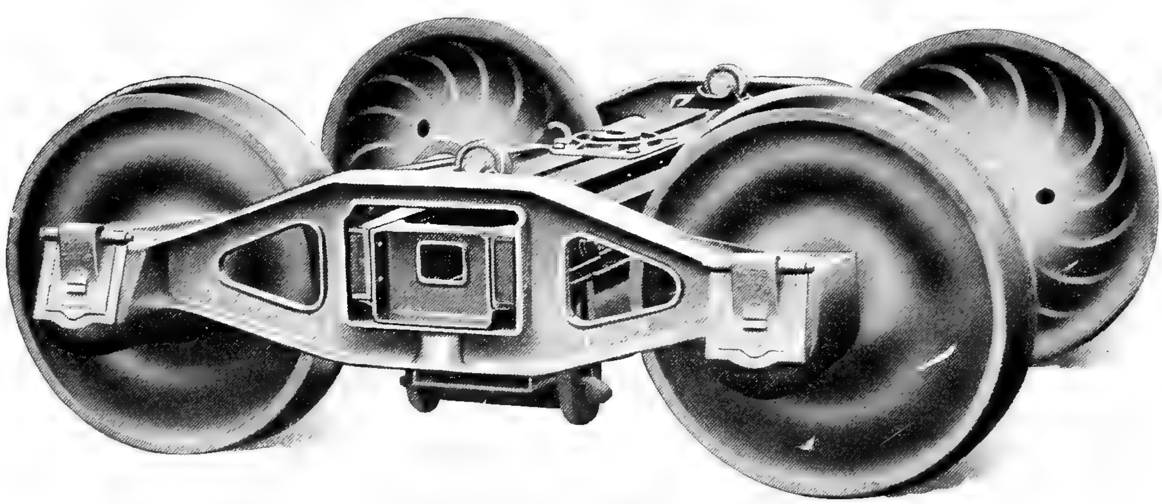


Fig. 969—Bettendorf Swing Motion Truck for 30-Ton Capacity Car. The Bettendorf Company.

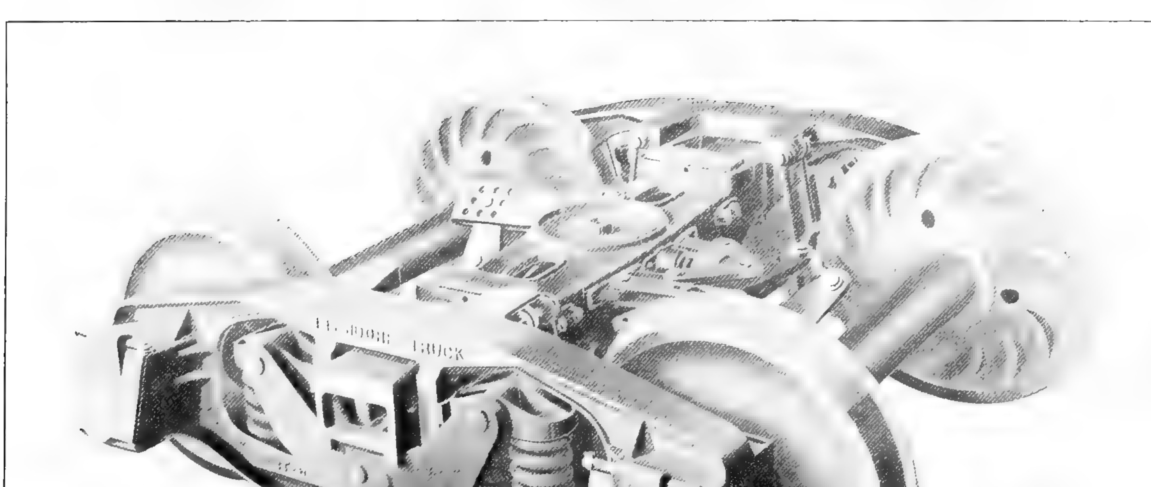


Fig. 970—Variable Load Brake Truck with Semi-Equalized Frame. The Bettendorf Company.

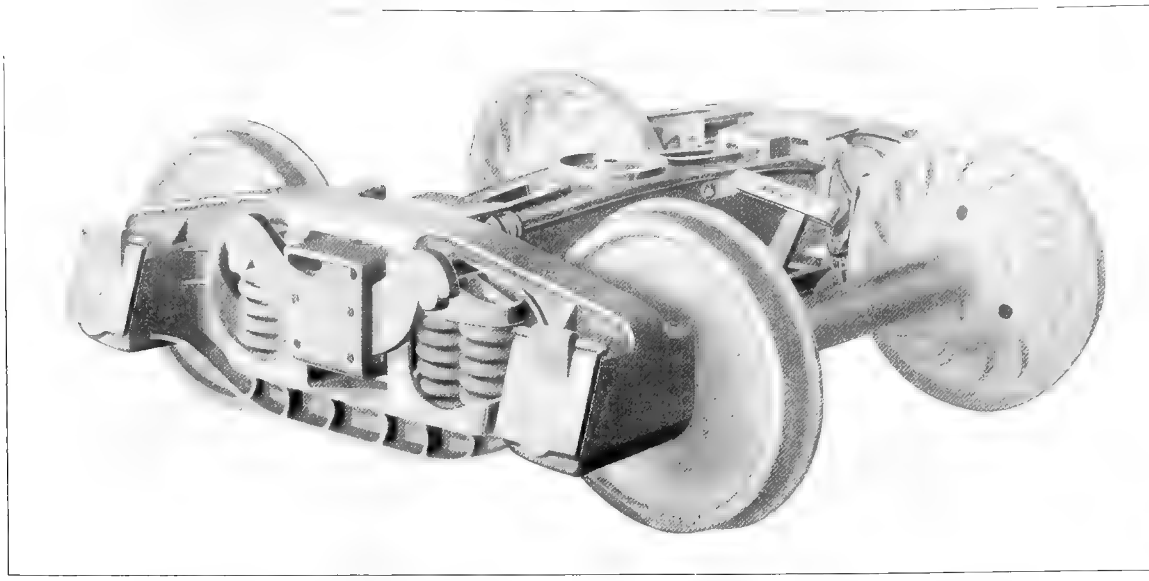


Fig. 971—Bettendorf 70-Ton Capacity Equalized Truck. The Bettendorf Company.

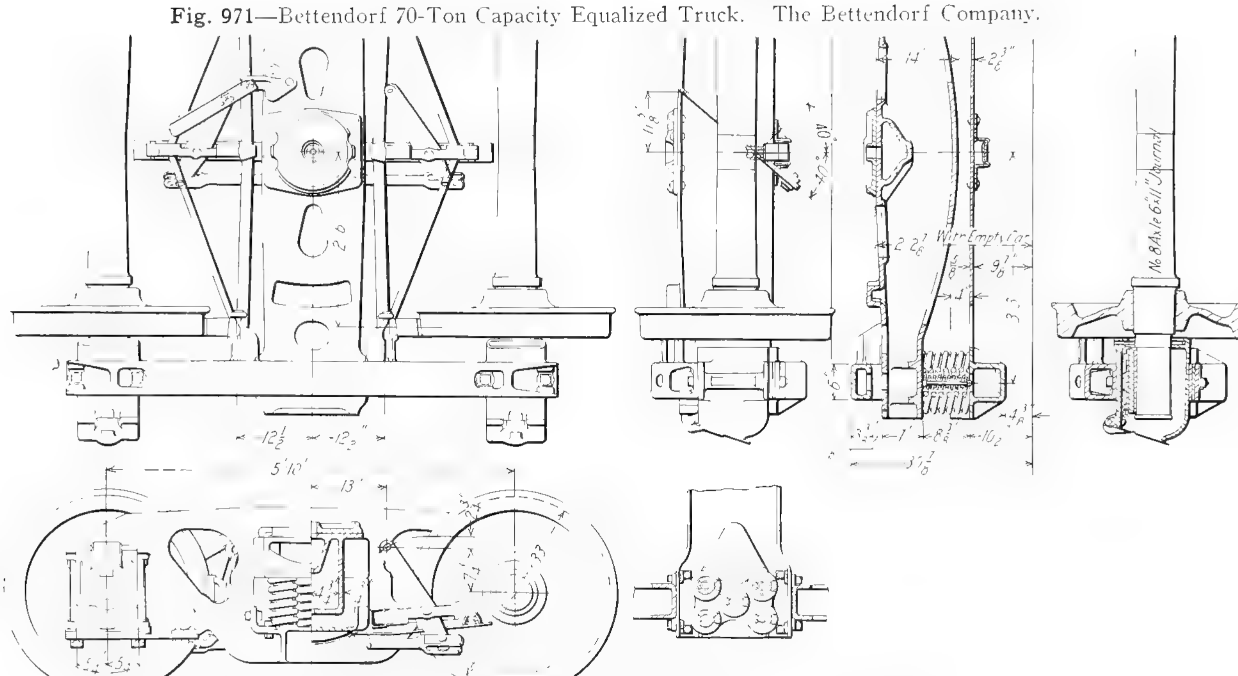


Fig. 972—Pennsylvania Railroad 70-Ton Capacity Truck with Crown Cast Steel Side Frame.

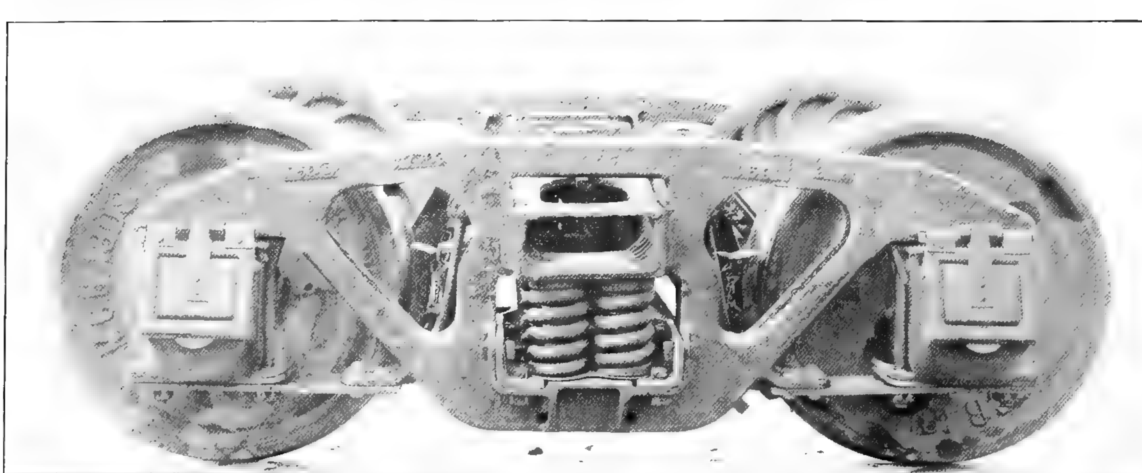


Fig. 973—Pennsylvania Railroad 70-Ton Capacity Truck with Crown Cast Steel Side Frame.

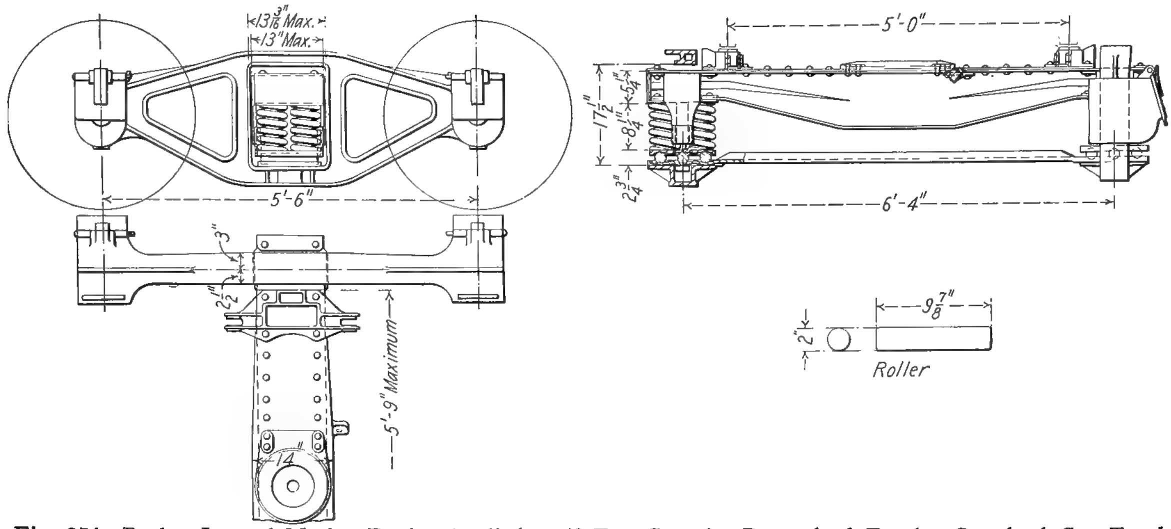


Fig. 974—Barber Lateral Motion Device Applied to 40-Ton Capacity Bettendorf Truck. Standard Car Truck Company.

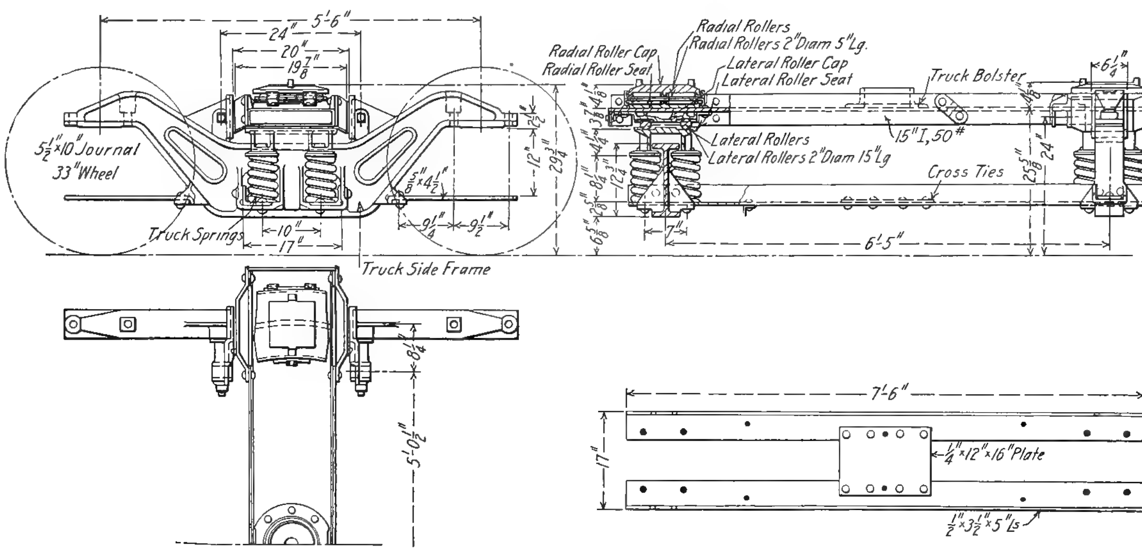


Fig. 975—Barber Double Action Freight Truck for 50-Ton Capacity Cars. Standard Car Truck Company.

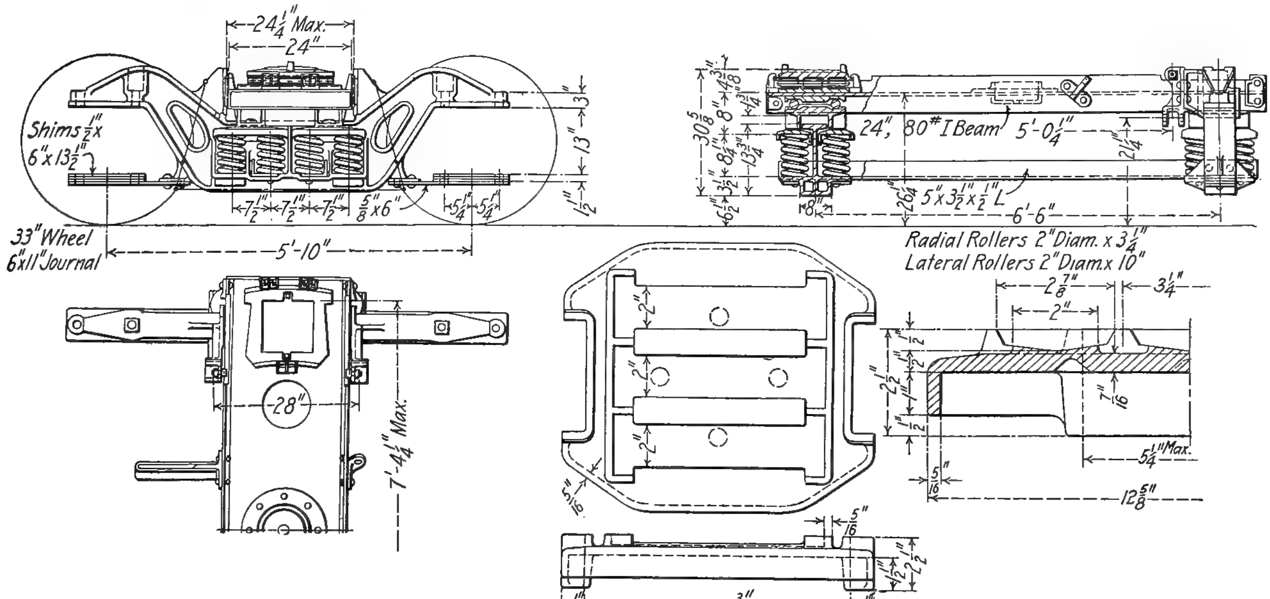


Fig. 976—Barber Double Action Freight Truck for 70-Ton Capacity Cars. Standard Car Truck Company.

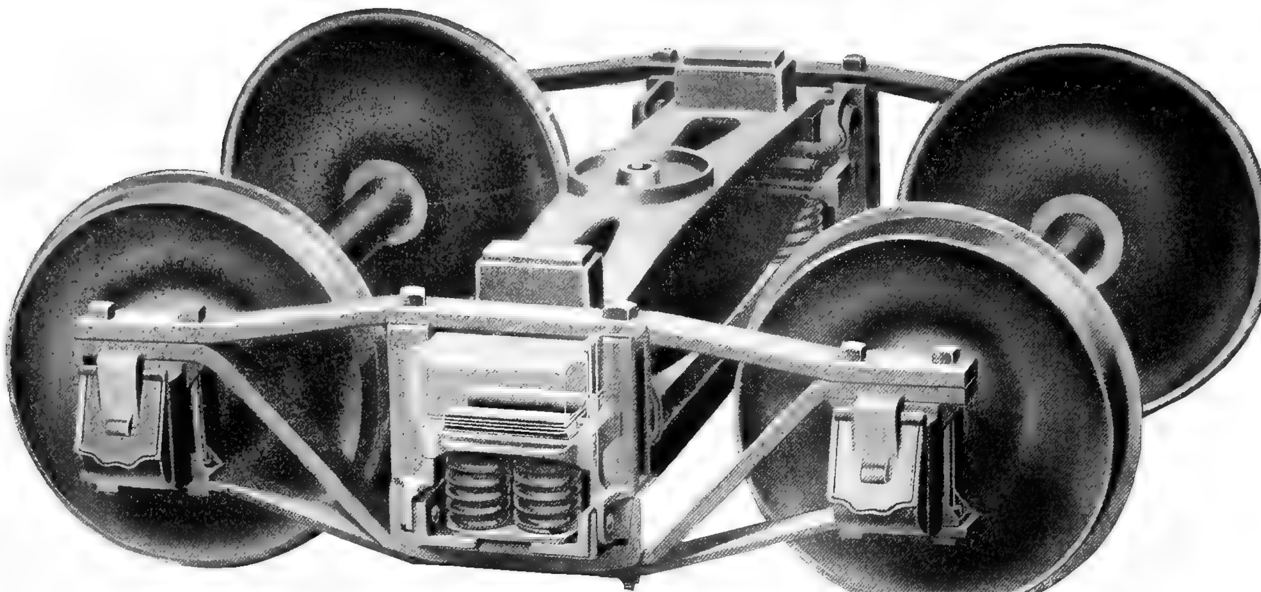


Fig. 977—Barber Lateral Motion Roller Bearing Freight Truck. Standard Car Truck Company.

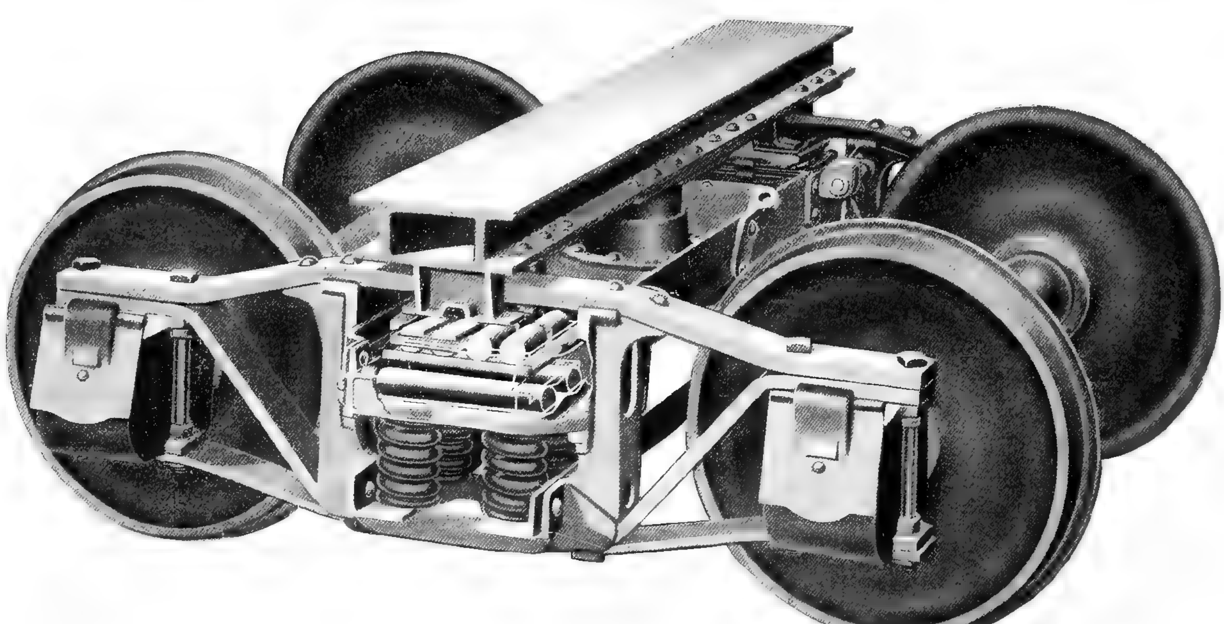


Fig. 978—Barber Double Action Arch Bar Type Truck.
Standard Car Truck Company.

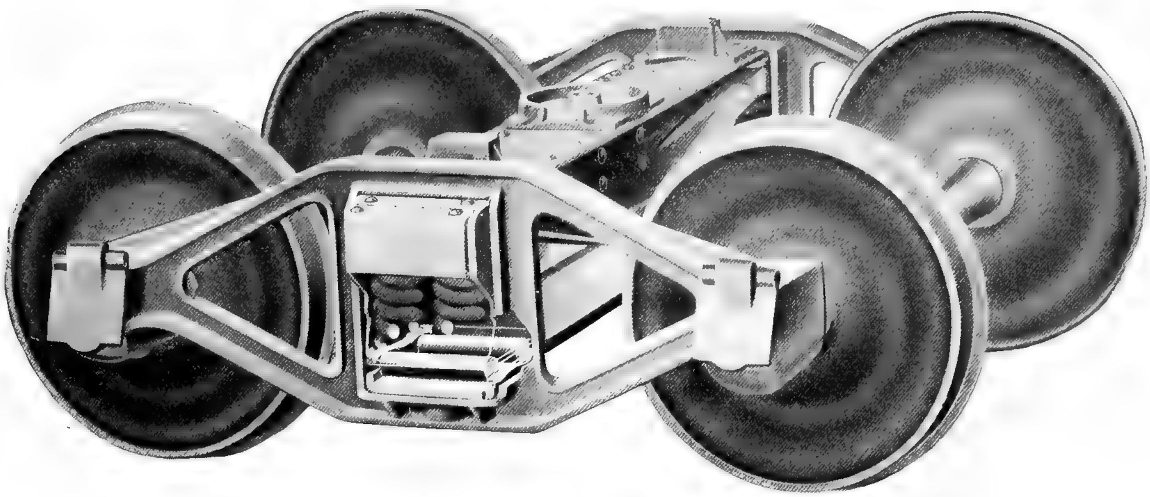


Fig. 979—Barber Lateral Motion Roller Bearing Freight Truck with Bettendorf Type of Side Frame and Bolster. Standard Car Truck Company.

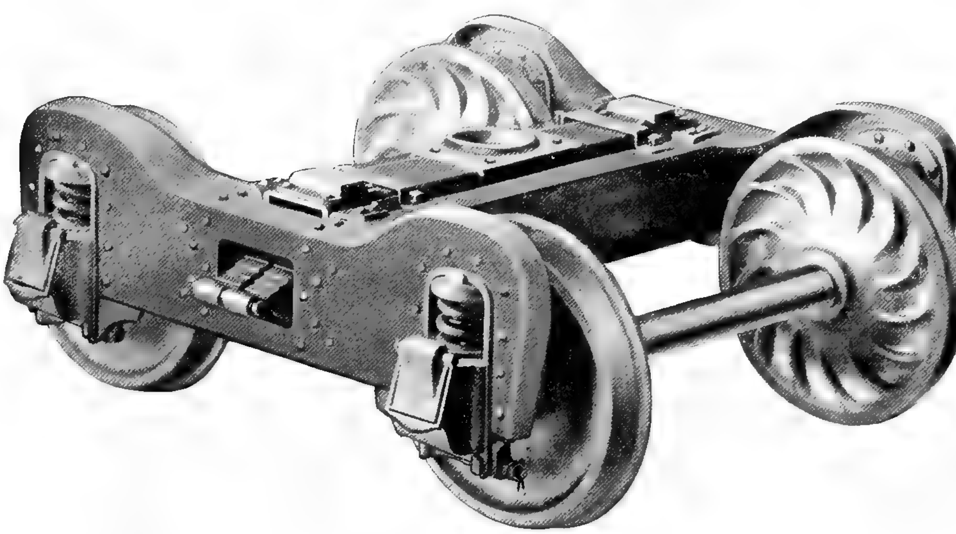


Fig. 980—Fox Pressed Steel Truck. Pressed Steel Car Company.

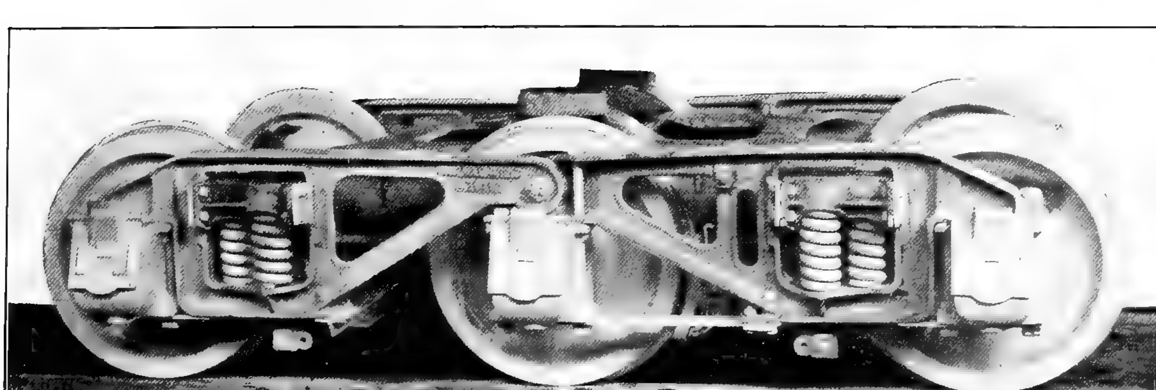


Fig. 981—Six-Wheel Truck for 90-Ton Capacity Norfolk & Western Gondola Car Shown in Fig. 59. See also Figs. 982 and 983. American Steel Foundries.

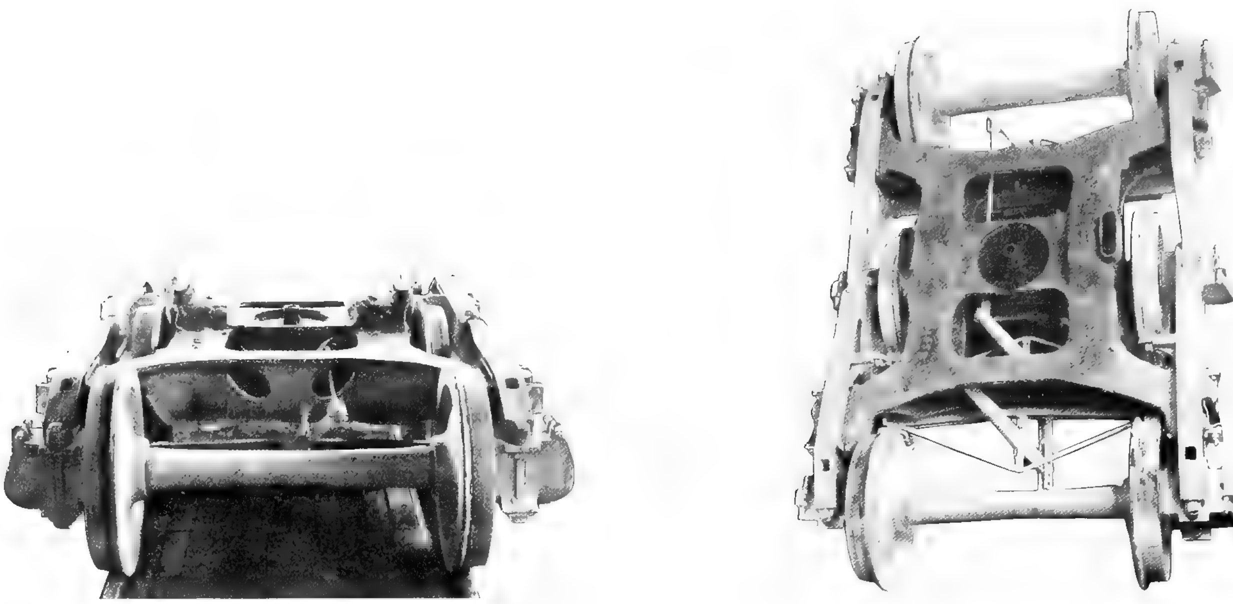


Fig. 982—Six-Wheel Truck for Norfolk & Western 90-Ton Capacity Gondola Car Shown in Fig. 59.

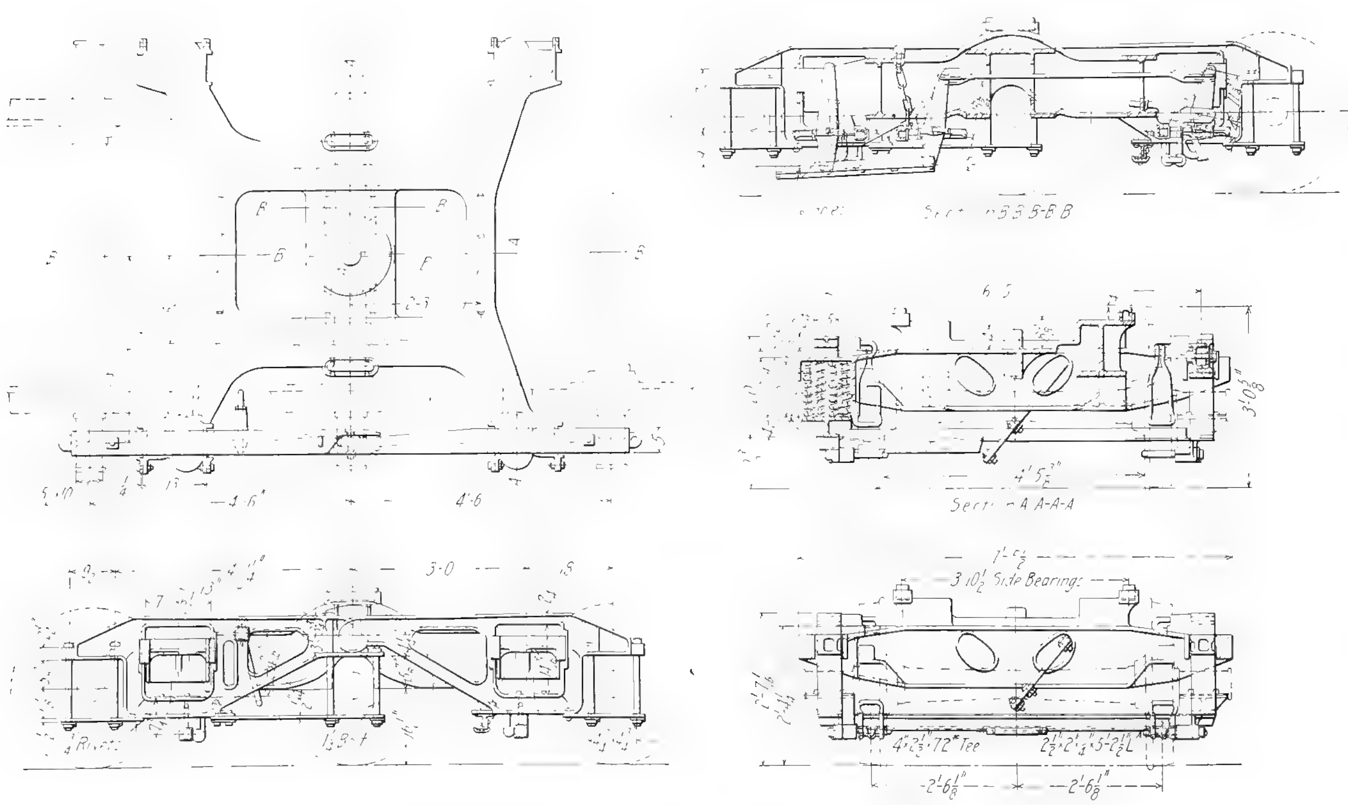


Fig. 983—General Arrangement of Truck for Norfolk & Western 90-Ton Capacity Gondola Car Shown in Fig. 59. See also Figs. 981 and 982. American Steel Foundries.

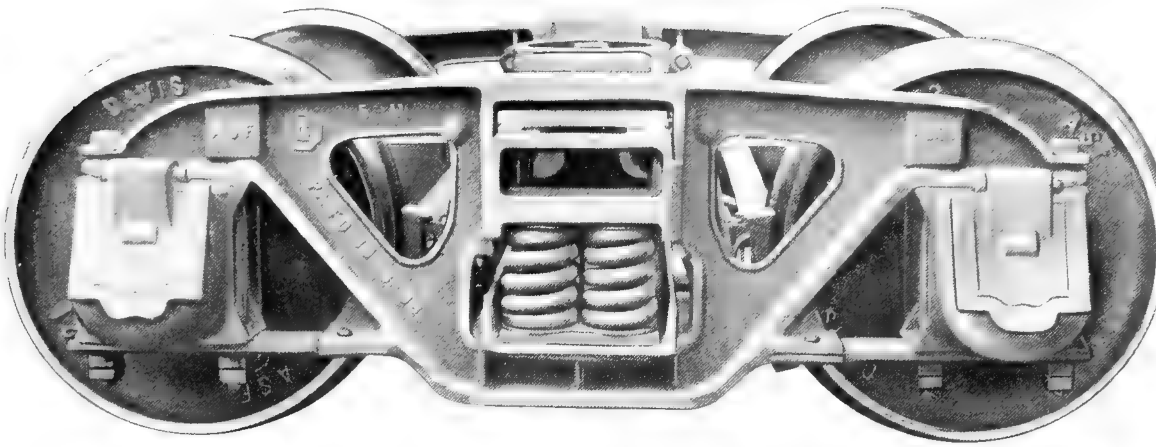


Fig. 984 -American Steel Foundries Andrews Side Frame Truck.

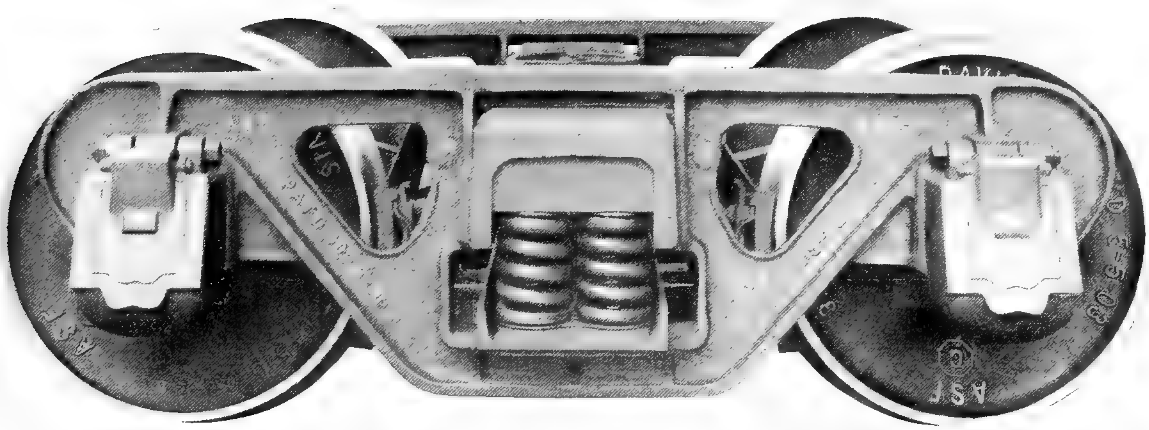


Fig. 985—Vulcan Truck. American Steel Foundries.

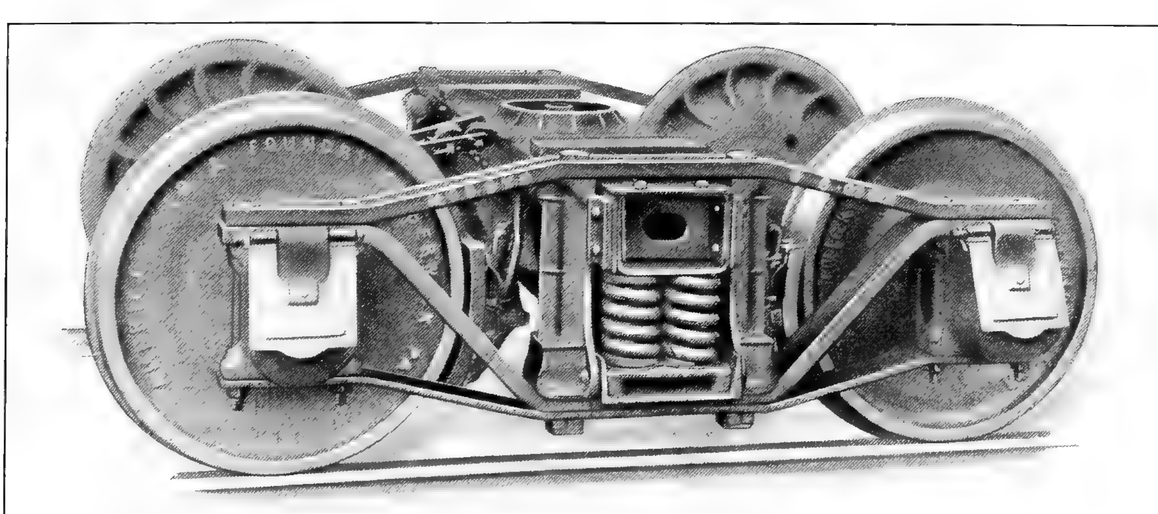


Fig. 986—Diamond Arch Bar Truck for 30, 40 or 50-Ton Capacity Cars. American Car & Foundry Company.

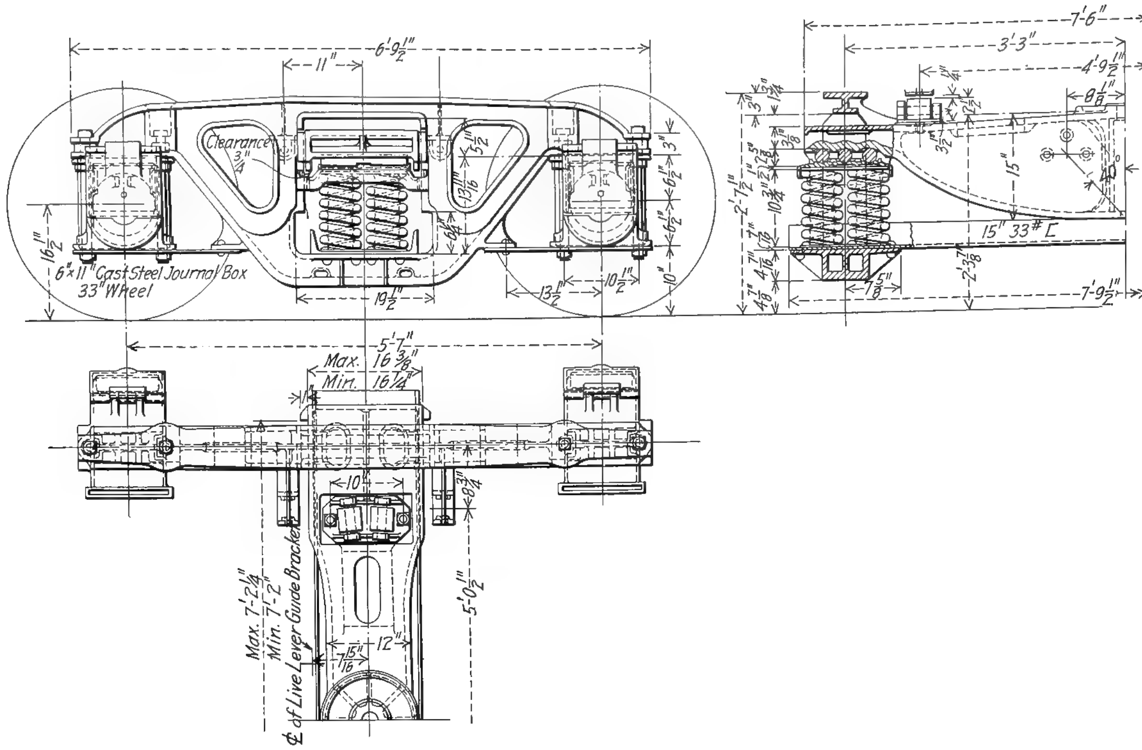


Fig. 987—Truck for Baltimore & Ohio 70-Ton Capacity Car. Buckeye Steel Castings Company.

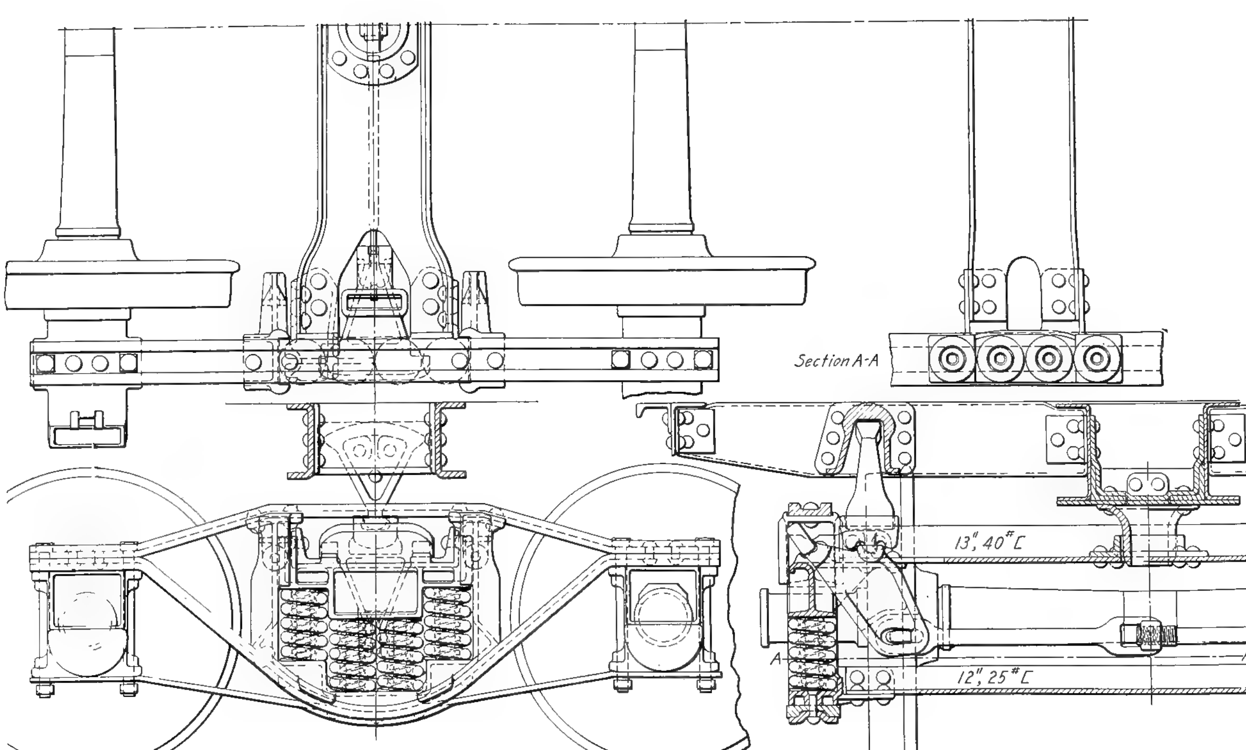


Fig. 988—Summers Balanced Side-Bearing Truck. Summers Steel Car Company.

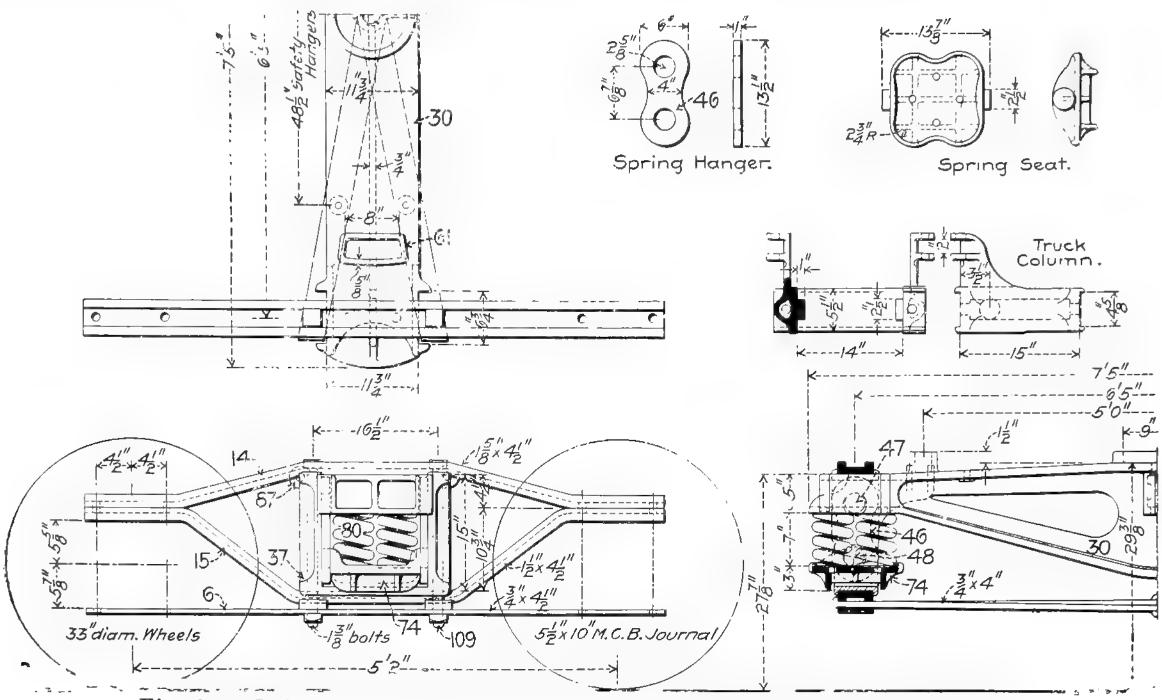


Fig. 989—Swing Motion Diamond Arch Bar Truck for 50-Ton Capacity Cars.

Parts of Trucks. See Figs. 989, 991 and 1010.

1 *Wheel*
2 *Axle*
3 *Journal Box*
4 *Journal Box Lid*
5 *Pedestal*
6 *Pedestal Tie Bar*
7 *Pedestal Stay Rod*
10 *Wheel Piece*
11 *Outside Wheel Piece Plate*
12 *Inside Wheel Piece Plate*
14 *Top Arch Bar*
15 *Bottom Arch Bar*
17 *Truck Frame End Piece*
20 *Transom*
20a *Extra Transom*
21 *Middle Transom (for Six-Wheel Truck)*
22 *Outside Transom (for Six-Wheel Truck)*
23 *Transom Tie Rod*
23a *Extra Transom Tie Rod*
24 *Transom Truss Rod*
25 *Transom Truss Block*
26 *Transom Tie Rod Washer*
27 *Friction Block*
30 *Truck Bolster*
37 *Bolster Guide Bars or Truck Columns*
43 *Spring Plank*
44 *Spring Plank Bearing*
45 *Spring Plank Safety Hanger*
46 *Swing or Spring Hanger*
47 *Upper Swing or Spring Hanger Pin*
48 *Lower Swing or Spring Hanger Pin or Spring Plank Pin*
49 *Swing Hanger Pin Bearing*
51 *End Axle Guard*
55 *Axle Safety Hanger*
59 *Transom and End Piece Tie Rod*
60 *Center Axle Guard*
61 *Truck Side Bearing*
62 *Side Bearing Arch*
63 *Truck Center Plate*
64 *Center Plate Block*
66 *Center Bearing Top Arch Bar*
67 *Center Bearing Bottom Arch Bar*
68 *Safety Chain*
69 *Safety Chain Hook*
70 *Safety Chain Eye Bolt*
71 *Equalizing Bar*
72 *Equalizing Bar Spring Cap*
73 *Equalizing Bar Spring Seat*
74 *Bolster Spring Seat*
75 *Bolster Spring Cap*
76 *Spring Block*
79 *Equalizing Bar Spring*
80 *Bolster Spring*
83 *Brake Head*
84 *Brake Beam*
86 *Brake Hanger*
87 *Brake Hanger Carrier*
88 *Brake Beam Safety Chain*
89 *Brake Safety Chain Eye Bolt*
90 *Brake Beam Safety Hanger*
91 *Release Spring*
92 *Brake Lever*
93 *Brake Lever Fulcrum*
95 *Dead Lever Guide*
97 *Bottom Brake Rod*
98 *Brake Shoe*
109 *Column Bolt*
130 *End Piece Corner Plate*
131 *Transom Corner Plate*

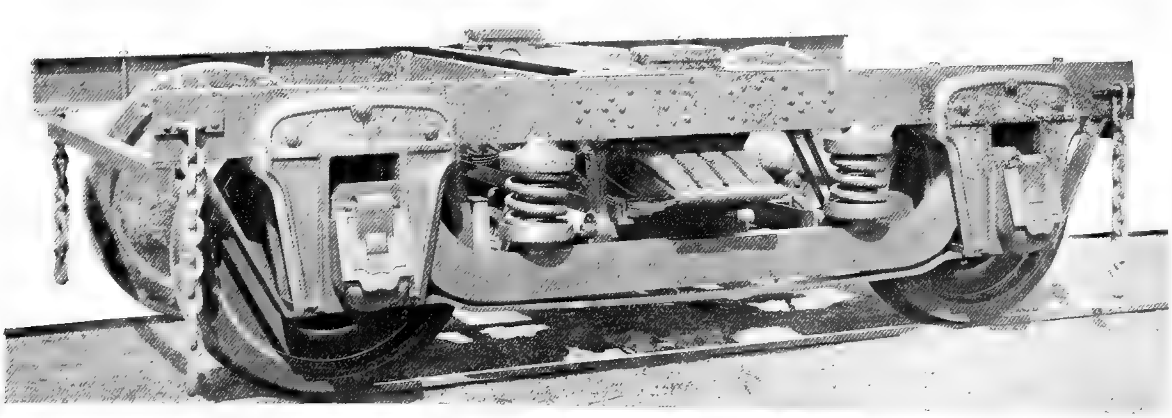


Fig. 990—Four-Wheel Steel Truck for Passenger Train Cars. The Harlan & Hollingsworth Corporation.

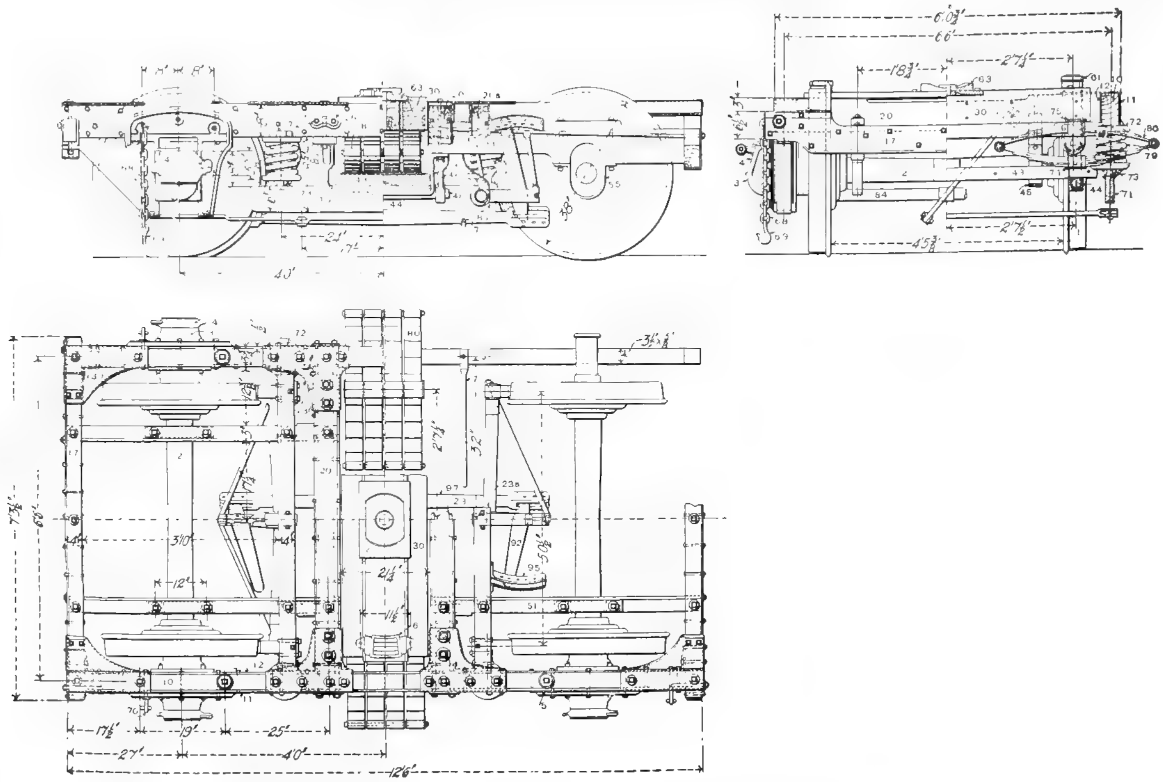


Fig. 991—Four-Wheel Passenger Truck with Wooden Frame.

See Page 567 for Names of Numbered Parts.

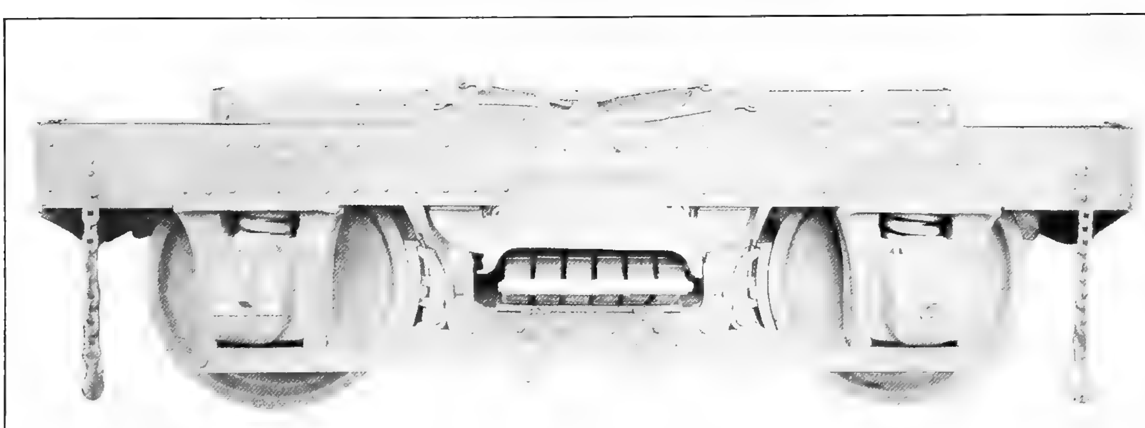


Fig. 992—Four-Wheel Truck for Pennsylvania Railroad Steel Cars.

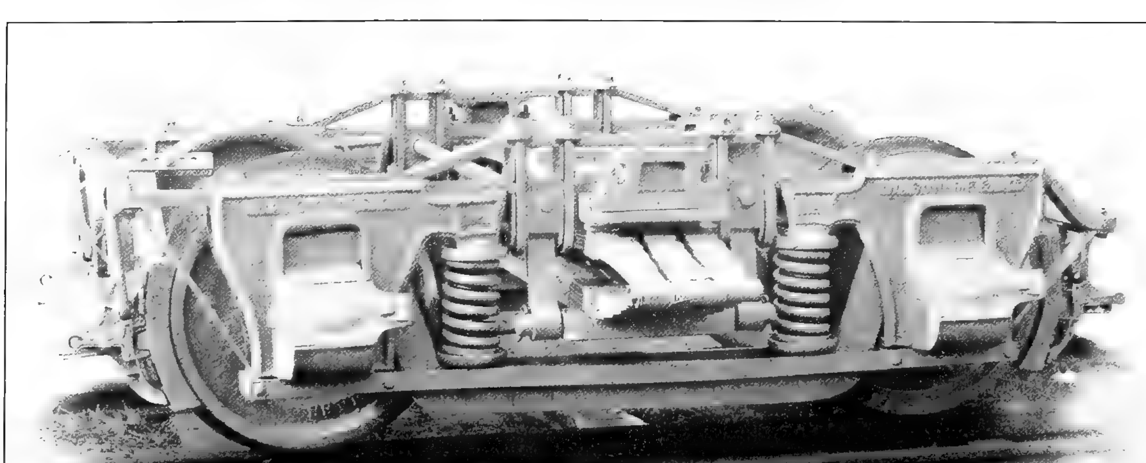


Fig. 993—Four-Wheel Truck for Narrow Gage Cars. The Wason Manufacturing Company.

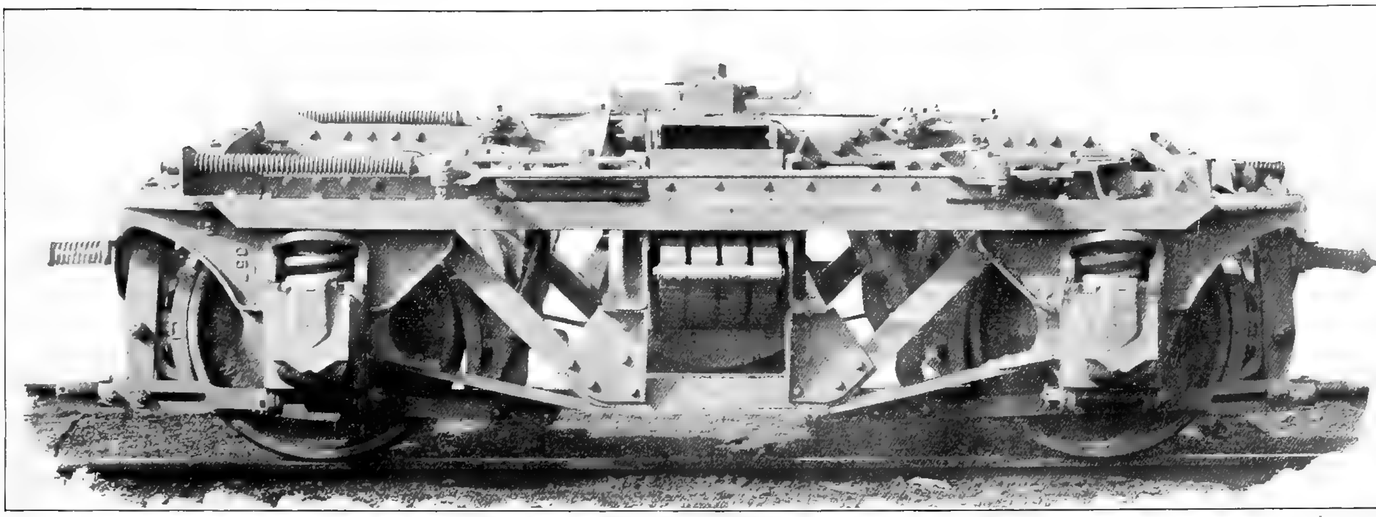


Fig. 994—Truck for Erie Steel Suburban Car Shown in Fig. 147. Pressed Steel Car Company.

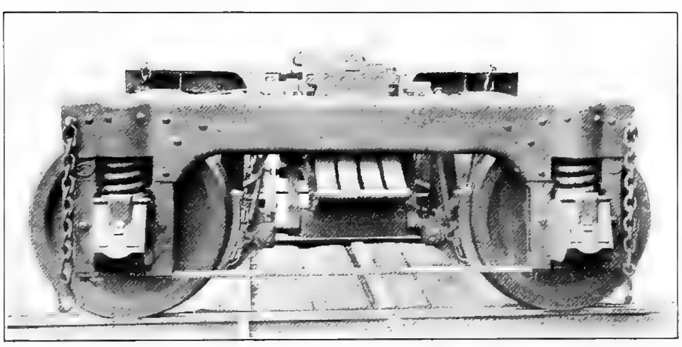


Fig. 995—Truck for Long Island Railroad Steel Trailer Car.

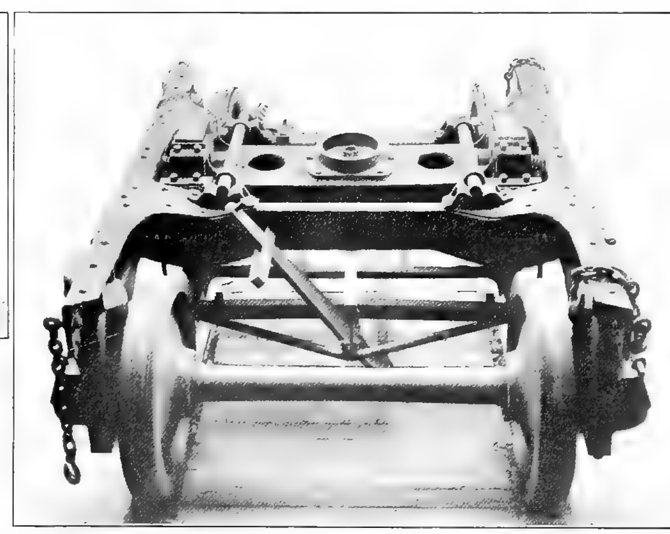
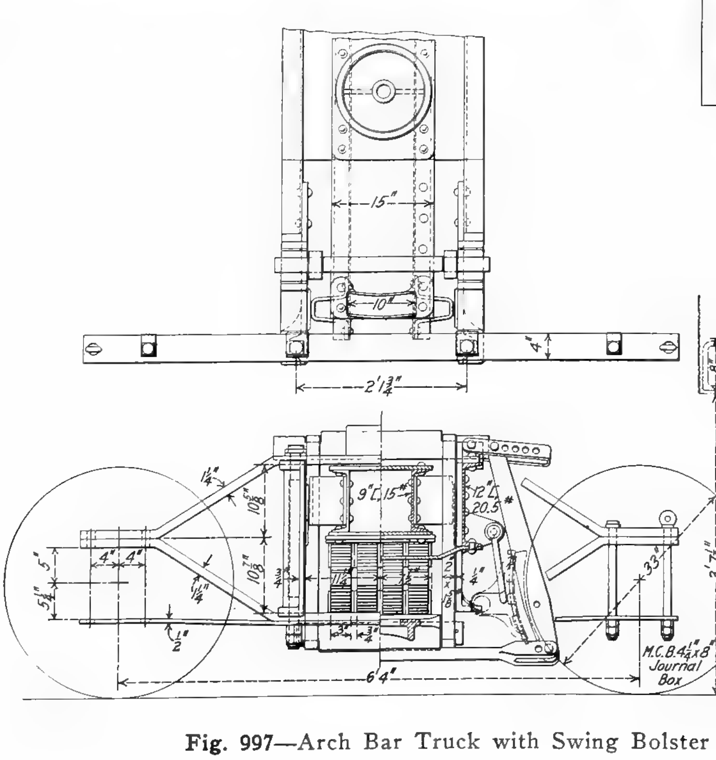


Fig. 996—Truck for Long Island Railroad Steel Trailer Car.



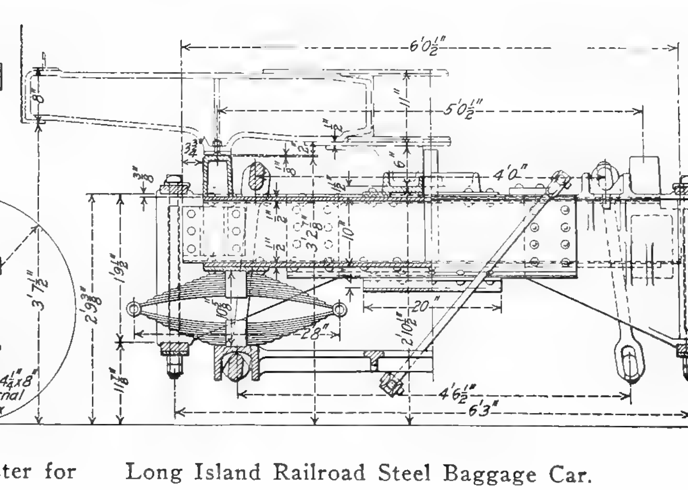


Fig. 997—Arch Bar Truck with Swing Bolster for Long Island Railroad Steel Baggage Car.

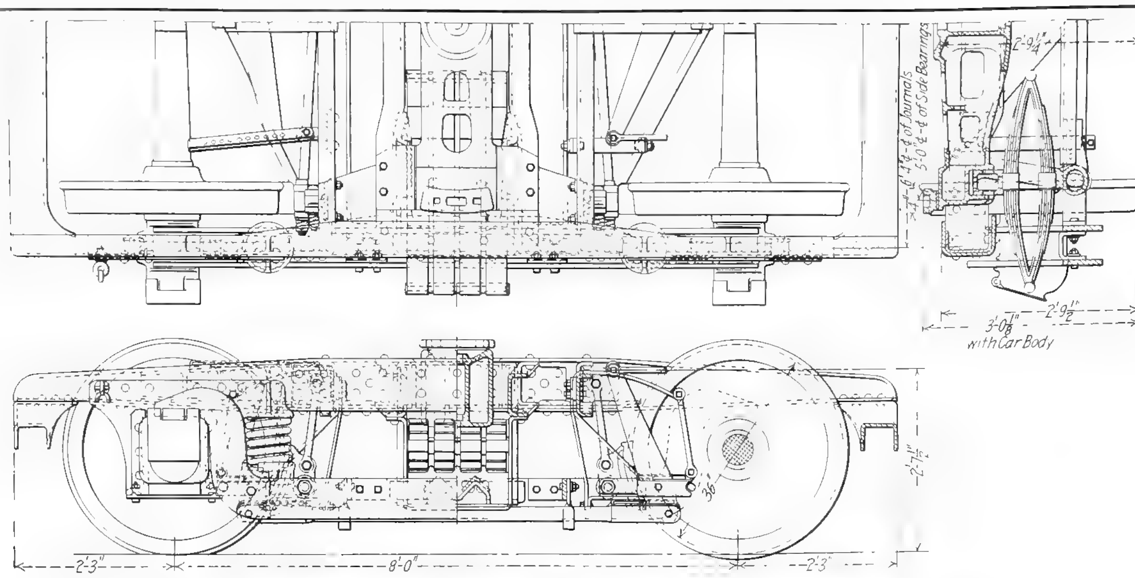


Fig. 998—Four-Wheel Truck for Electric Motor Car. Standard Motor Truck Company.

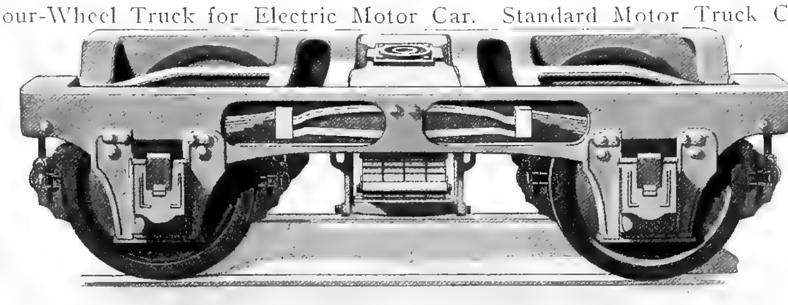


Fig. 999—Four-Wheel Top Equalizer Truck. Commonwealth Steel Company.

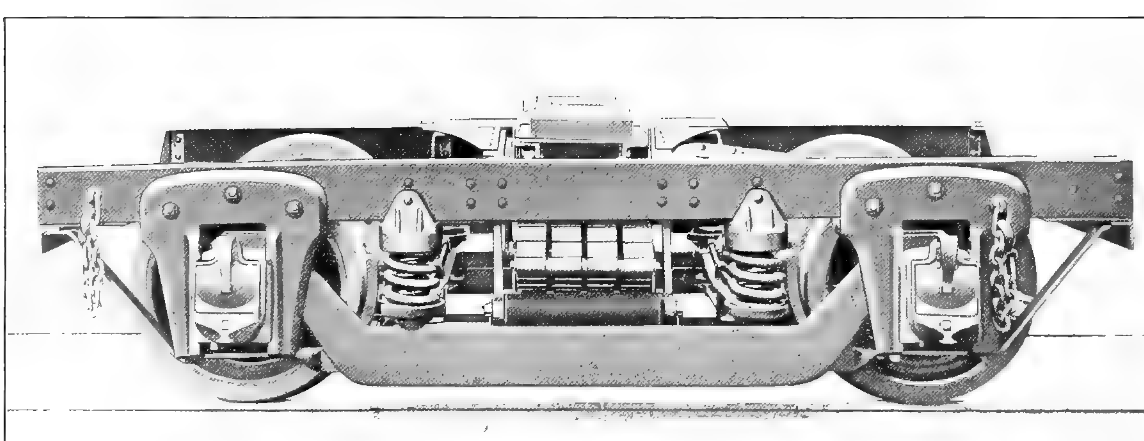


Fig. 1000—Four-Wheel Truck with Rolled Steel Frame. American Car & Foundry Company.

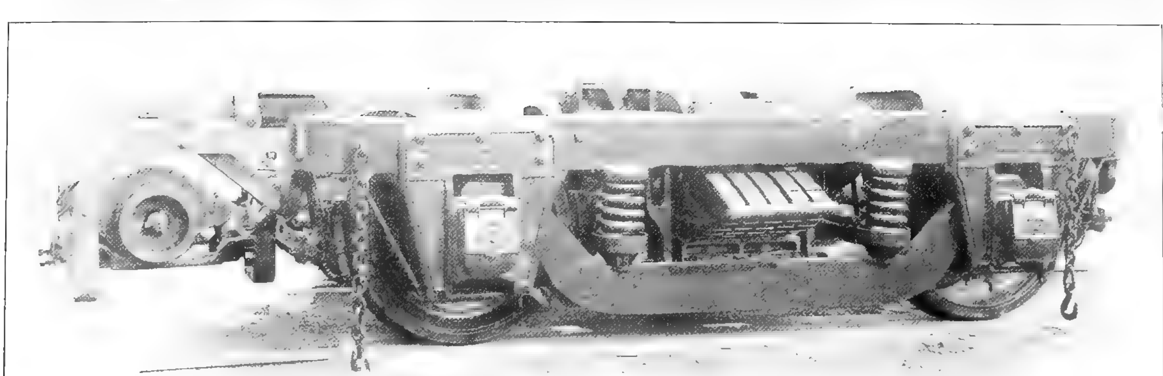


Fig. 1001—Four-Wheel Steel Frame Truck. The Harlan & Hollingsworth Corporation.

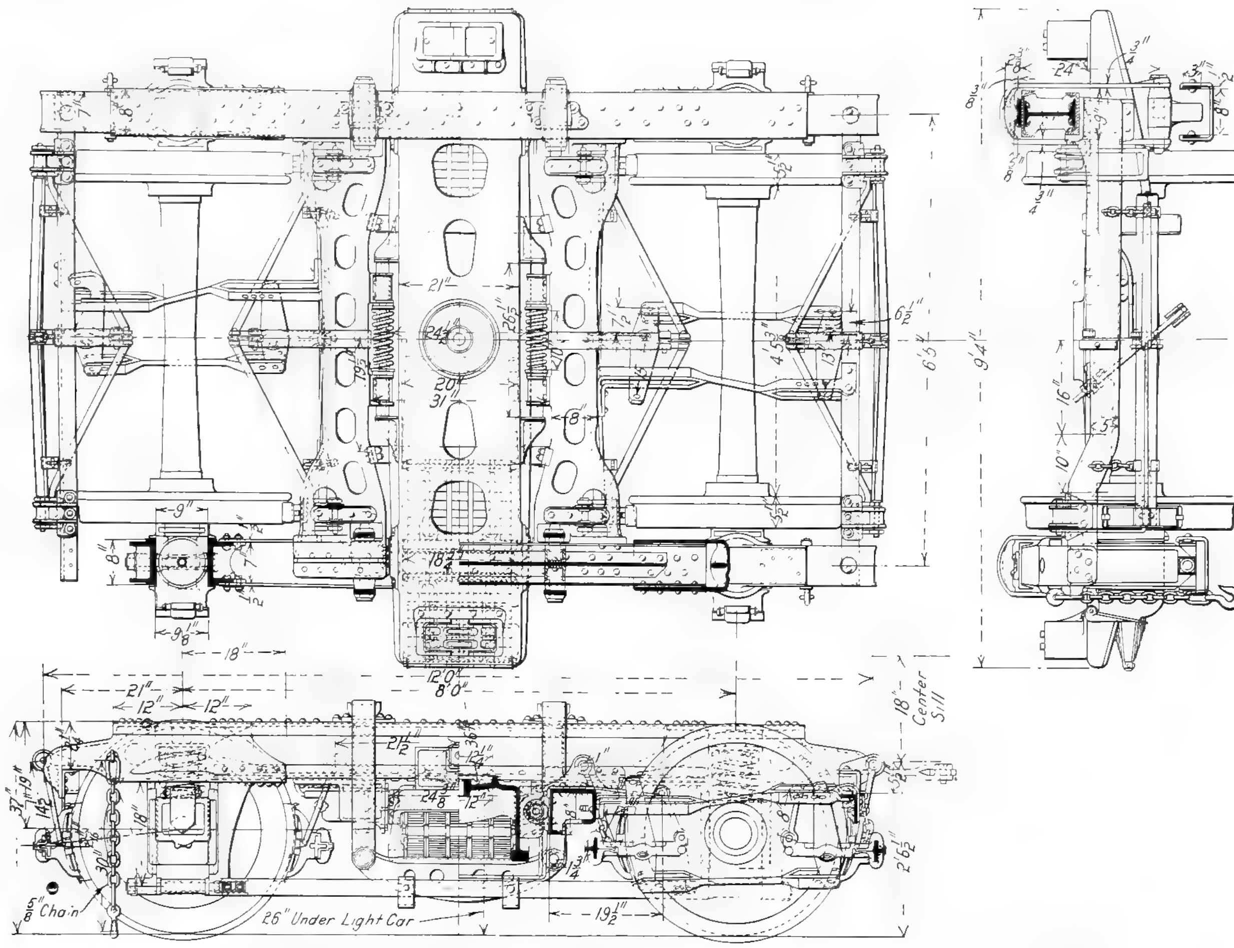


Fig. 1002—General Arrangement of Four-Wheel Steel Truck Shown in Fig. 1003.

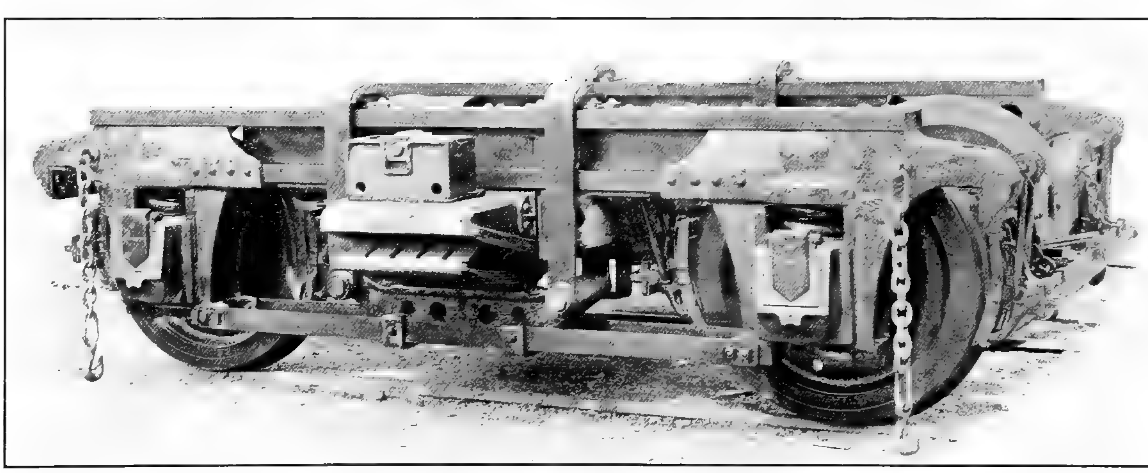


Fig. 1003—Philadelphia & Reading Four-Wheel Steel Truck with Clasp Brake Arrangement. The Harlan & Hollingsworth Corporation.

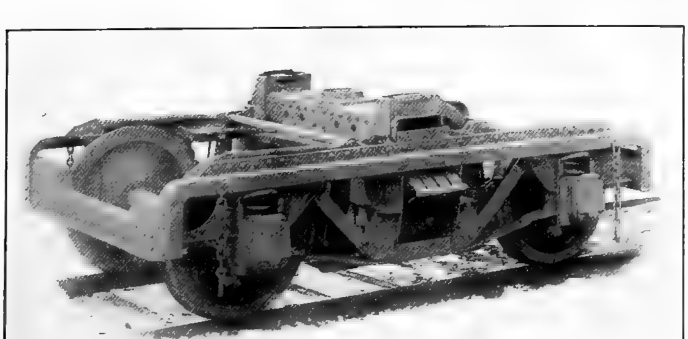


Fig. 1004—Four-Wheel Trailer Truck for New York, Westchester & Boston Steel Suburban Car.

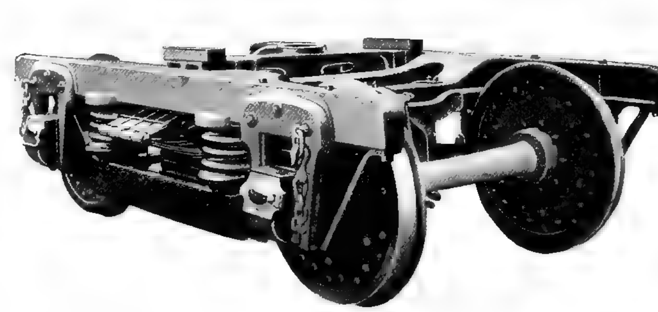


Fig. 1005—Commonwealth Steel Company's Four-Wheel Cast Steel Truck.

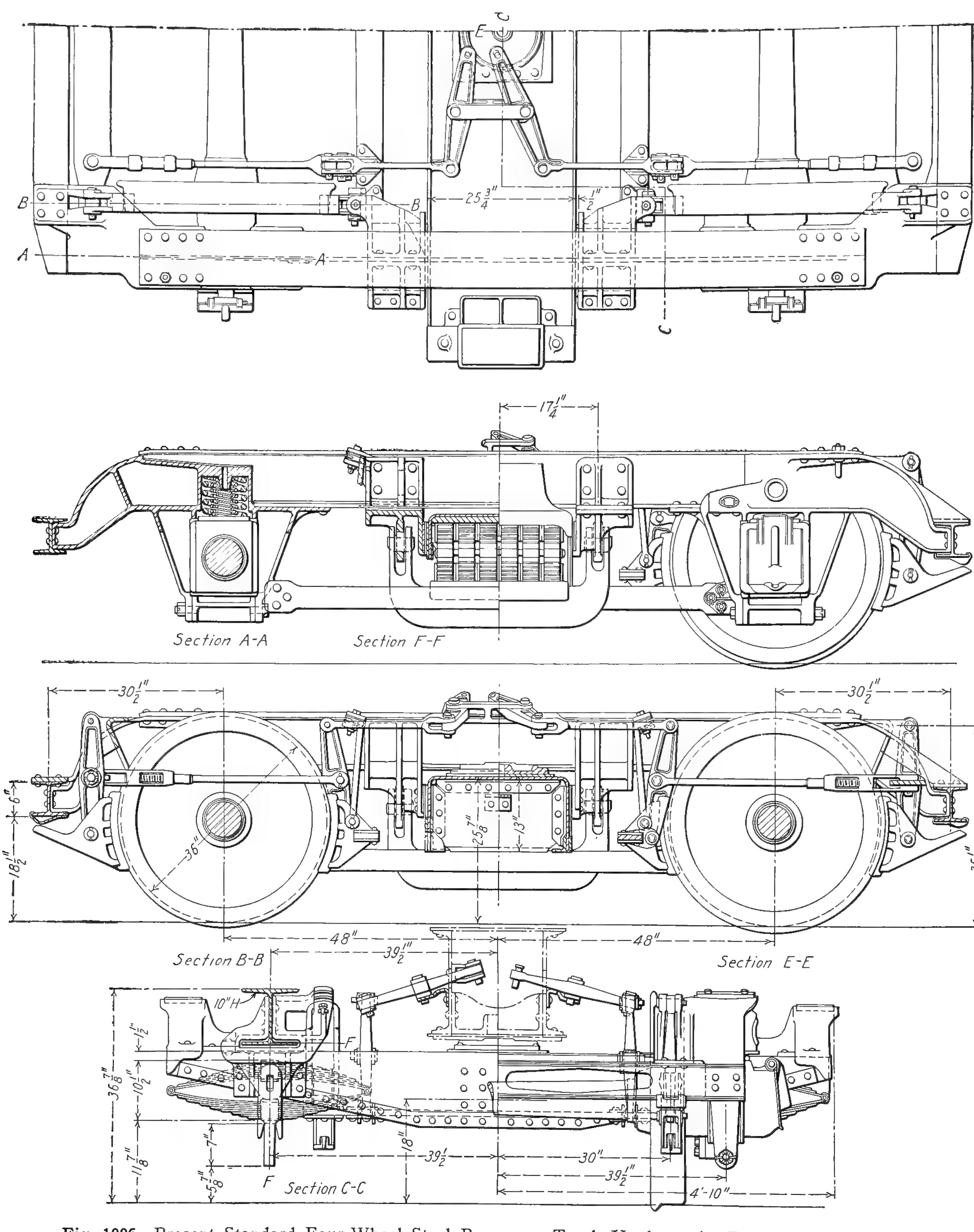


Fig. 1006—Present Standard Four-Wheel Steel Passenger Truck Used on the Pennsylvania Railroad.

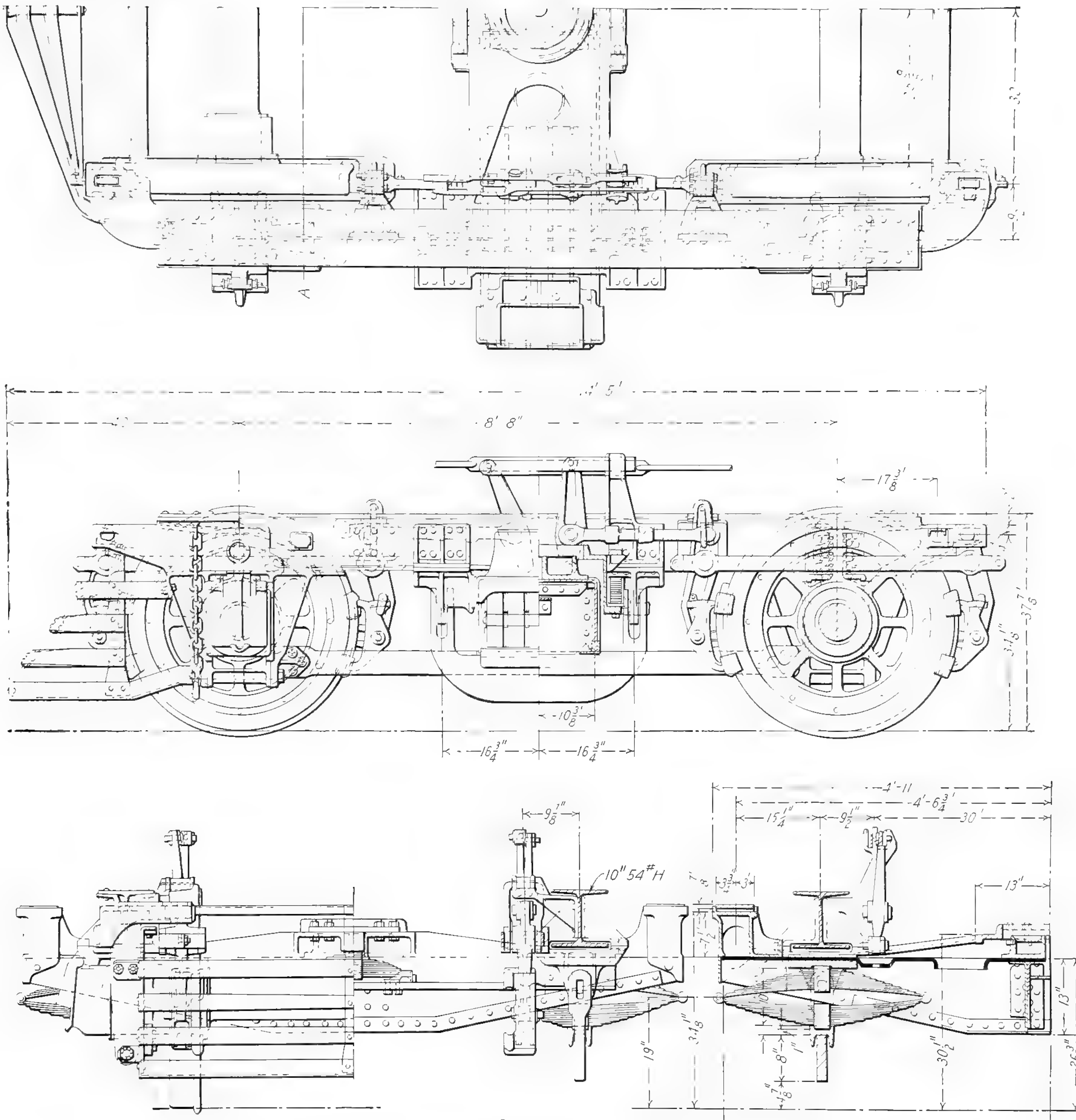


Fig. 1007—Standard Four-Wheel Steel Passenger Car Truck Modified for Use Under Motor Cars on Electrified District of the Pennsylvania Railroad at Philadelphia.

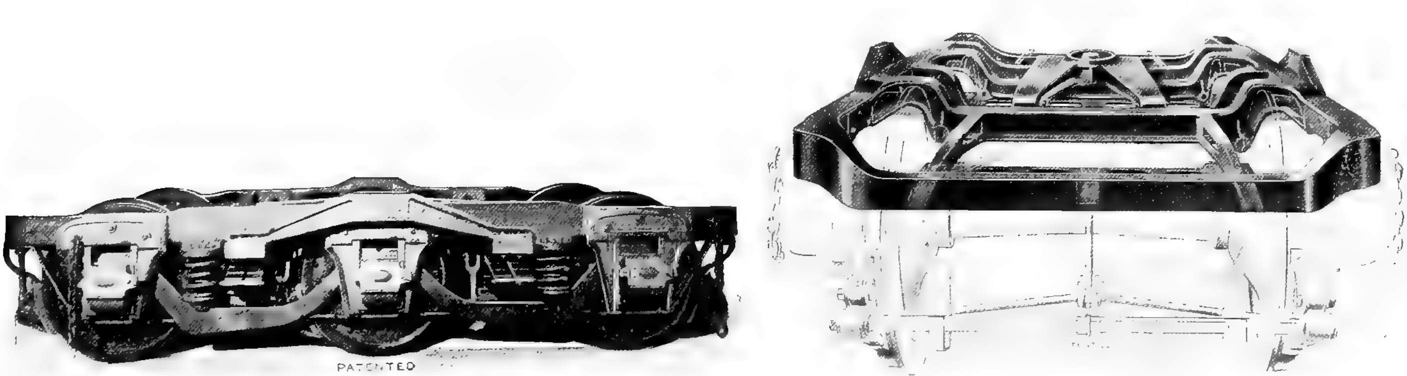


Fig. 1008—Commonwealth Steel Company's Six-Wheel Cast-Steel Truck.

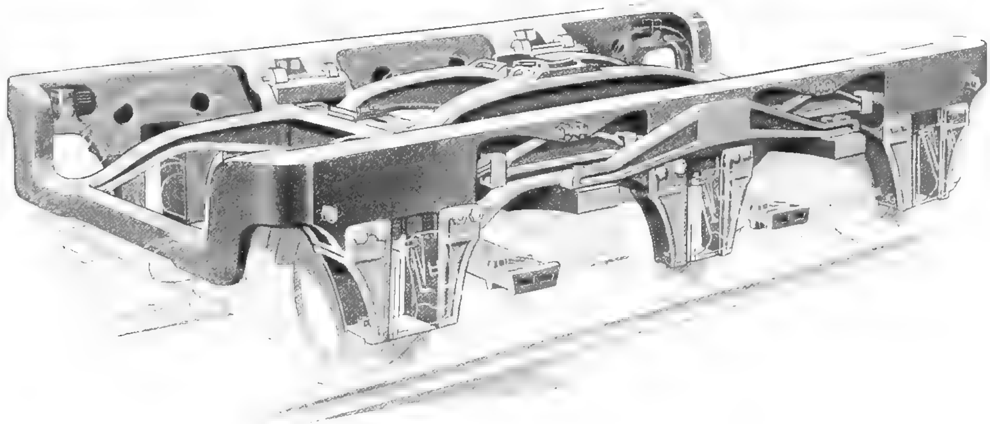


Fig. 1009—Six-Wheel Top Equalizer Truck. Commonwealth Steel Company.

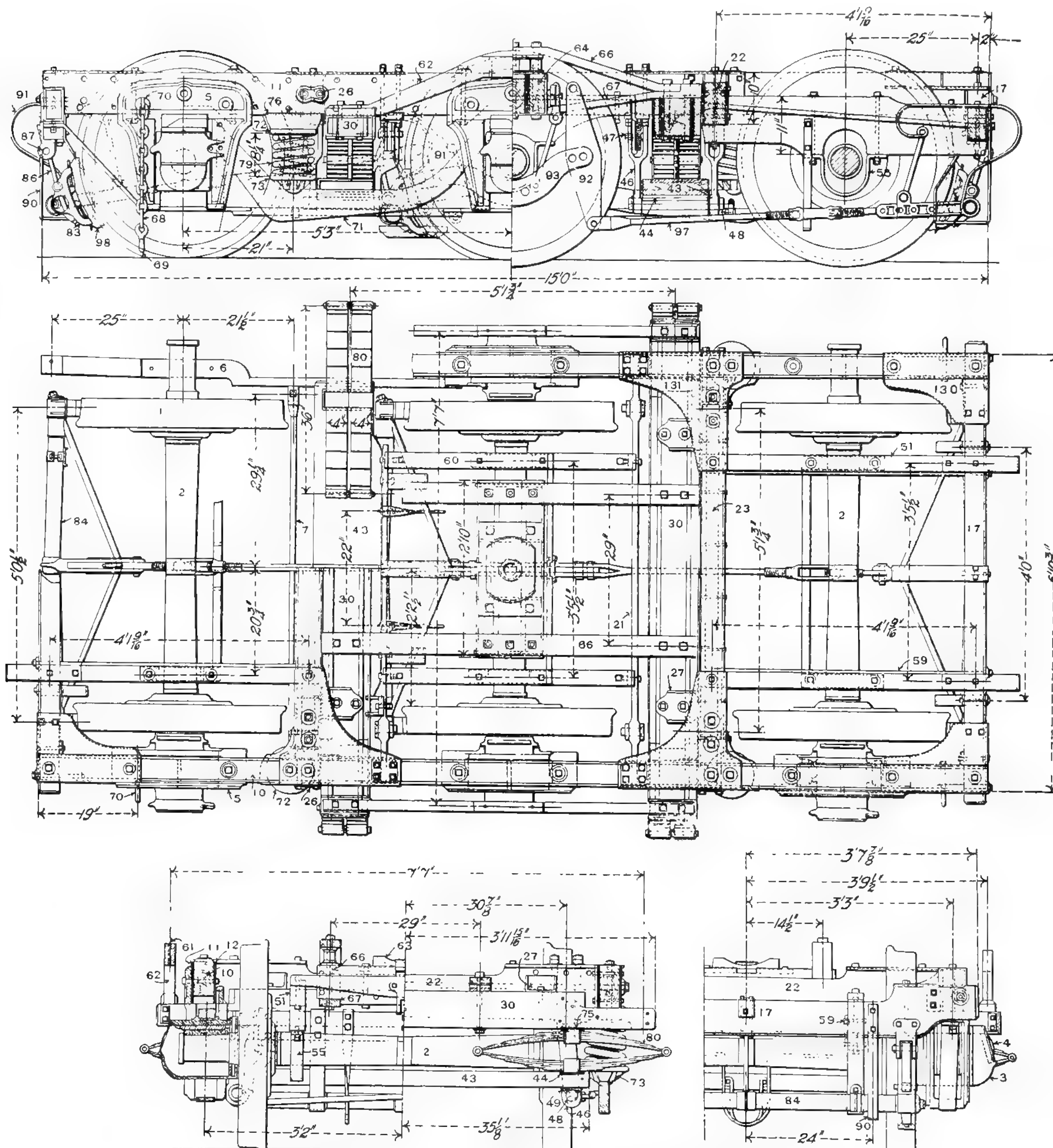


Fig. 1010—Six-Wheel Wooden Frame Passenger Truck.

See Page 567 for Names of Numbered Parts.

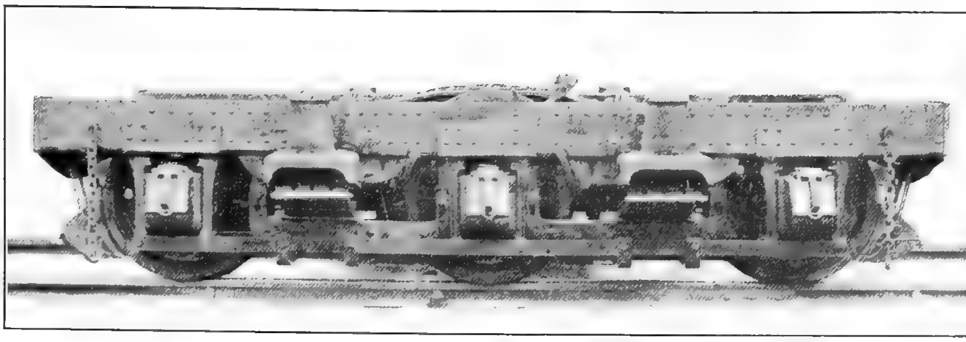


Fig. 1011—Six-Wheel Truck for Pennsylvania Railroad Steel Cars.

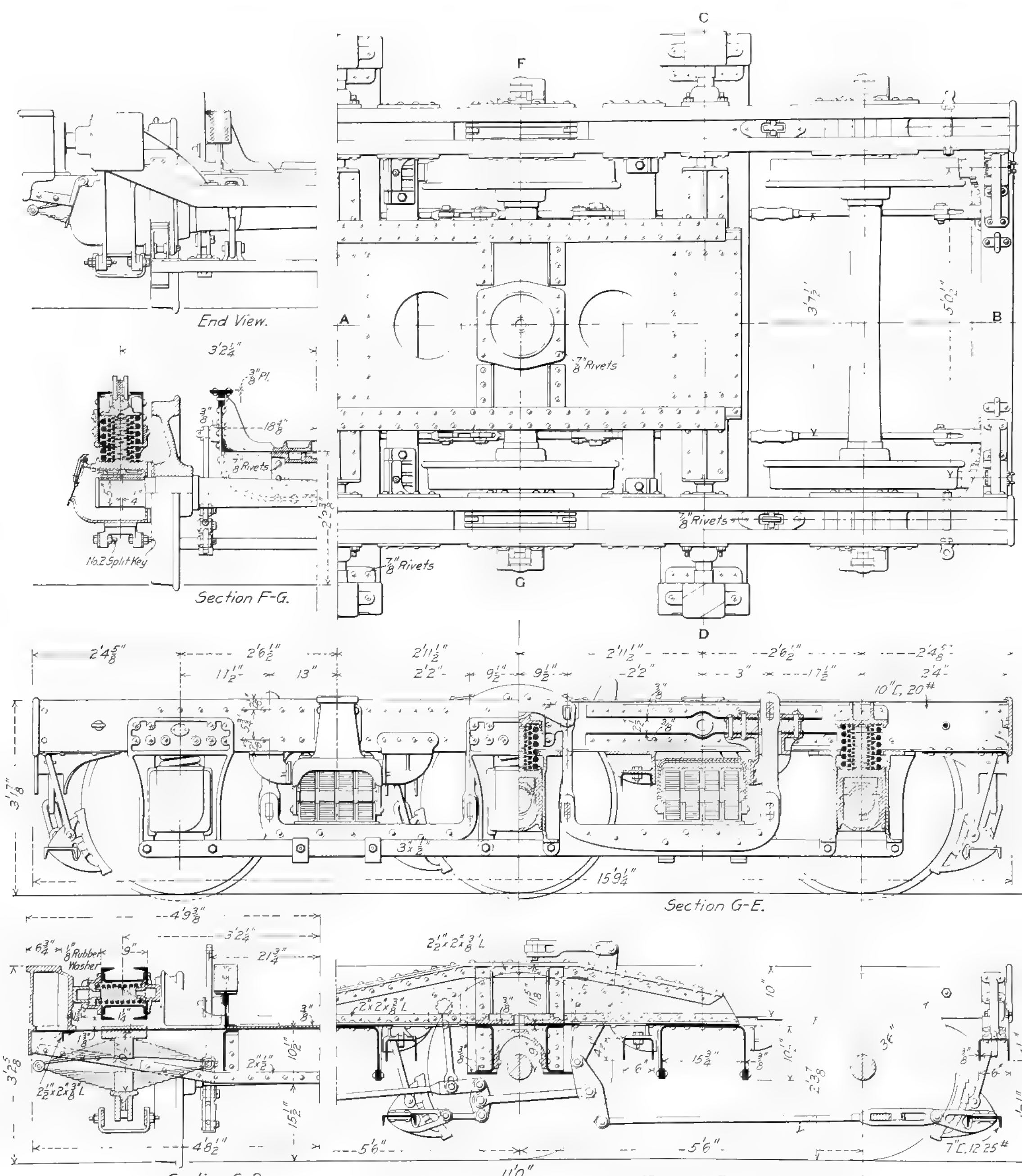


Fig. 1012—General Arrangement of Pennsylvania Railroad Six-Wheel Steel Truck Shown in Fig. 1011.

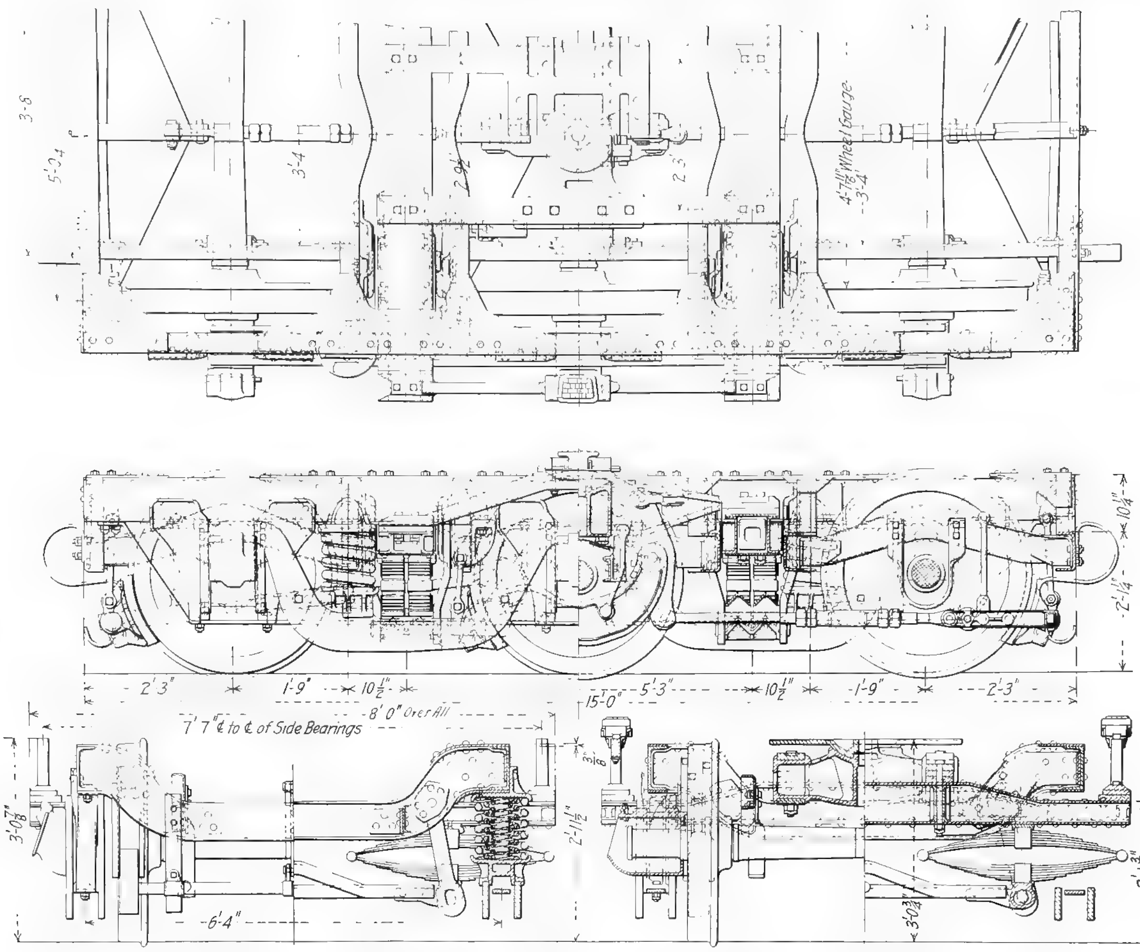


Fig. 1013—Six-Wheel Steel Truck. Standard Steel Car Company.

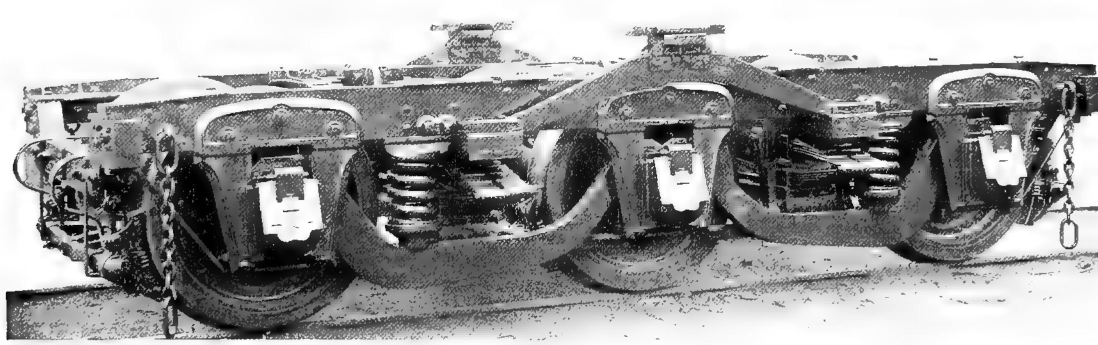


Fig. 1014—Six-Wheel Steel Truck. The Harlan & Hollingsworth Corporation.

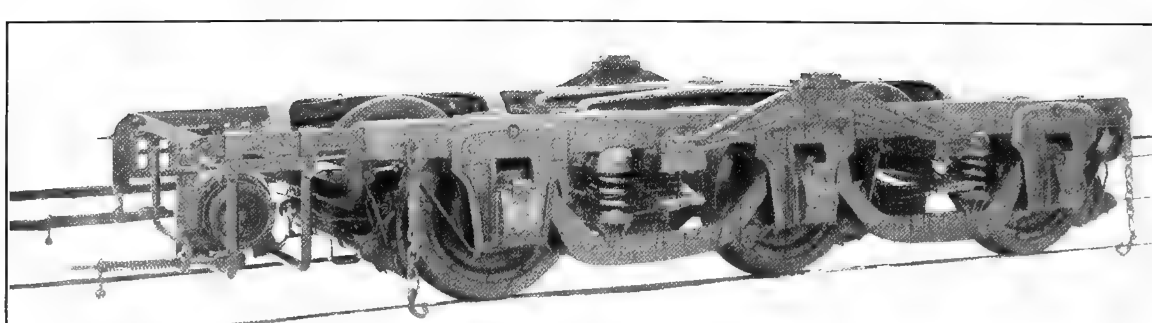


Fig. 1015—Six-Wheel Truck with Commonwealth Cast Steel Frame. The Harlan & Hollingsworth Corporation.

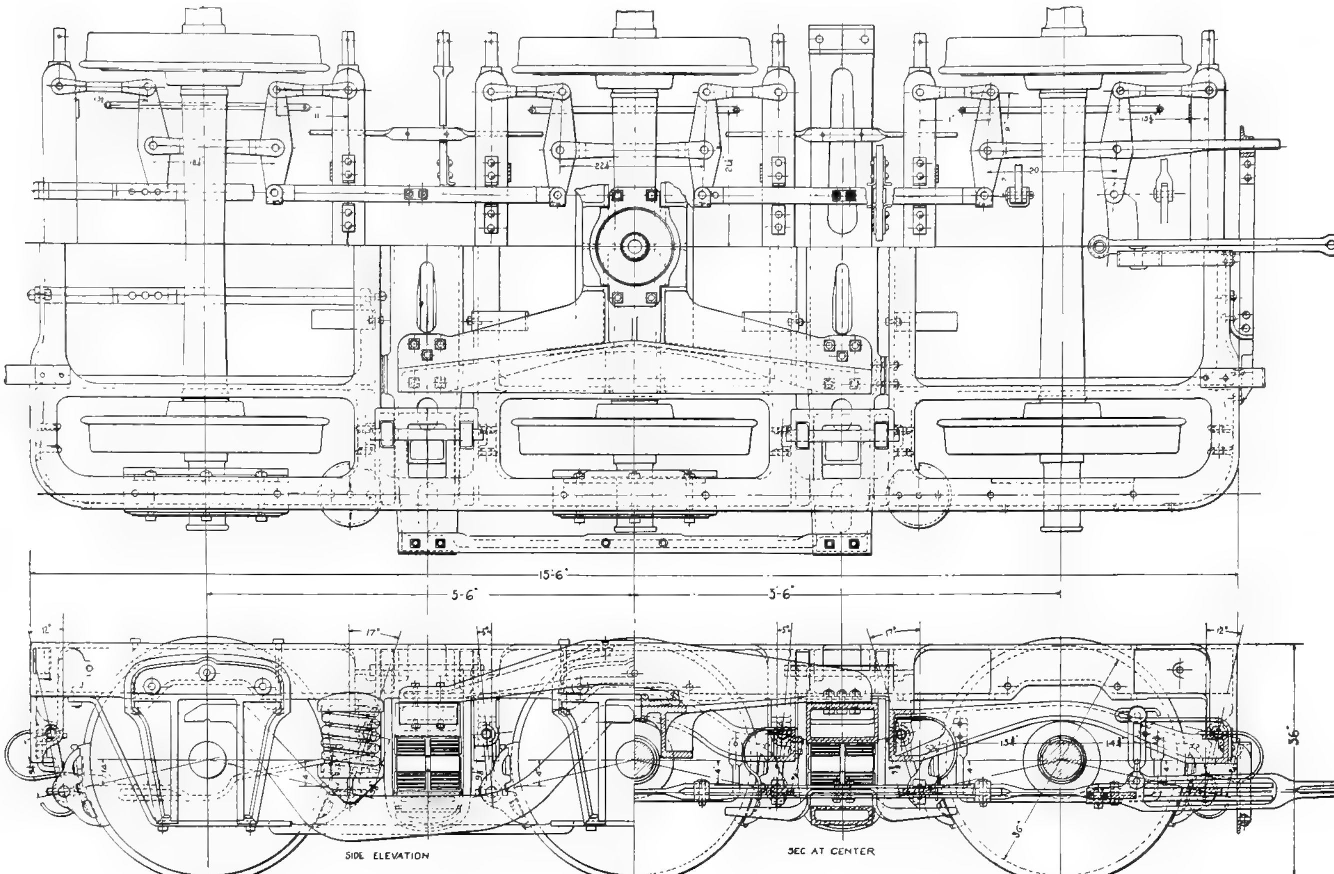


Fig. 1016—Philadelphia & Reading Six-Wheel Truck with Clasp Brake Arrangement. The Harlan & Hollingsworth Corporation.

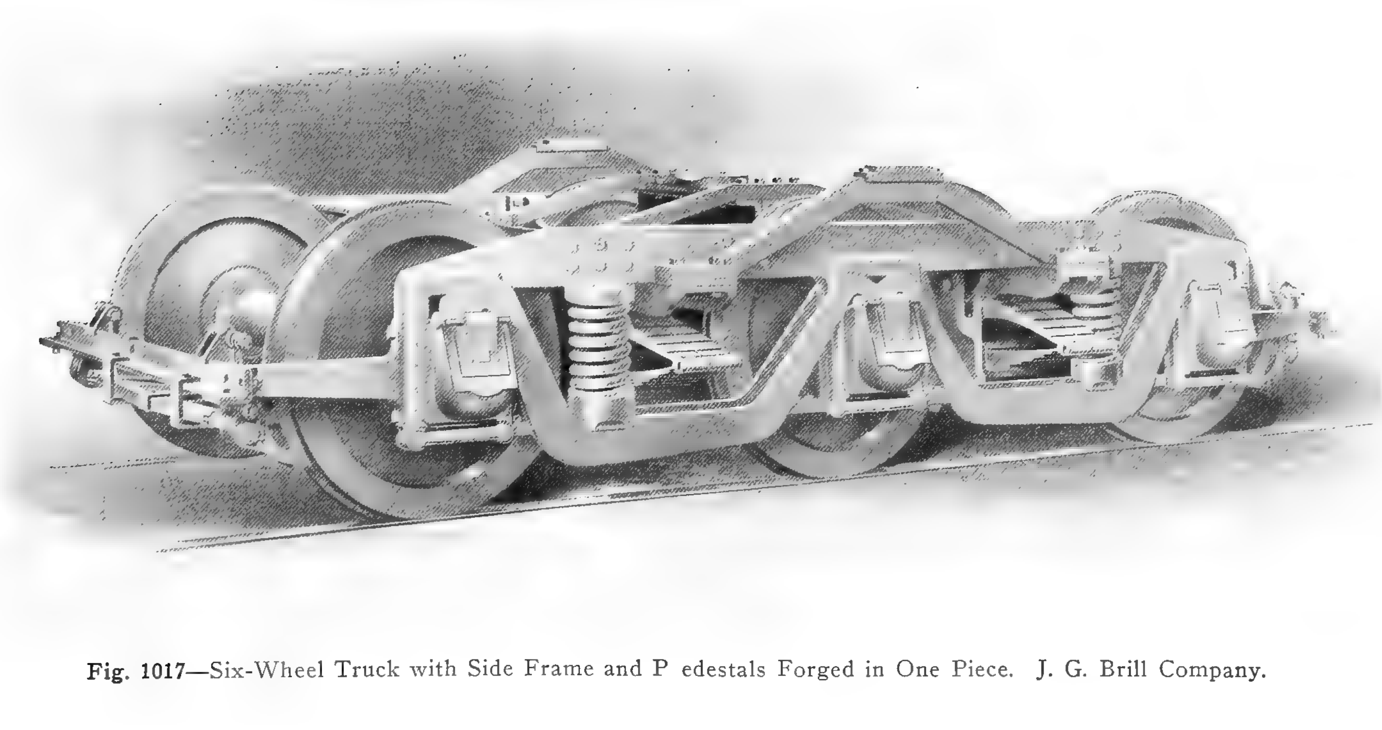


Fig. 1017—Six-Wheel Truck with Side Frame and P edestals Forged in One Piece. J. G. Brill Company.

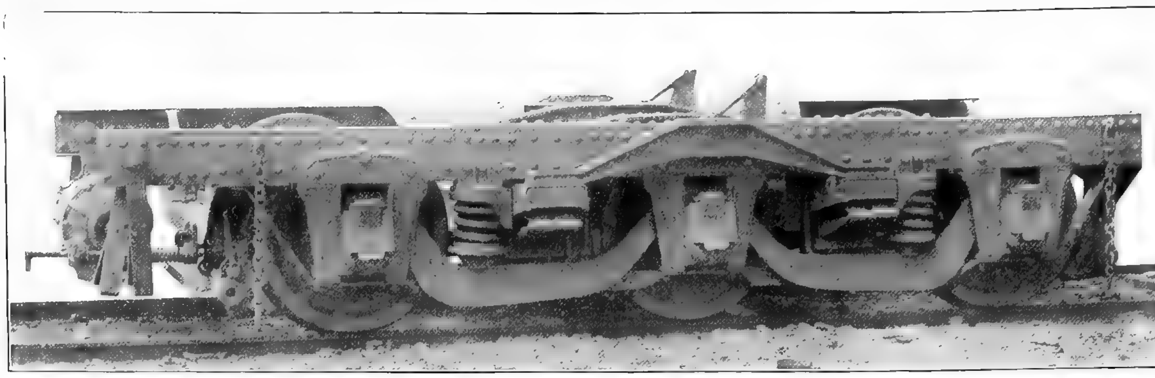


Fig. 1018—Grand Trunk Steel Frame Truck. Pressed Steel Car Company.

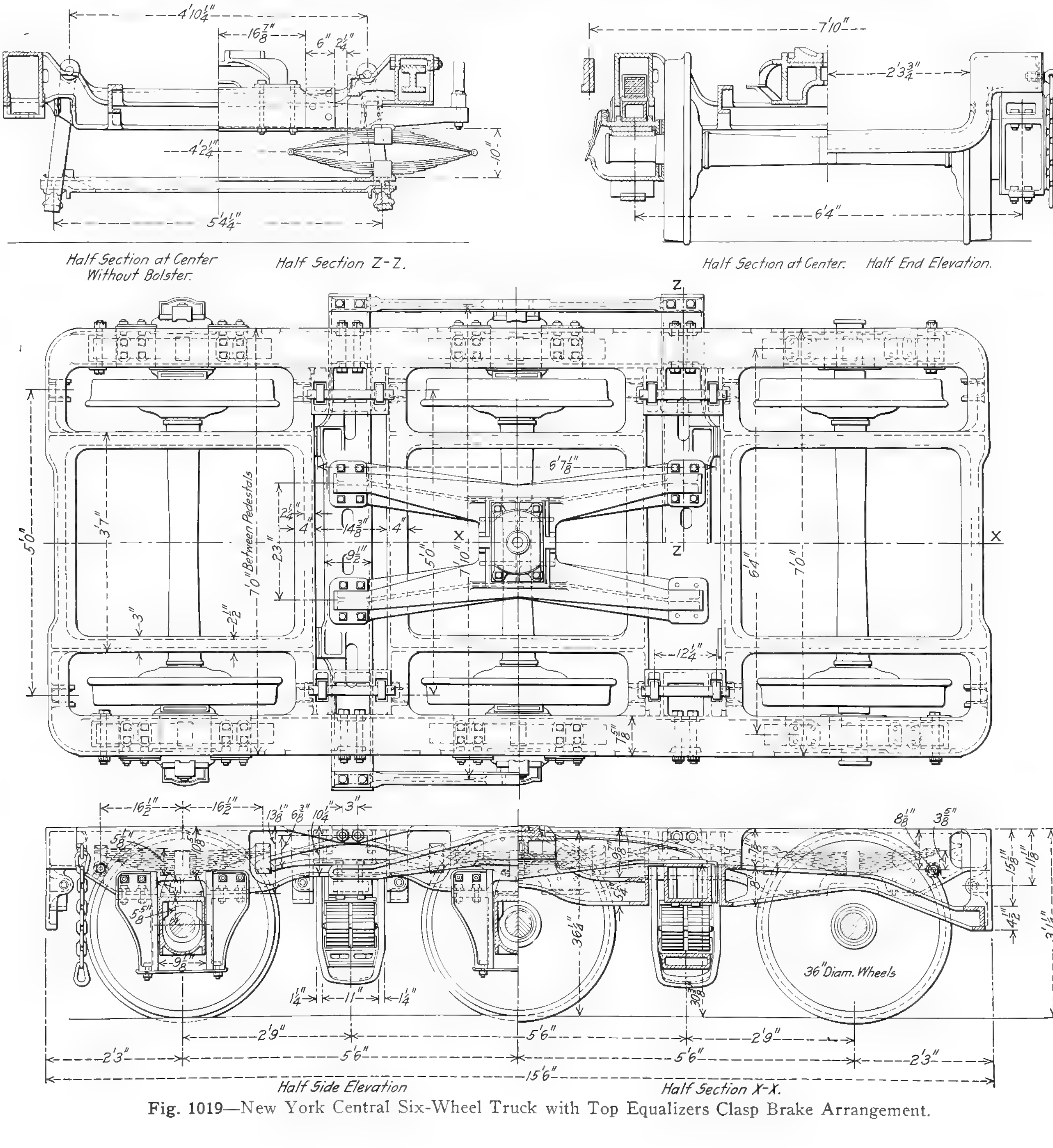


Fig. 1019—New York Central Six-Wheel Truck with Top Equalizers Clasp Brake Arrangement.

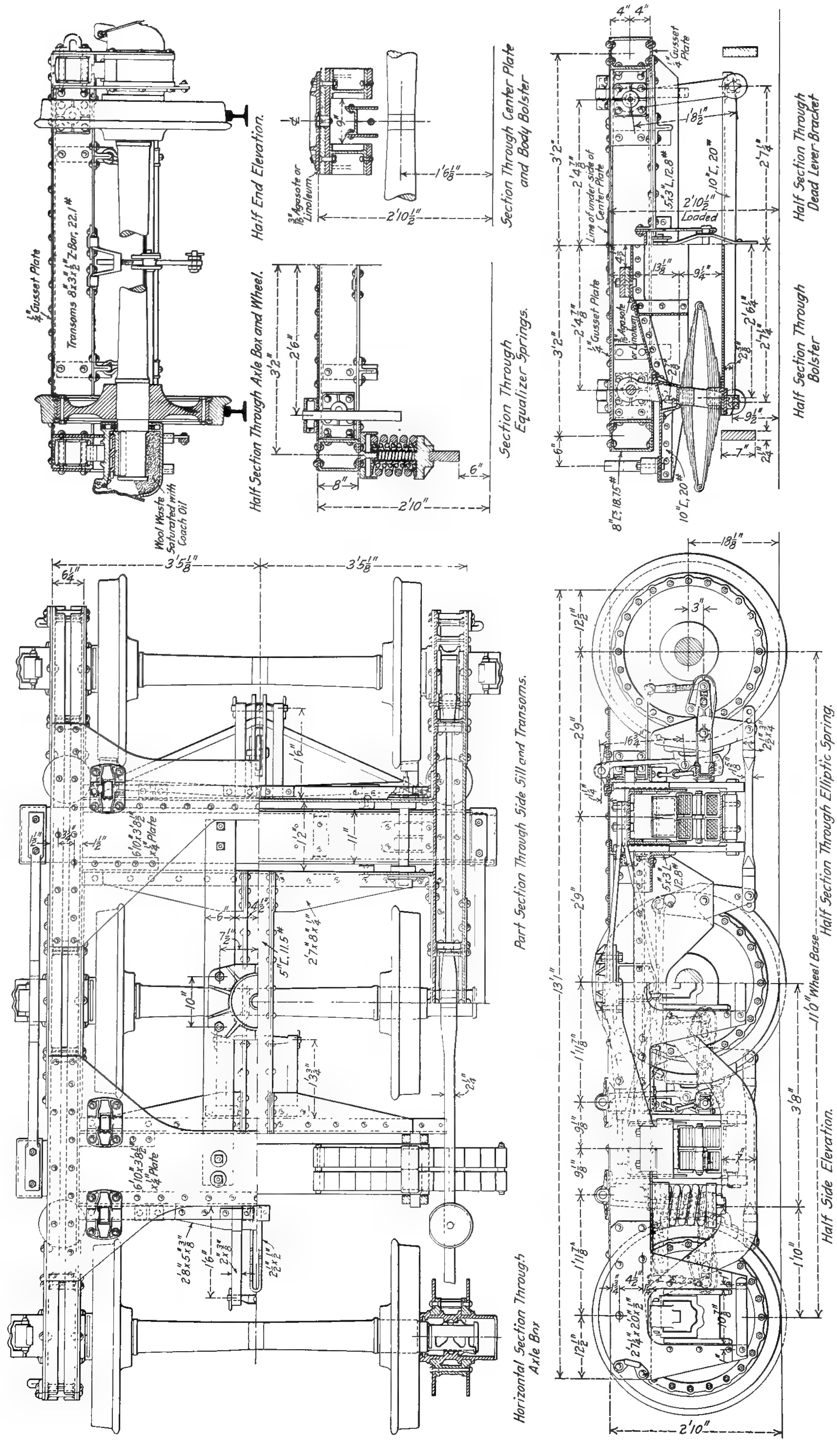


Fig. 1020—Canadian Pacific Steel Truck for Passenger Service.

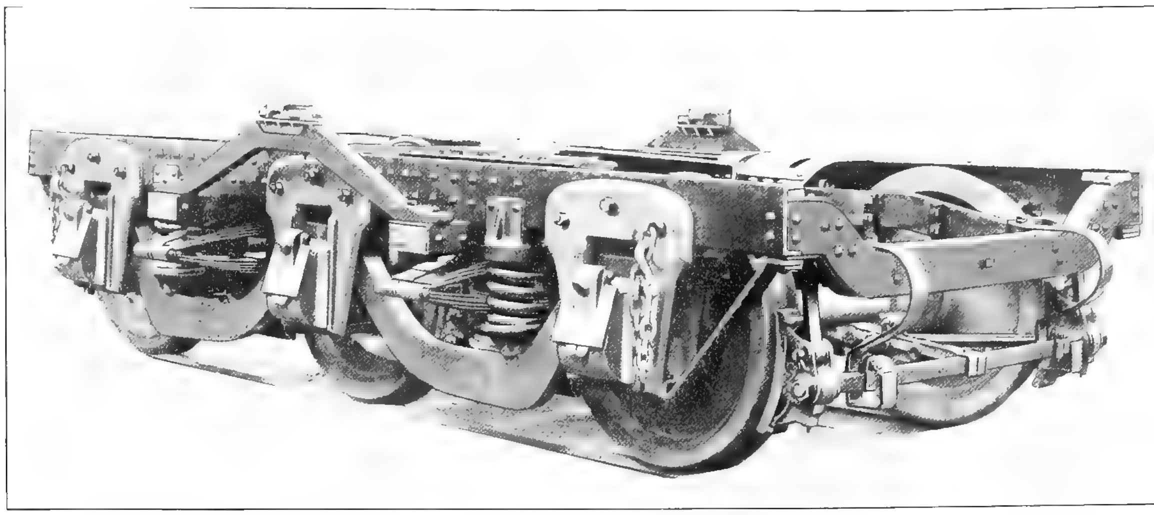
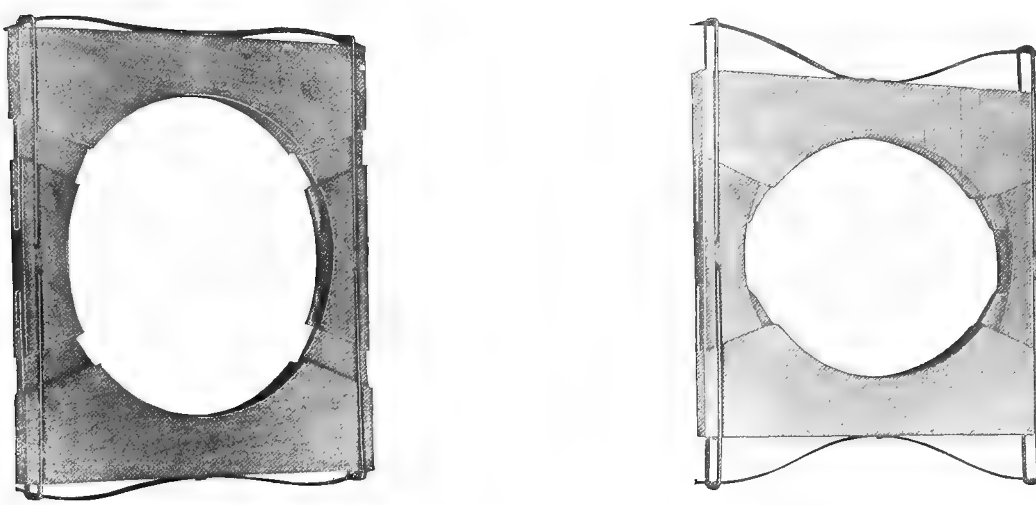


Fig. 1021—Six-Wheel Truck with Rolled Steel Frame. American Car & Foundry Company.



Extended. Closed.

Fig. 1022—Security Dust Guard. Western Railway Equipment Company.

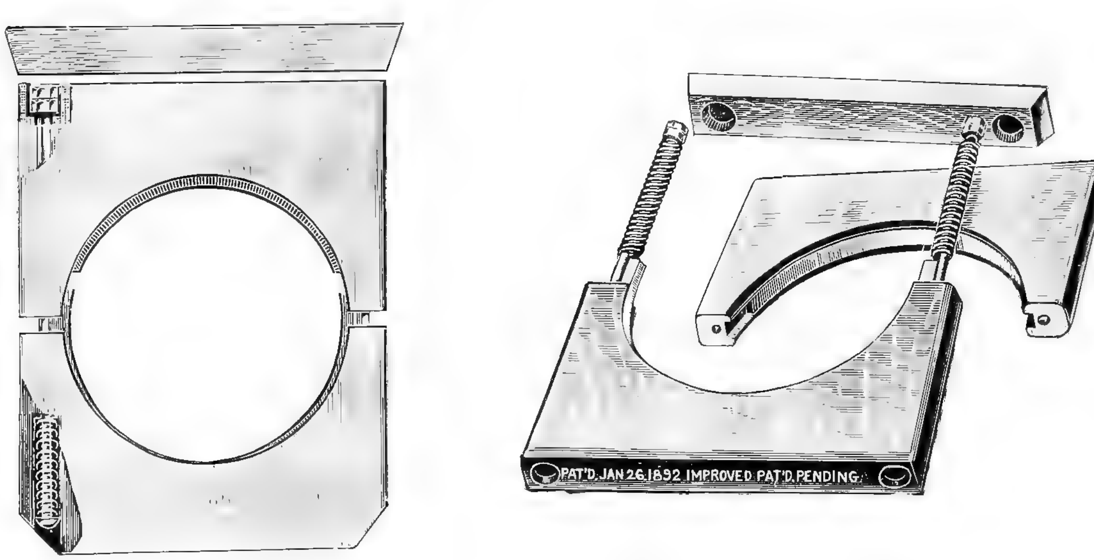


Fig. 1023—Harrison Dust Guard. Harrison Dust Guard Company.

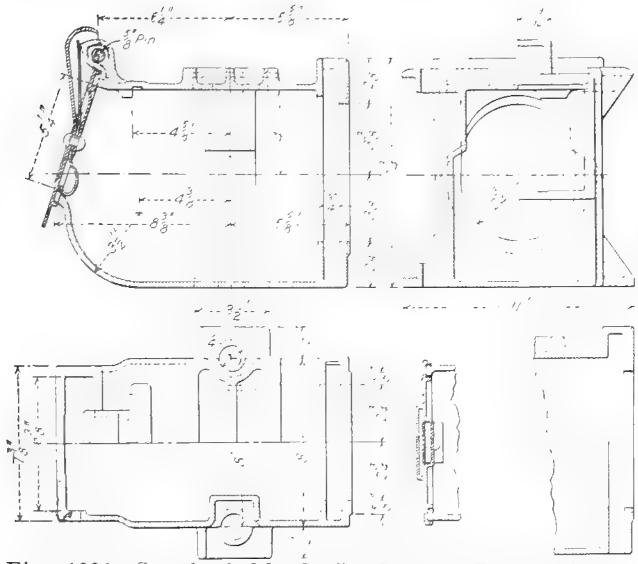


Fig. 1024—Standard M. C. B. Journal Box with Creco Lid, for 4¼ in. by 8 in. Journals.

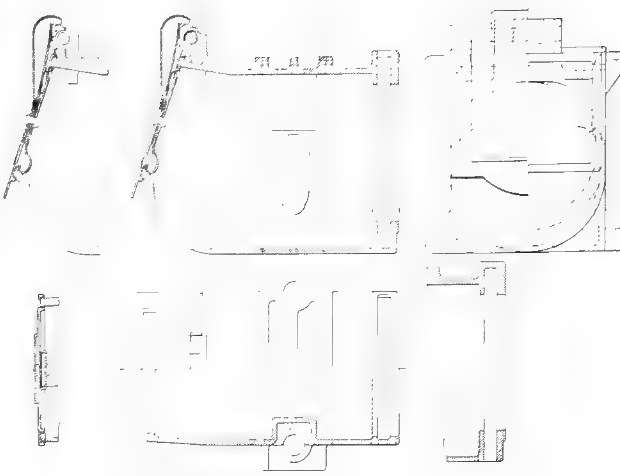


Fig. 1025—Standard M. C. B. Journal Box with Creco Lid, for 5 in. by 9 in. and 5½ in. by 10 in. Journals.

Chicago Railway Equipment Company.

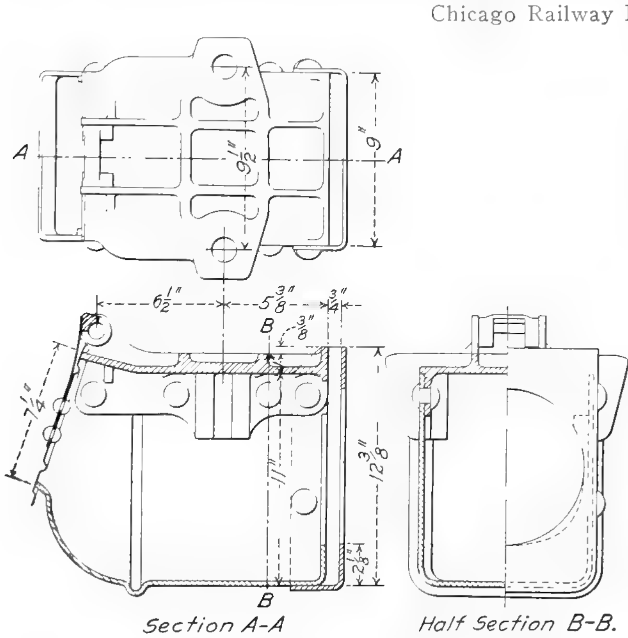


Fig. 1026—Kensington Steel Journal Box with Outside Lid Spring.

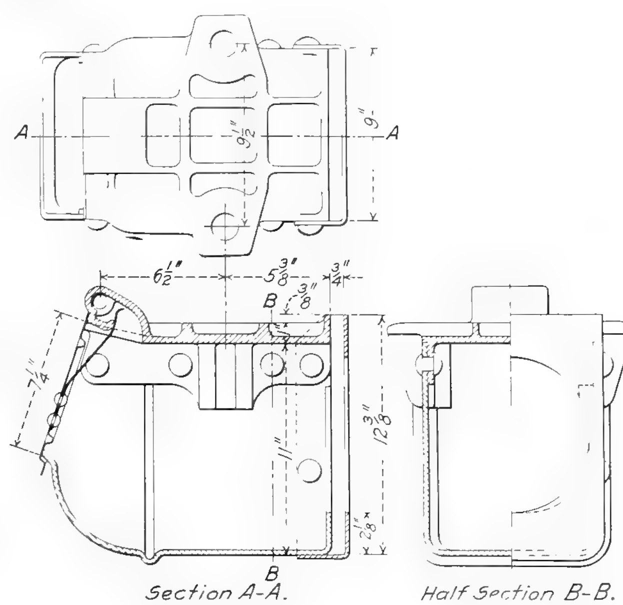


Fig. 1027—Kensington Steel Journal Box with Inside Lid Spring.

Union Spring & Manufacturing Company.

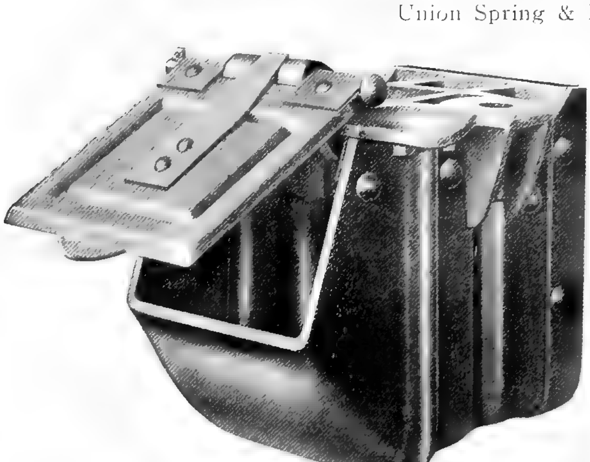


Fig. 1028—Kensington Steel Journal Box with Outside Lid Spring.

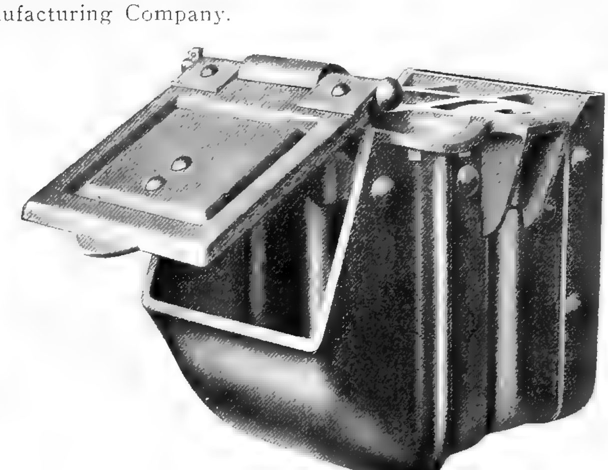


Fig. 1029—Kensington Steel Journal Box with Inside Lid Spring.

Union Spring & Manufacturing Company.

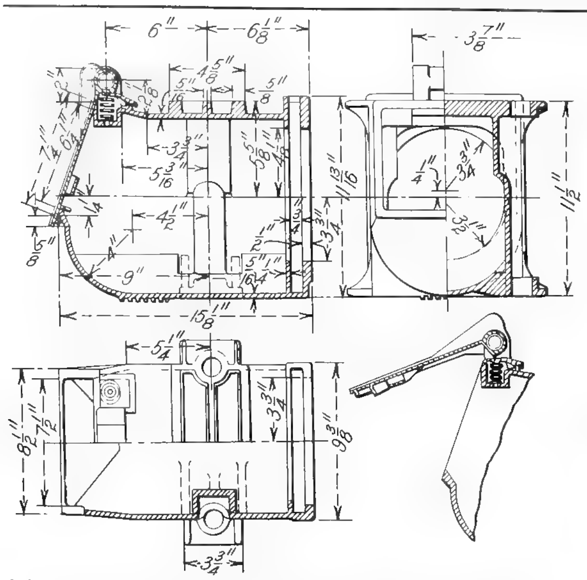


Fig. 1030—Buffalo Journal Box for 5 in. by 9 in. Journals. The Pratt & Letchworth Company.

Fig. 1031—Buffalo Journal Box. The Pratt & Letchworth Company.

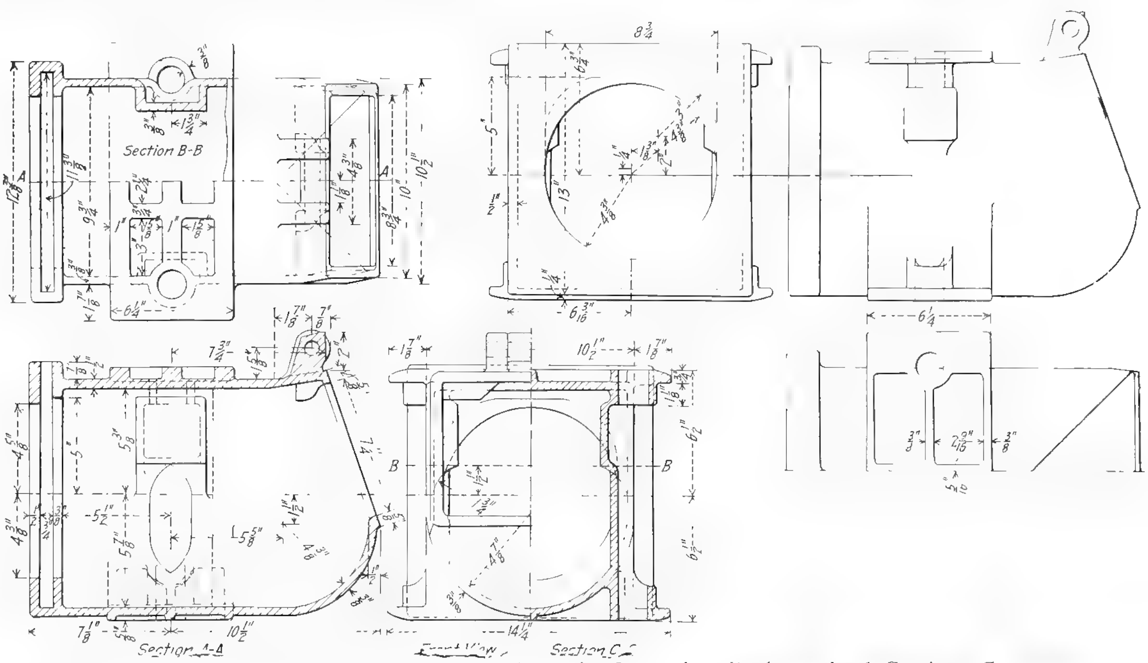
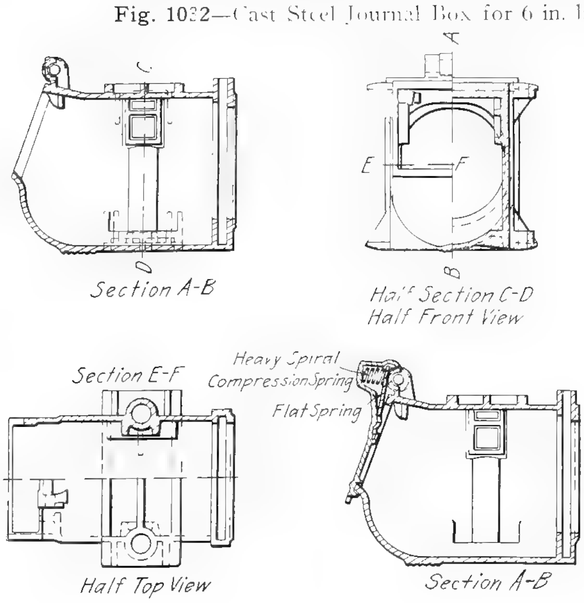


Fig. 1032—Cast Steel Journal Box for 6 in. by 11 in. Journals. Buckeye Steel Castings Company.



Figs. 1033 and 1034—Acme Journal Box. Acme Steel & Malleable Iron Works.

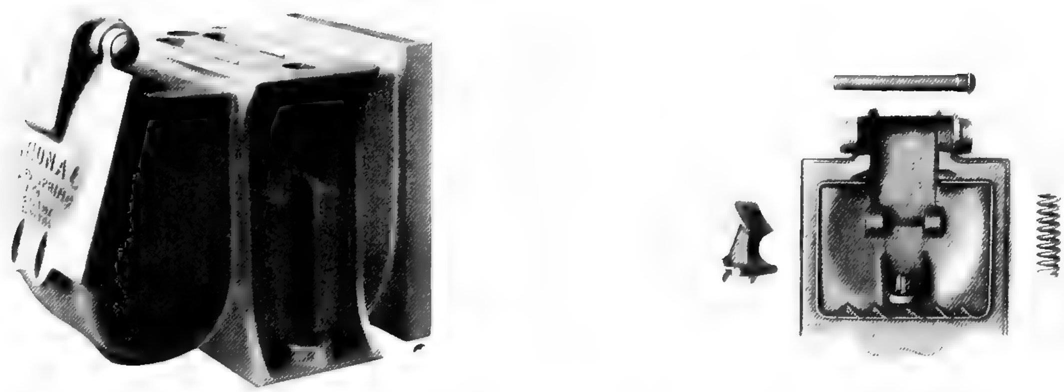


Fig. 1035—National Coiled Spring Journal Box and Parts (Patented).

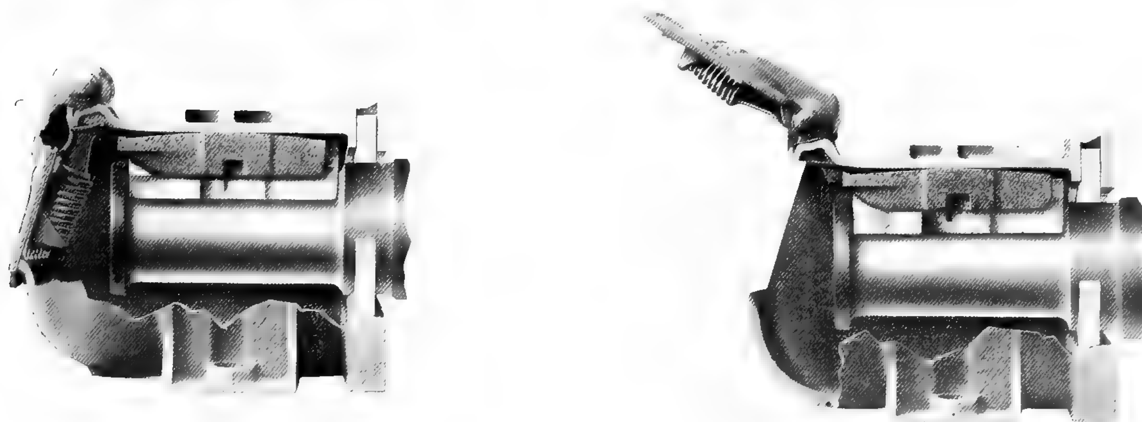


Fig. 1036—National Coiled Spring Journal Box, Open and Closed.

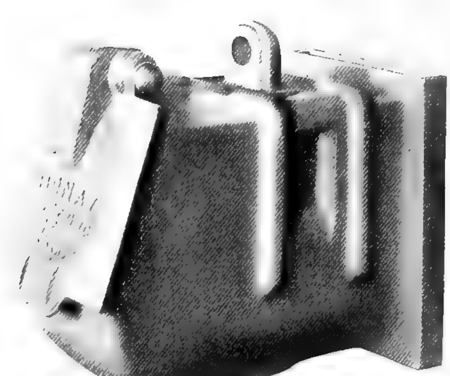


Fig. 1037—National Coiled Spring Journal Box for Scullin Truck (Patented).

Fig. 1038—National Coiled Spring Journal Box for Vulcan Truck (Patented).

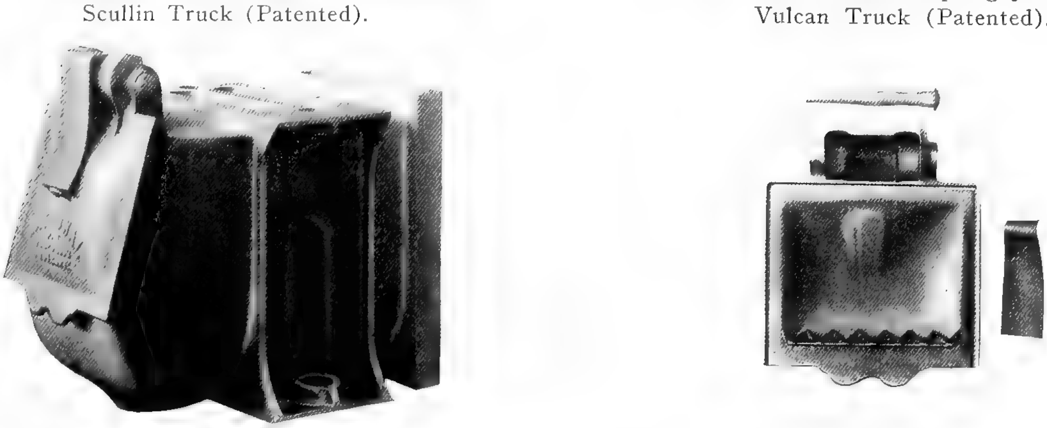


Fig. 1039—National Flat Spring Journal Box and Parts (Patented).
National Malleable Castings Company.

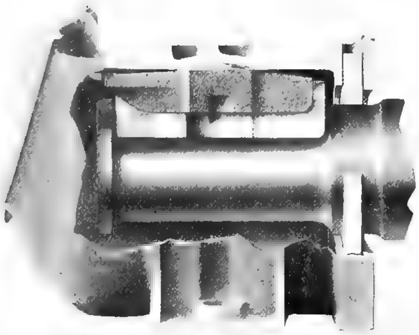


Fig. 1040—National Equalizing Wedge and Coiled Spring Journal Box (Patented). National Malleable Castings Company.

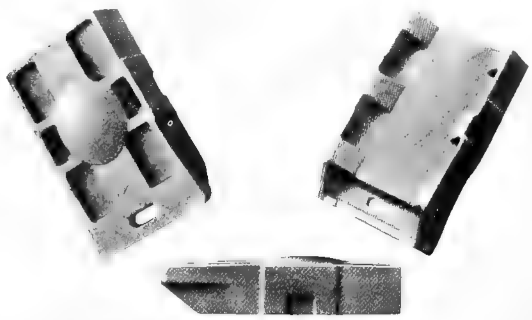


Fig. 1042—National Equalizing Wedge (Patented). National Malleable Castings Company.

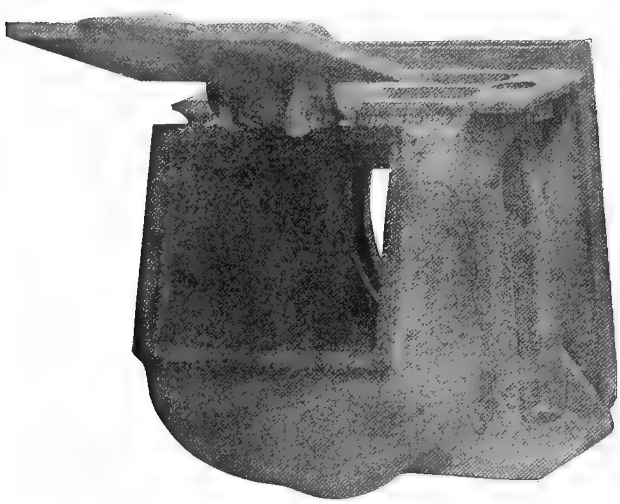


Fig. 1043—Pinless Lid Journal Box, Open.

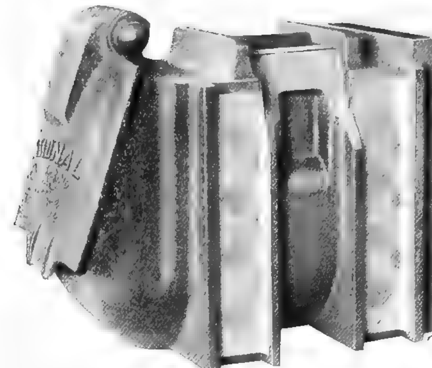


Fig. 1041—National Coiled Spring Journal Box with Steel Inserts for Passenger Trucks (Patented). National Malleable Castings Company.

Fig. 1044—Inset Lid Journal Box.

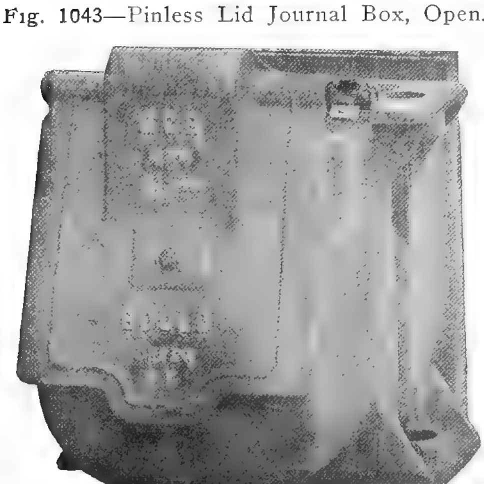


Fig. 1045—Journal Box with M. C. B. Lid.

Fig. 1046—Pinless Lid Journal Box, Closed.

Gould Coupler Company.

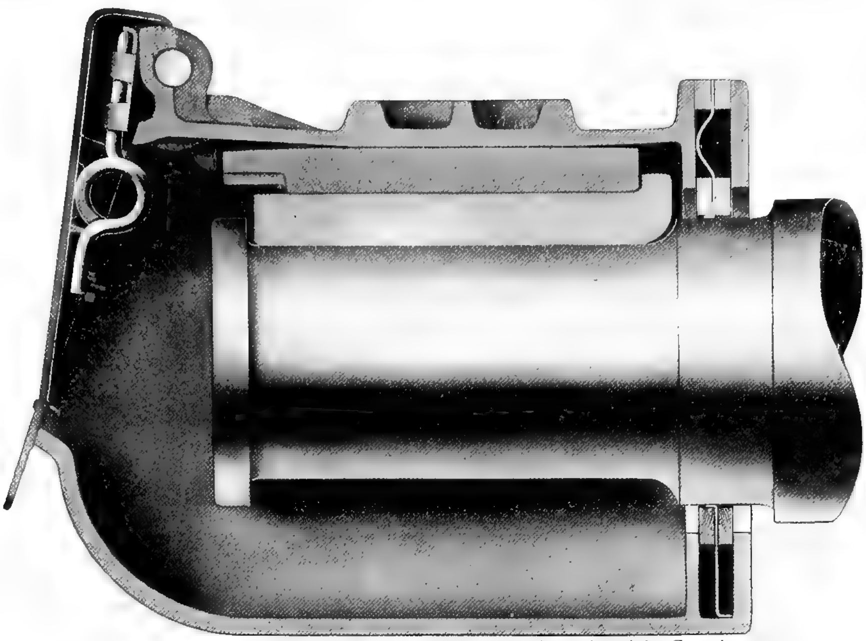


Fig. 1047—Symington Journal Box Equipped with Symington Flexible Dust Guard.

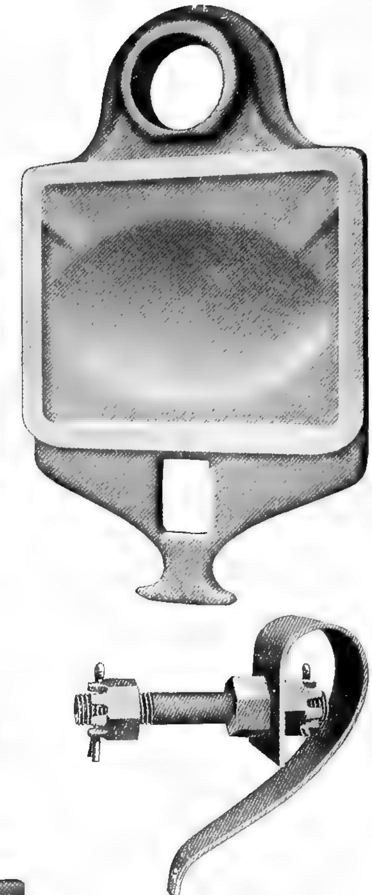


Fig. 1050—Symington Pivot Spring Lid, Spring and Bolt.

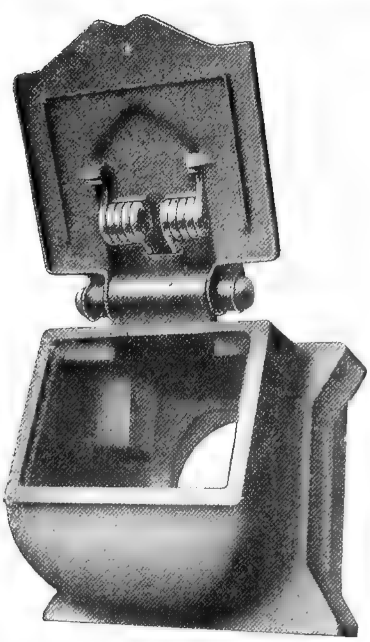


Fig. 1048—Symington M. C. B. Freight Car Journal Box with Torsion Spring Lid.

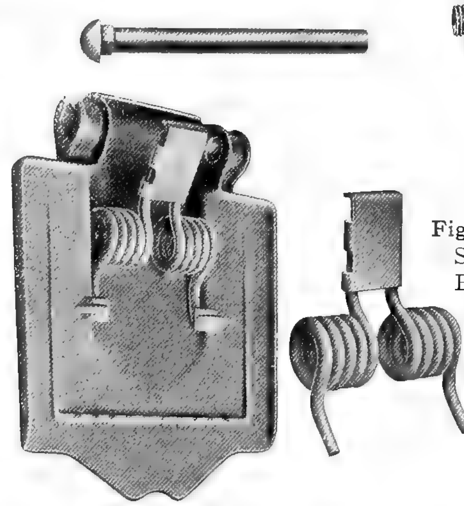


Fig. 1049—Symington Malleable Iron Torsion Spring Lid, Spring and Bolt.

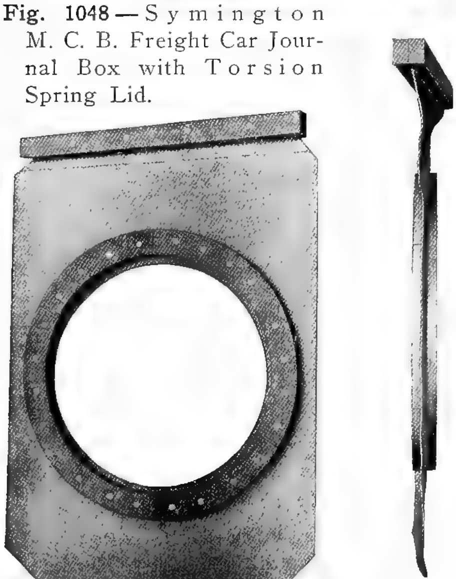


Fig. 1050A—Symington Flexible Journal Box Dust Guard.

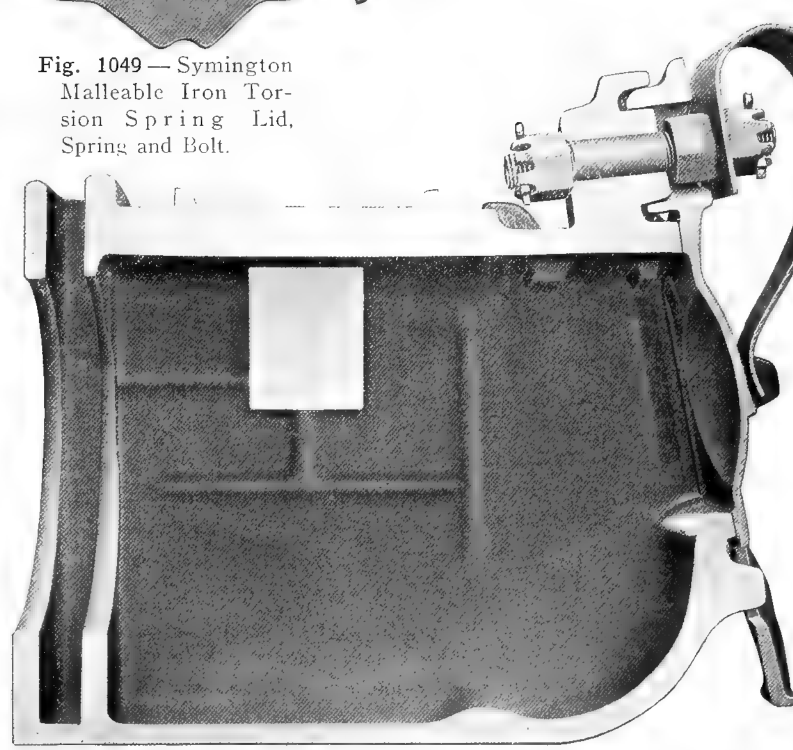


Fig. 1051—Sectional View of Symington Pedestal Truck Journal Box for Passenger and Electric Car Service, with Pivot Lid and Central Spring Pressure.

T. H. Symington Company.

Fig. 1052—Position of Pinless Lid for McCord Journal Box After Application.

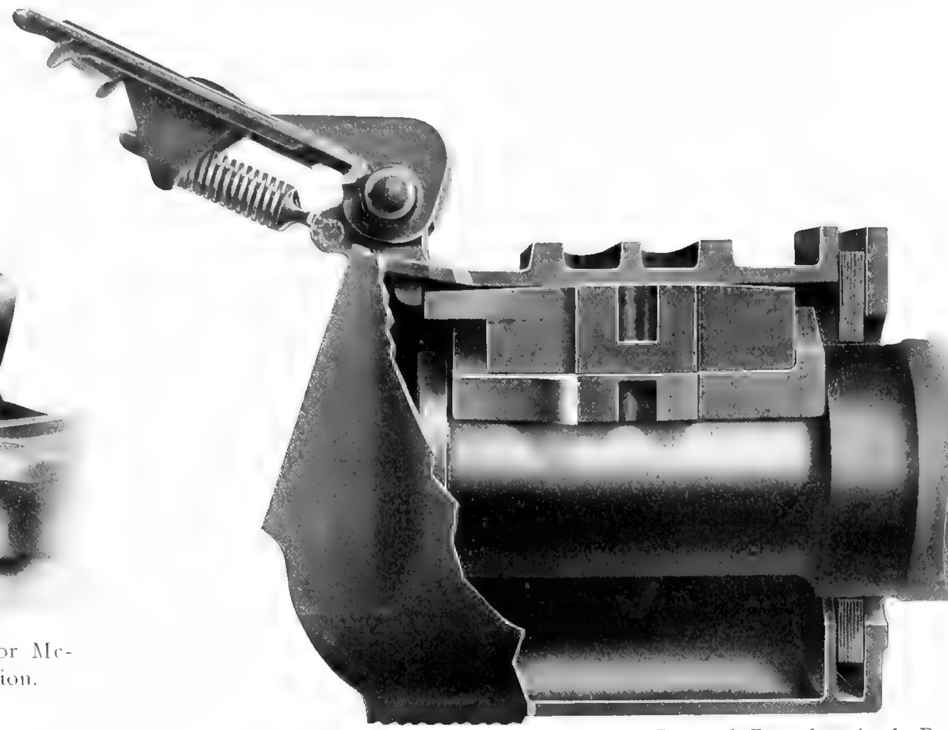


Fig. 1053—McCord Malleable Iron Journal Box for Arch Bar Trucks, with Coil Spring Lid in Open Position.

Fig. 1054—Position of Lid for Application.

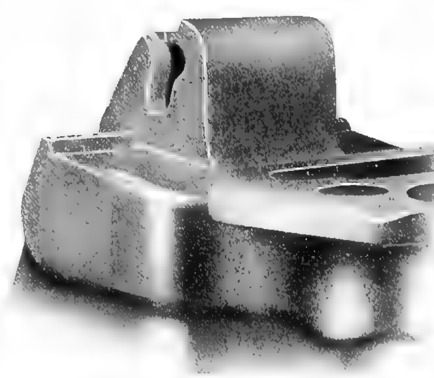


Fig. 1055—Hinge Lug of Box.

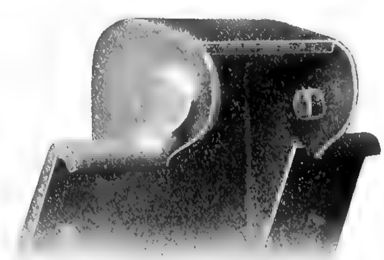


Fig. 1056—Lid, Showing Integral Cast Trunnion.

McCord Pinless Journal Box Lid.

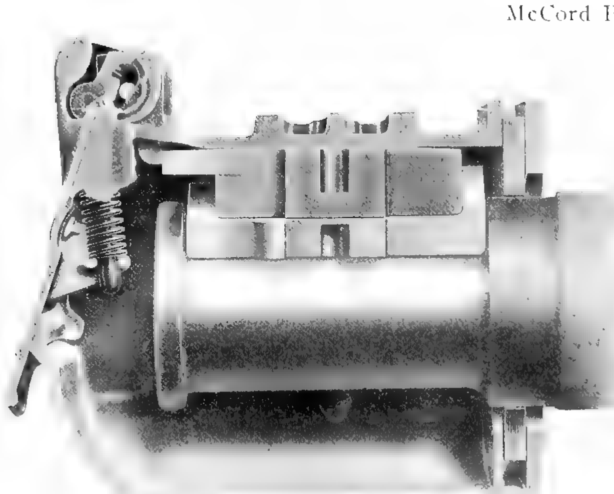


Fig. 1057—McCord 5 in. by 9 in. Journal Box with M. C. B. Dust Guard and Wedge; Lid in Closed Position, Showing Locking Lips.

Fig. 1058—McCord Malleable Iron Pedestal Truck Journal Box with Continuous Steel Inserts for Protection of Pedestal Channels.

McCord & Company.

Fig. 1059—McCord Steel Journal Box with Coil Spring Pinless Lid, for Arch Bar Trucks.

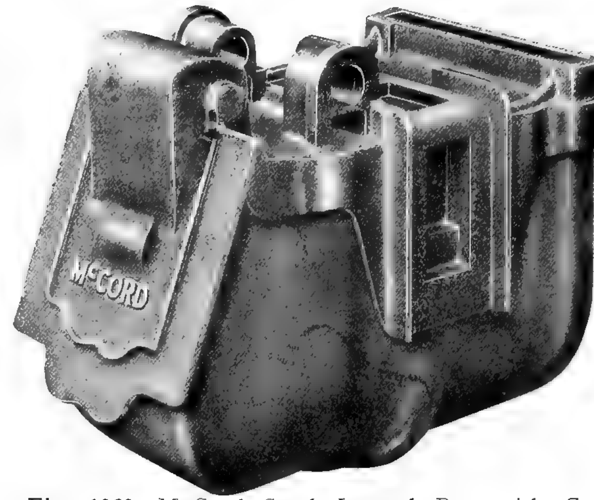


Fig. 1060—McCord Steel Journal Box with Coil Spring Pinless Lid, for Freight Pedestal Trucks.

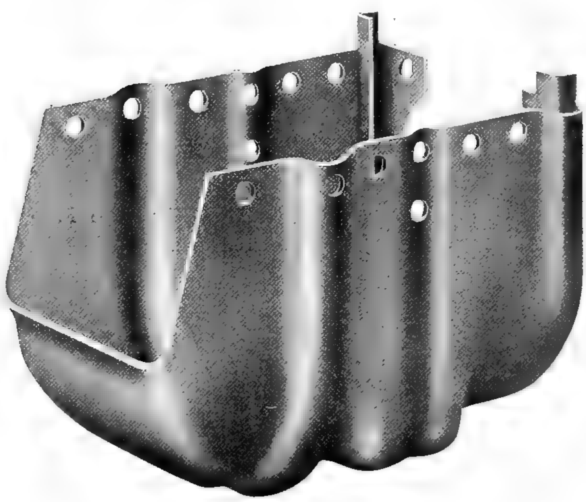


Fig. 1061—Steel Cellar Perforated Ready for Mold.

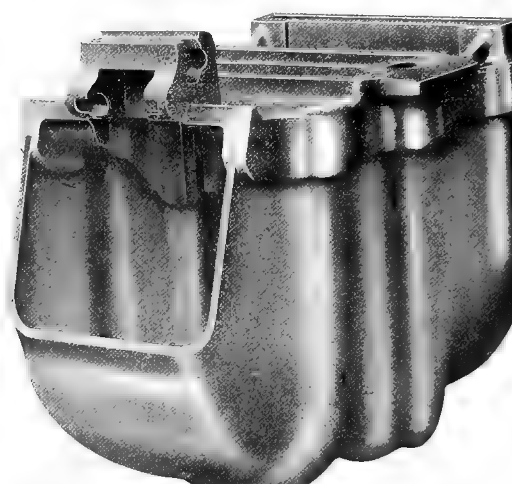


Fig. 1061A—Finished Box After Pouring. McCord & Company.

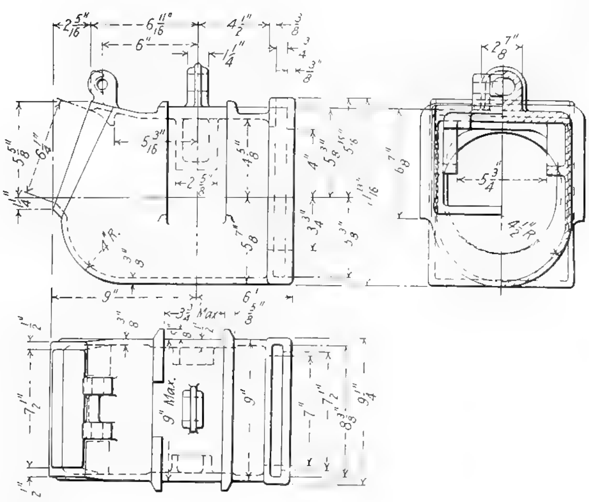


Fig. 1062—Scullin Journal Box. Scullin Steel Company.

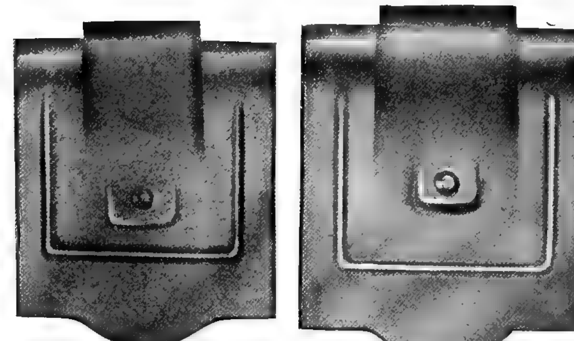


Fig. 1063—Davis Pressed Steel M. C. B. Journal Box Lid. Davis Brake Beam Company.

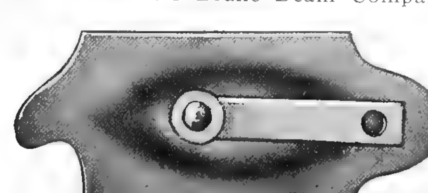


Fig. 1063A—Davis Pressed Steel Side Hung Journal Box Lid. Davis Brake Beam Company.

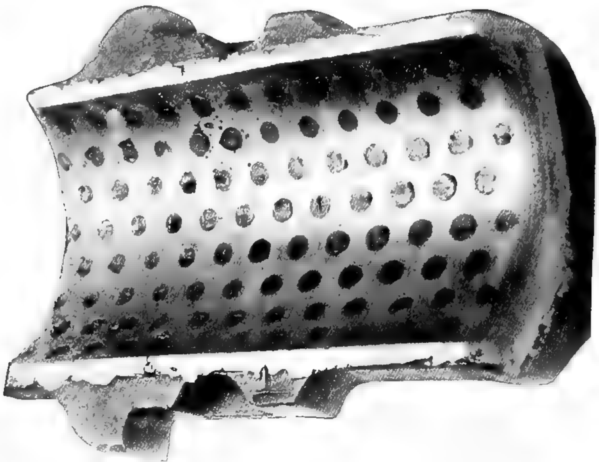


Fig. 1064—Randall Graphite Sheet Lubricant Applied to Journal Bearing. Strong, Carlisle & Hammond Company.

Fig. 1065—Virginia Journal Box Dust Guard. Virginia Equipment Company.

Fig. 1066—A. B. C. Journal Bearing and Wedge. A. B. C. Bearing Corporation.

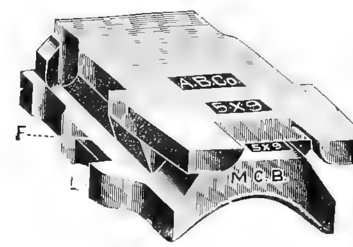


Fig. 1067—A. B. C. Wedge Fitted to M. C. B. Journal Bearing.

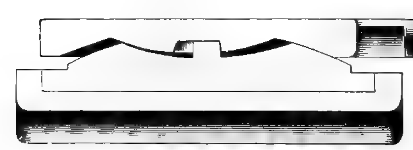


Fig. 1068—Section Through A. B. C. Journal Bearing and Wedge. A. B. C. Bearing Corporation.

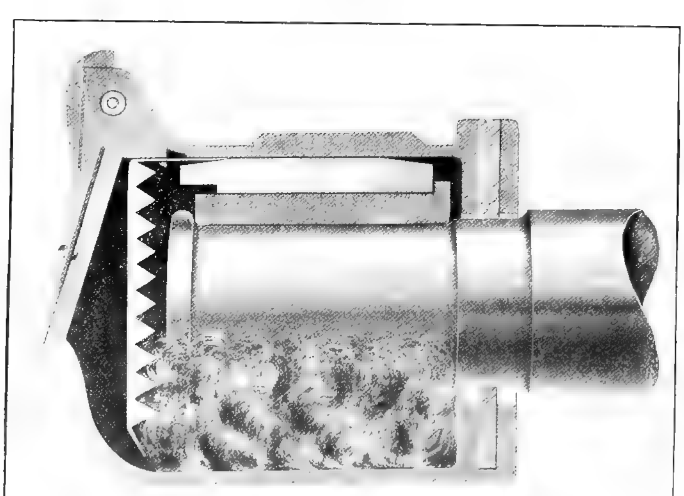


Fig. 1069—Packing Guard in Position in Journal Box. Nuway Packing Guard Company.

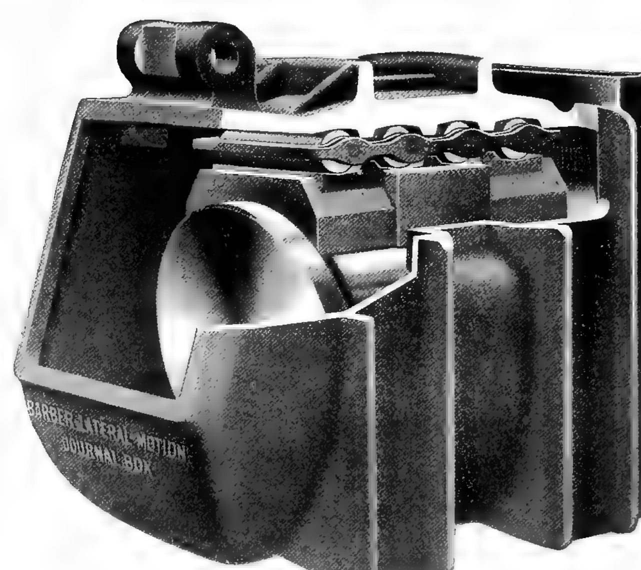


Fig. 1070—Barber Roller Bearing Lateral Motion Journal Box. Standard Car Truck Company.

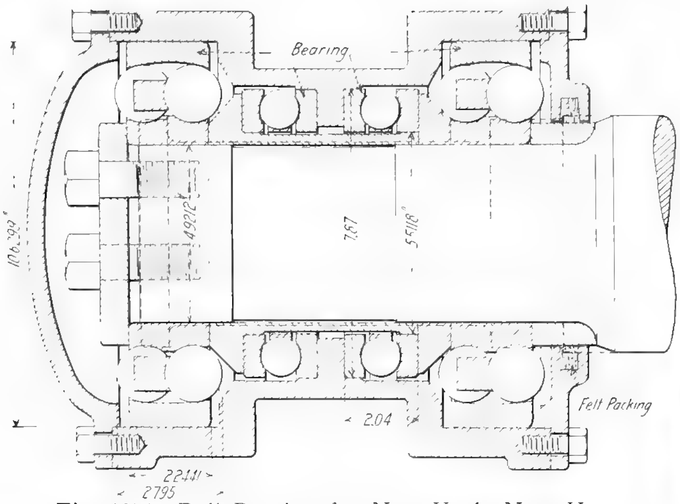


Fig. 1071—Ball Bearing for New York, New Haven & Hartford 5 in. by 9 in. Journal. S. K. F. Ball Bearing Company.

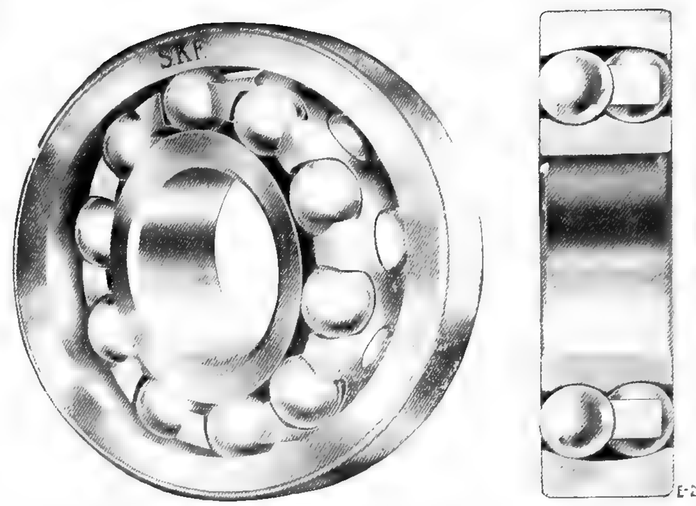


Fig. 1072—S. K. F. Ball Bearings. S. K. F. Ball Bearing Company.

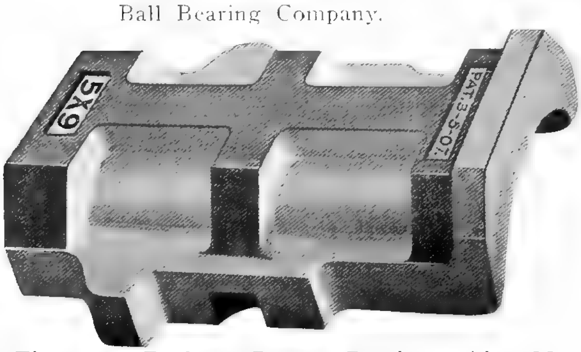


Fig. 1073—Perfecto Bronze Bearing. Ajax Metal Company.

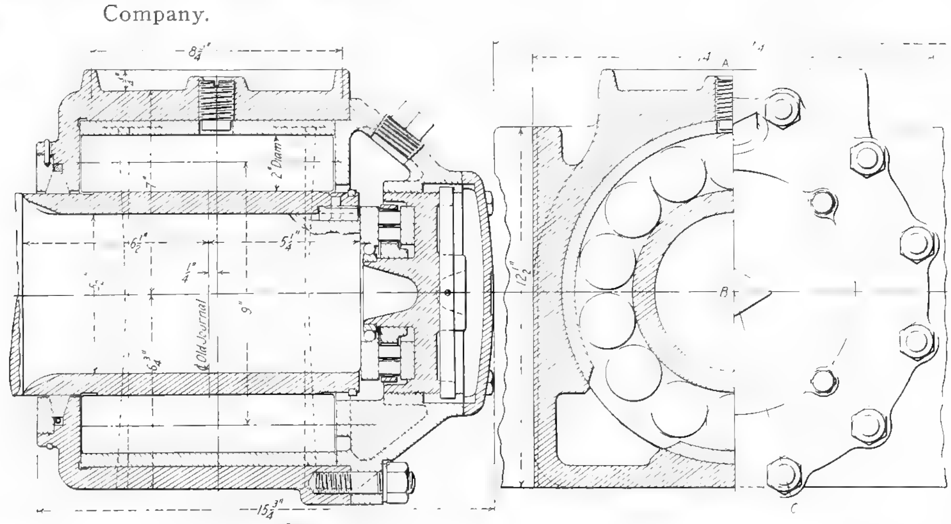


Fig. 1074—Roller Bearing for 5 in. by 9 in. Journal. Standard Roller Bearing Company.

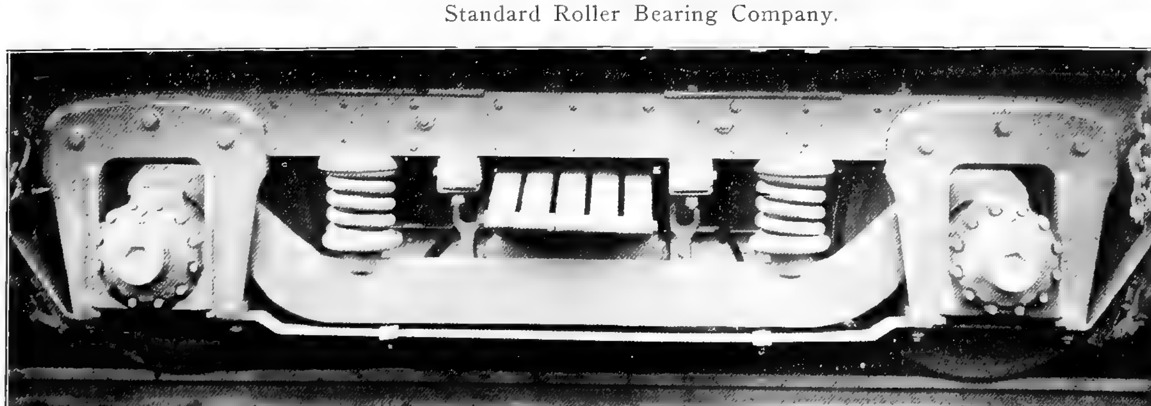


Fig. 1075—Roller Bearings Applied to Axles of a Passenger Car. Standard Roller Bearing Company.

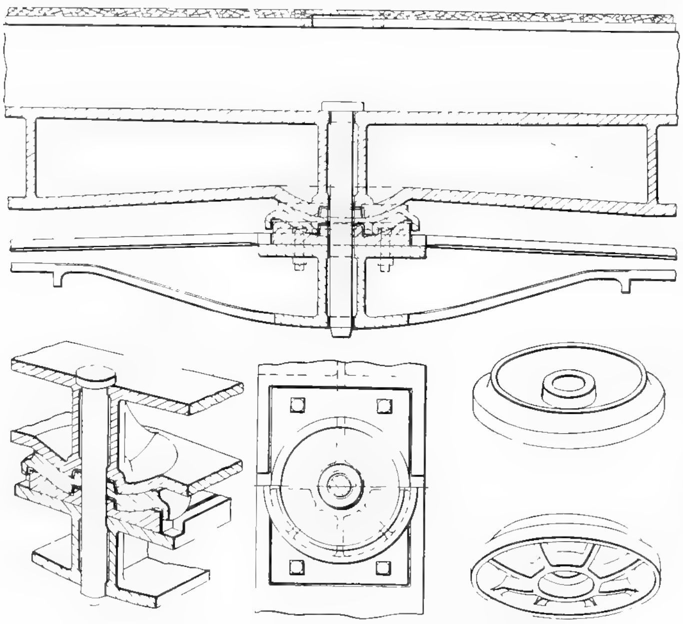


Fig. 1076—Miner Center Plate Shim as Applied to Passenger Equipment with Six-Wheel Trucks. W. H. Miner.

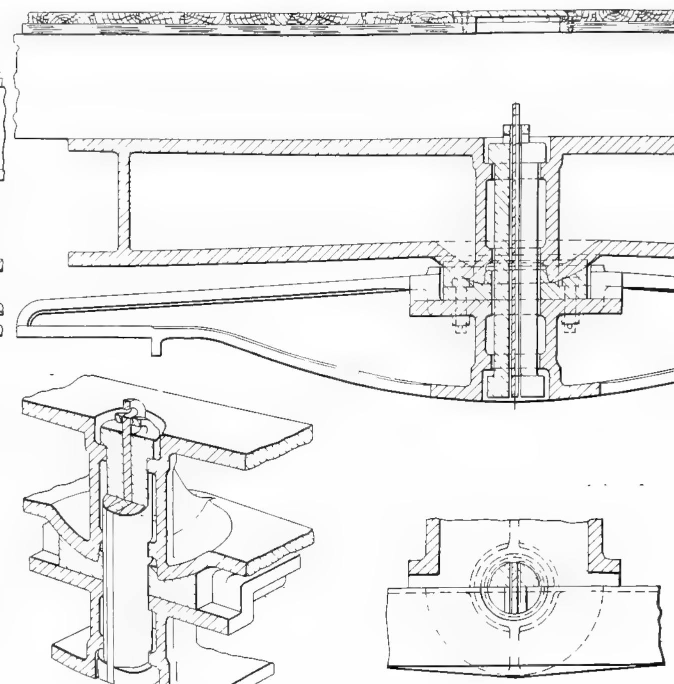


Fig. 1077 Coleman Bolster-Locking Center Pin. W. H. Miner.

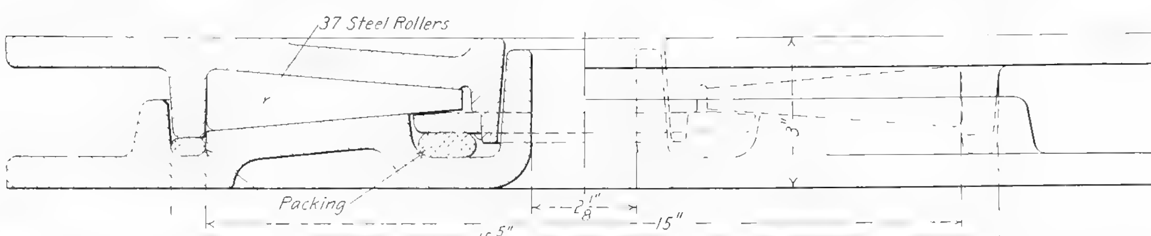


Fig. 1078—Barber Roller Center Bearing, 15 in. Diameter, 37 Rollers. Standard Car Truck Company

Fig. 1080—Barber Roller Center Bearing. Standard Car Truck Company.

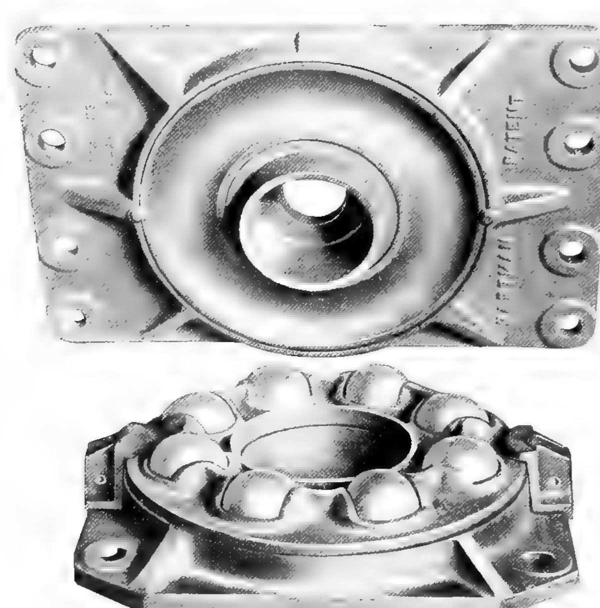


Fig. 1079—Hartman Ball Bearing Center Plate. Joliet Railway Supply Company.

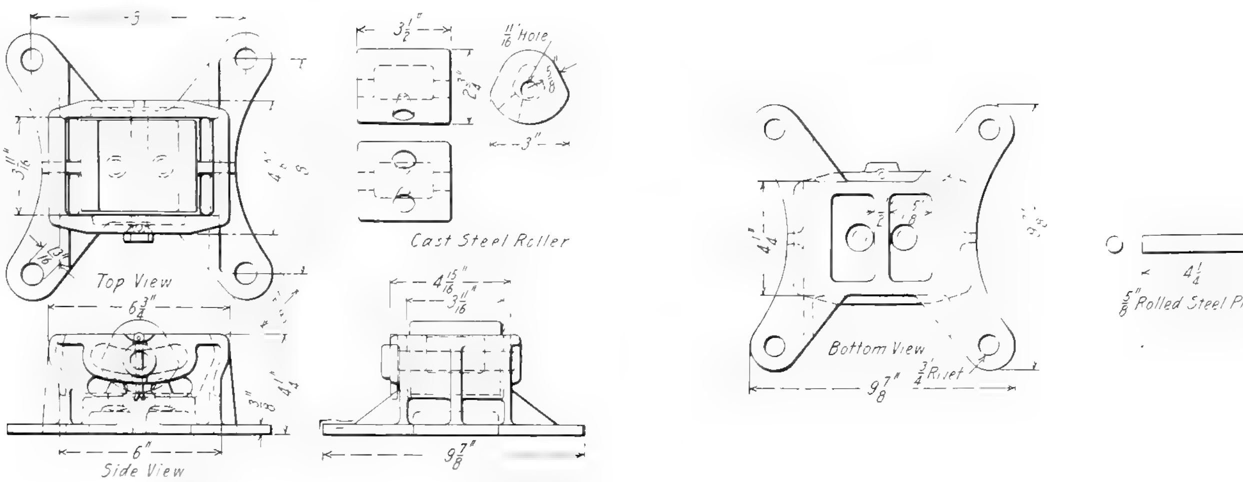


Fig. 1081—Wine Self-Centering Roller Side Bearing. Equipment Improvement Company.

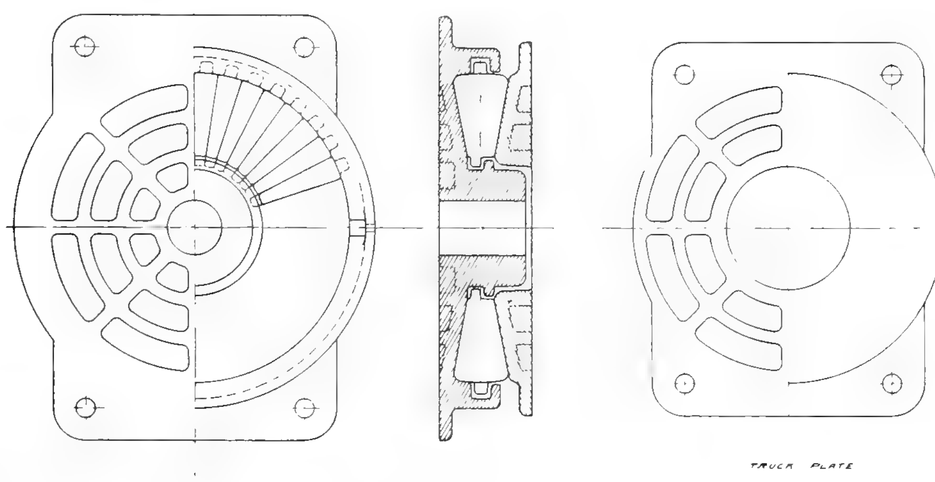


Fig. 1082—General Arrangement of 12 in. Roller Center Plate. Edwin S. Woods & Company.

Fig. 1083—Roller Center Plate. Diameter of Roller Circle, 12 in; Number of Rollers, 40; Diameter, 2¼ in.; Length, 3¼ in. Edwin S. Woods & Company.

Fig. 1084—Norwood Roller Side Bearing. T. H. Symington Company.

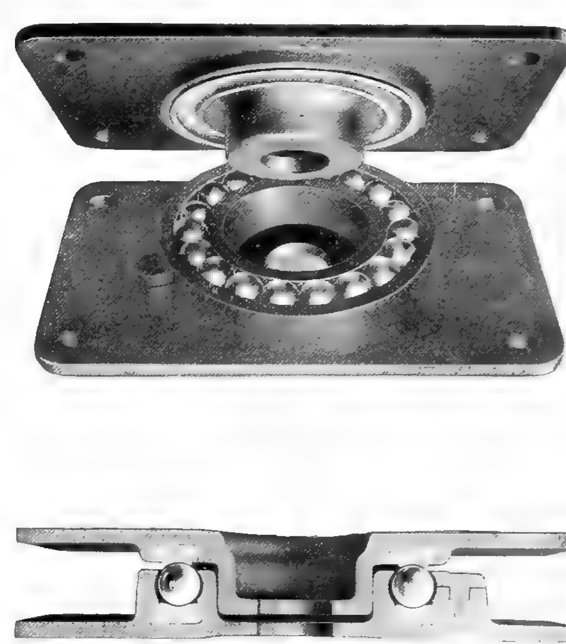


Fig. 1085—Baltimore Ball-Bearing Center Bearing. T. H. Symington Company.

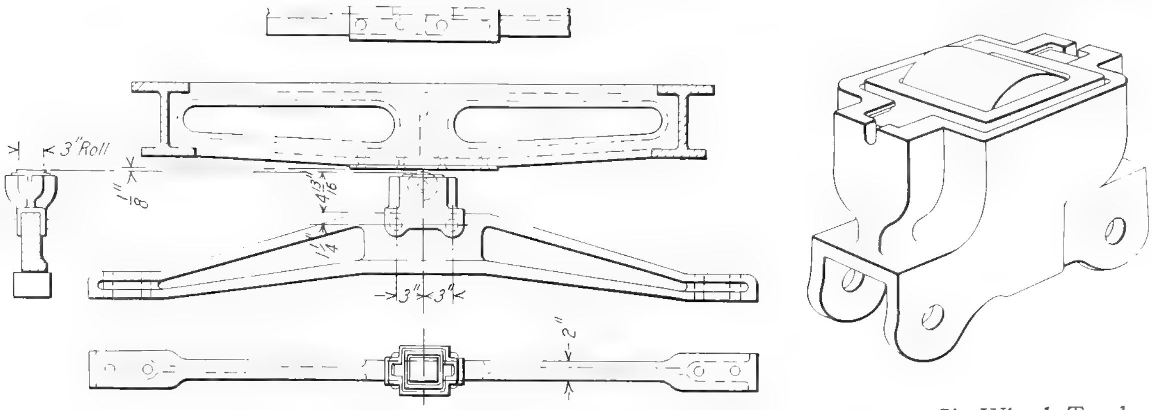


Fig. 1086—Miner Single Roller Side Bearing as Applied to Passenger Equipment Six-Wheel Trucks. W. H. Miner.

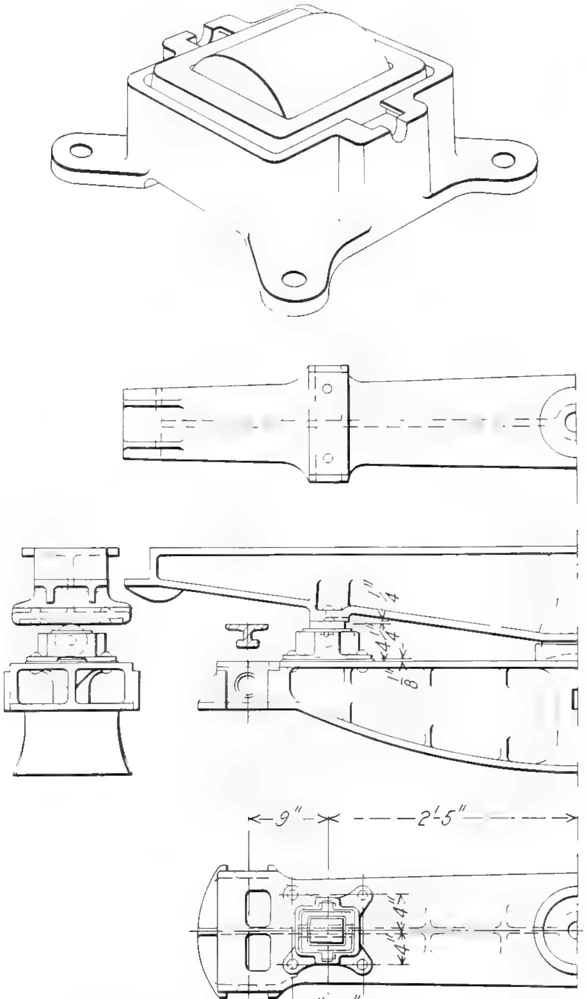


Fig. 1087—Miner Single Roller Side Bearing as Applied to Truck Bolsters for Freight Equipment. W. H. Miner.

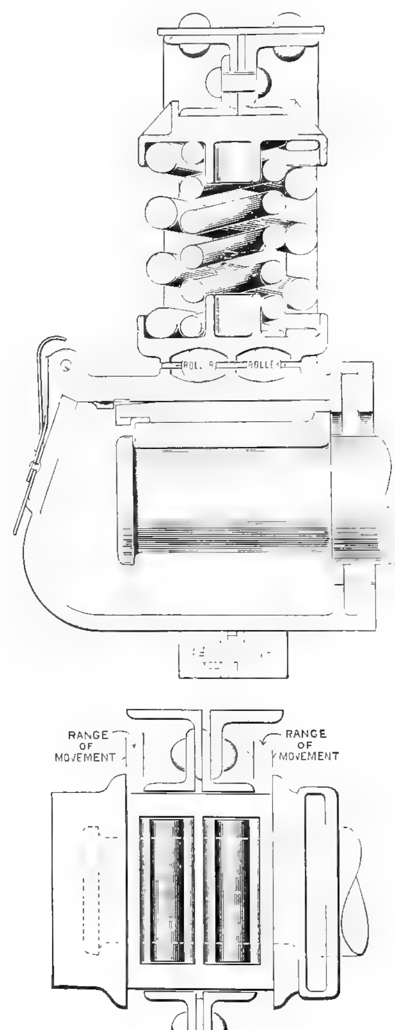


Fig. 1088—Lateral Motion Device for Pedestal Trucks. Standard Car Truck Company.

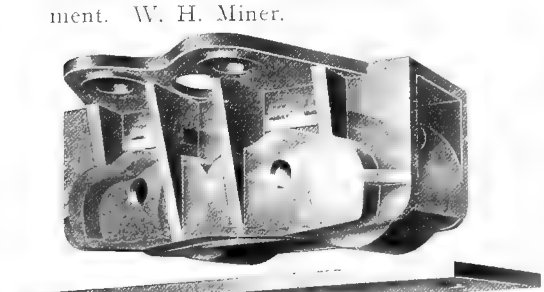


Fig. 1089—Joliet Roller Side Bearing. Joliet Railway Supply Company.

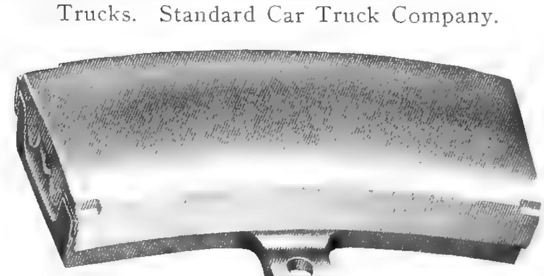


Fig. 1090—Perry Roller Side Bearing. Joliet Railway Supply Company.

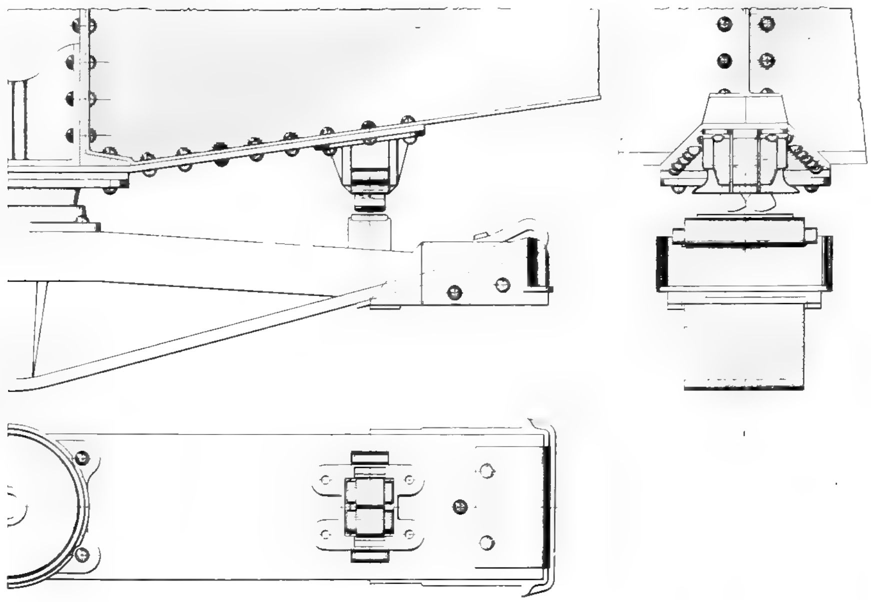


Fig 1091—Tip Roller Side Bearing Applied to 50-Ton Capacity Freight Car. Edwin S. Woods & Company.

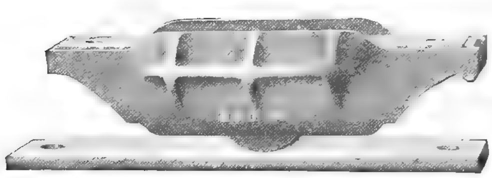


Fig. 1092—Passenger Train Car Side Bearing. Edwin S. Woods & Company.

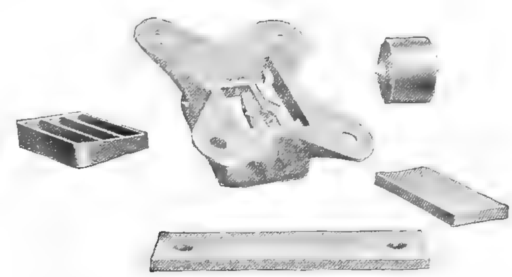


Fig. 1093—Parts of Single Roller Side Bearing for Freight Cars. Edwin S. Woods & Company.

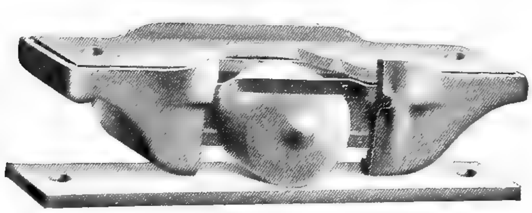


Fig. 1094—Passenger Train Car Side Bearing Showing Roller and Springs. Edwin S. Woods & Company.

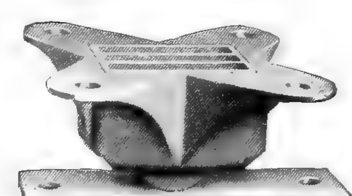


Fig. 1095—Single Roller Side Bearing for Freight Cars. Edwin S. Woods & Company.

Fig. 1096—Lateral Motion Combined Roller Seat and Spring Cap. Standard Car Truck Company.

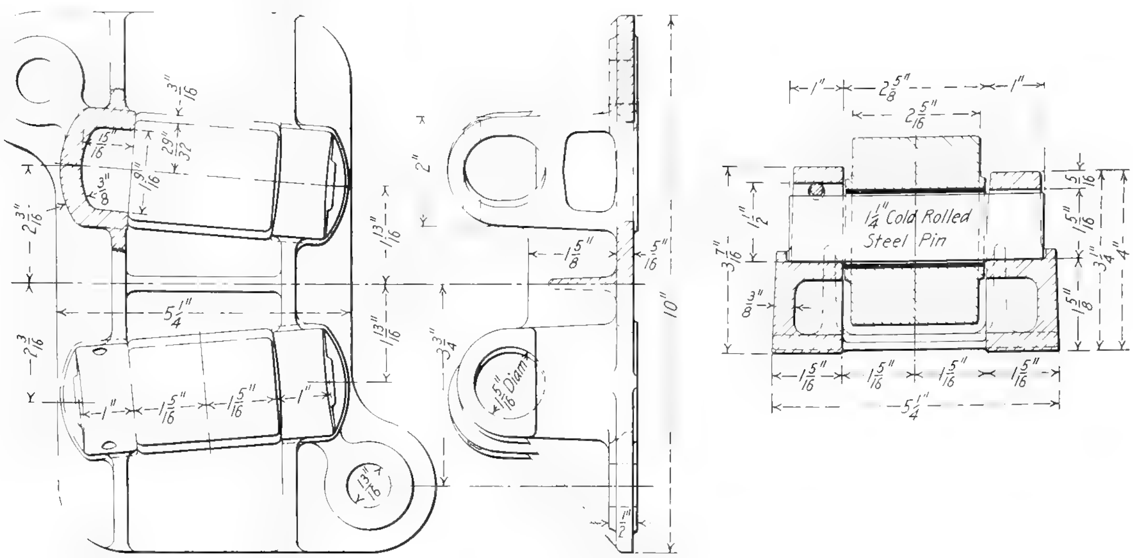


Fig. 1097—Barber Roller Side Bearing for Freight Cars. Standard Car Truck Company.

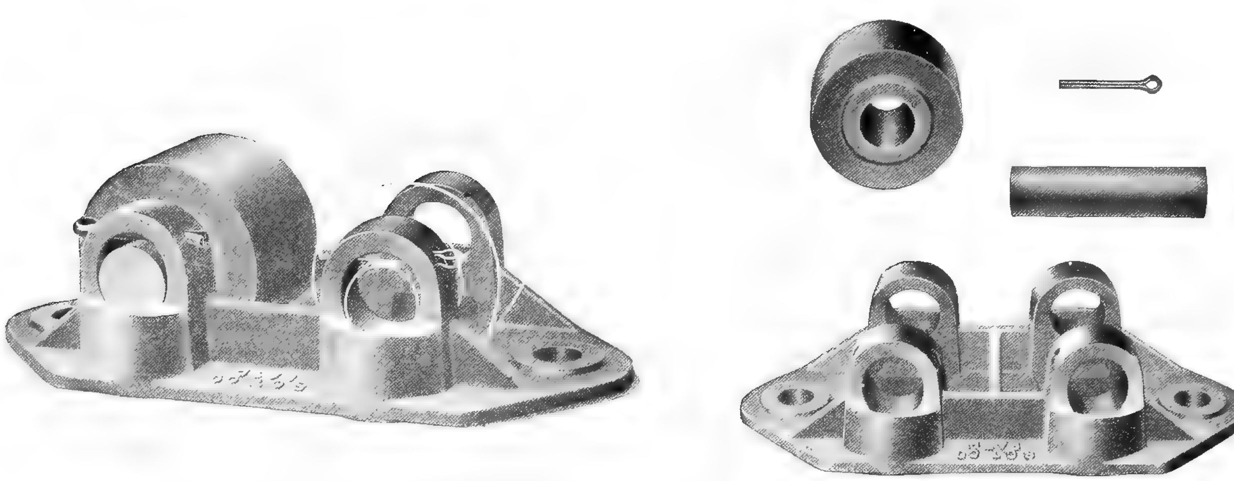


Fig. 1098—Barber Roller Side Bearing for Six-Wheel Passenger Train Car Truck.

Fig. 1099—Type C Stucki Side Bearing for Freight and Passenger Train Cars.

Fig. 1100—Type B Stucki Side Bearing for Passenger Train Cars.

A. Stucki Company.

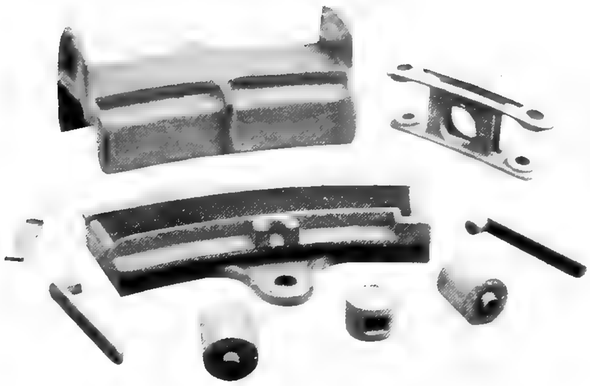


Fig. 1101—Parts of Susemihl Side Bearing.

Fig. 1102—Susemihl Side Bearing for Four-Wheel Passenger Train Car Trucks.

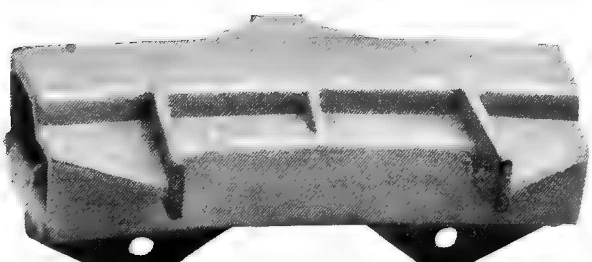


Fig. 1103—Susemihl Side Bearing for Six-Wheel Passenger Train Car Trucks. American Steel Foundries.

Fig. 1104—Susemihl Side Bearing for Freight Car Trucks. American Steel Foundries.

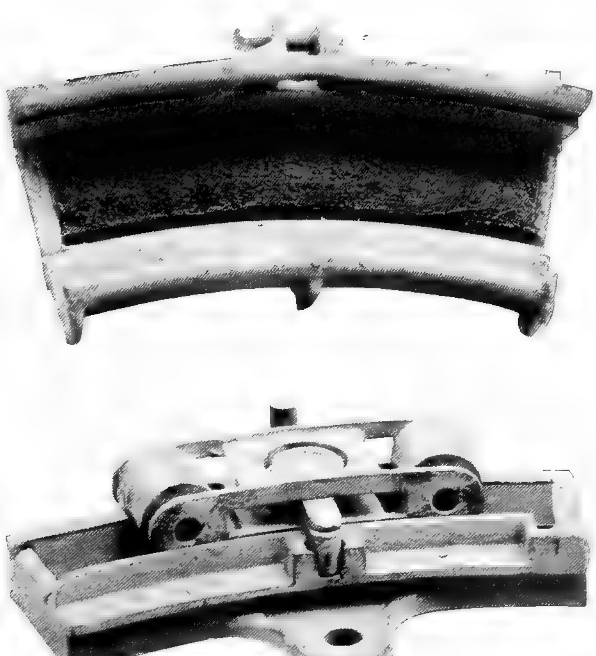


Fig. 1105—Susemihl Side Bearing with Top Removed.

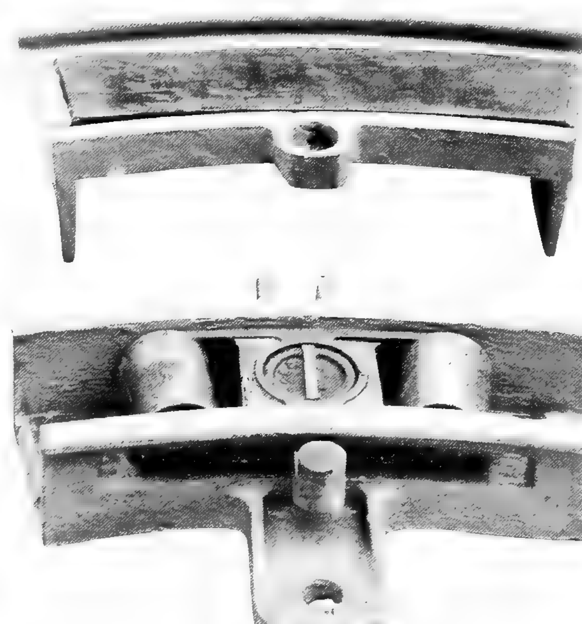


Fig. 1106—Susemihl Side Bearing for Freight Car Trucks, with Top Removed.

American Steel Foundries.

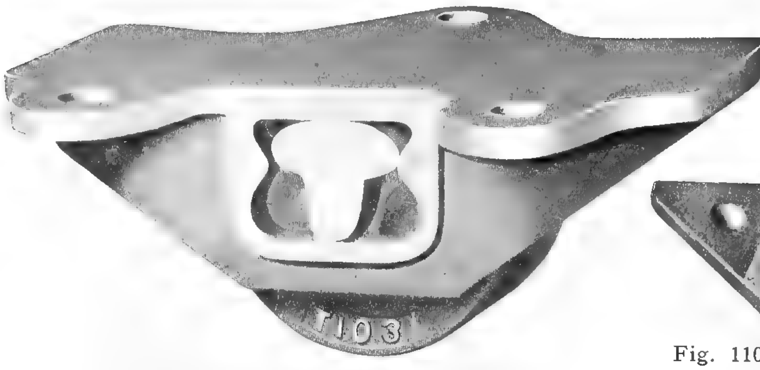


Fig. 1107—Cardwell Rocker Side Bearing

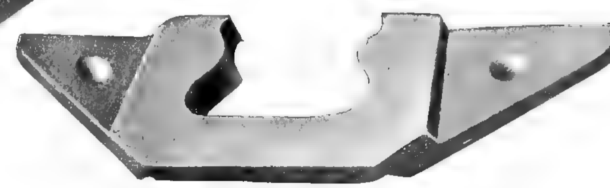


Fig. 1108—Side Plate of Carrier for Cardwell Rocker Side Bearing.

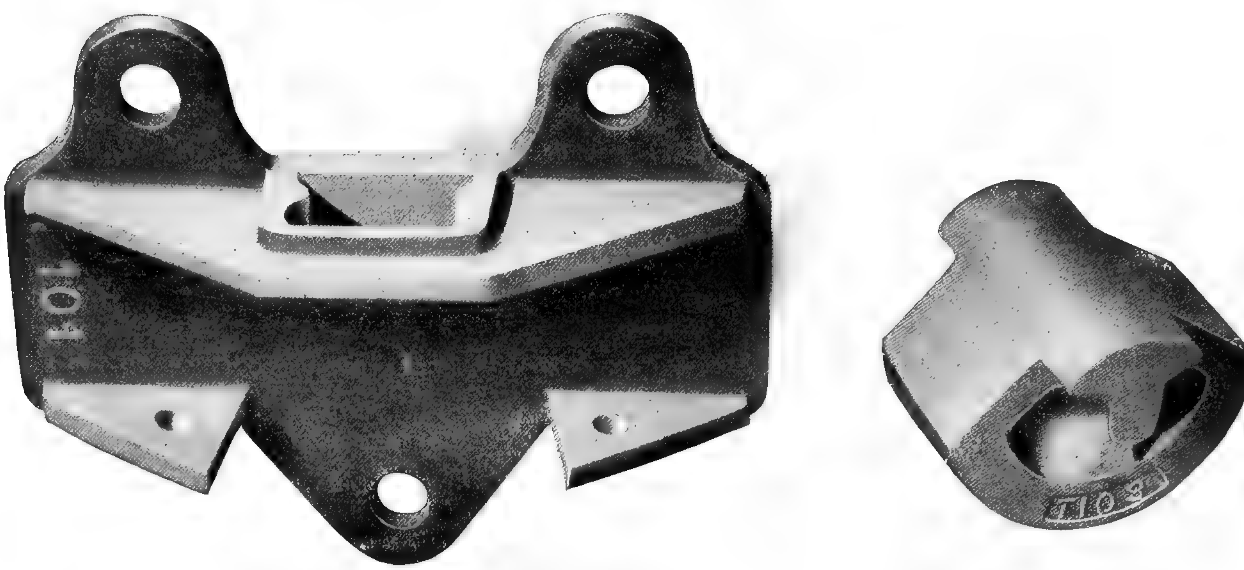


Fig. 1109—Rocker Carrier and Rocker for Cardwell Rocker Side Bearing.
Cardwell Manufacturing Company.

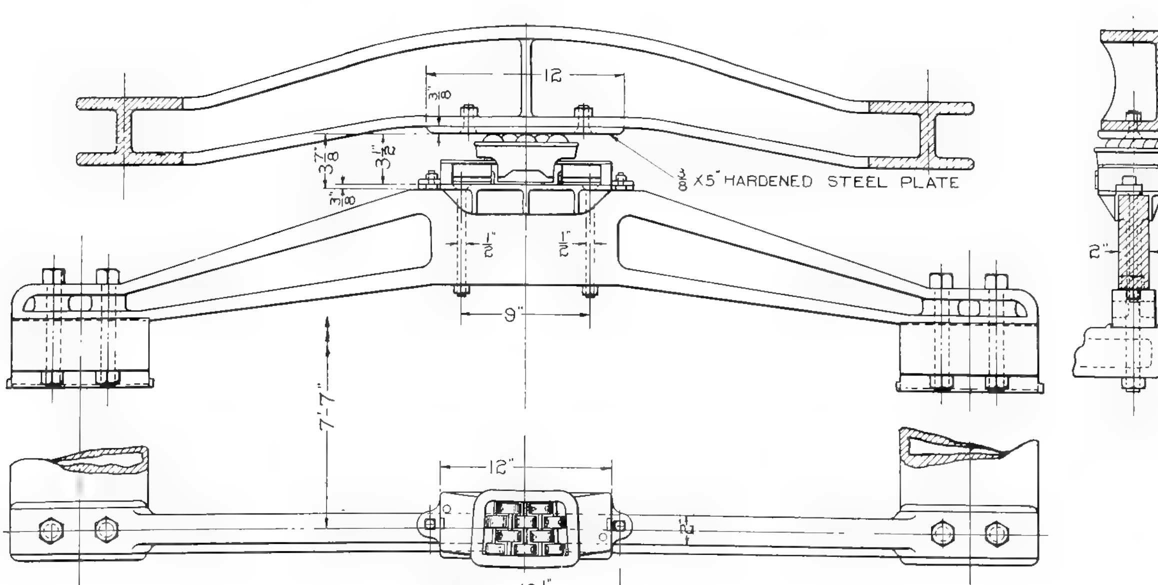


Fig. 1110—Creco Roller Side Bearing Applied to Bearing Bridge of Six-Wheel Truck.

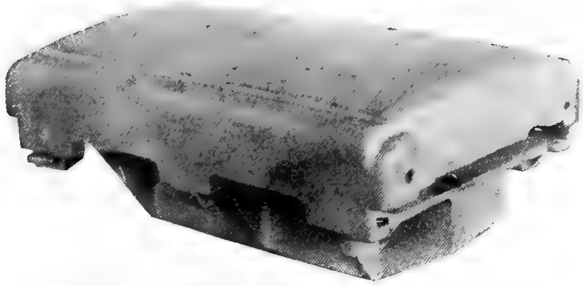


Fig. 1111—Creco Covered Roller Side Bearing.

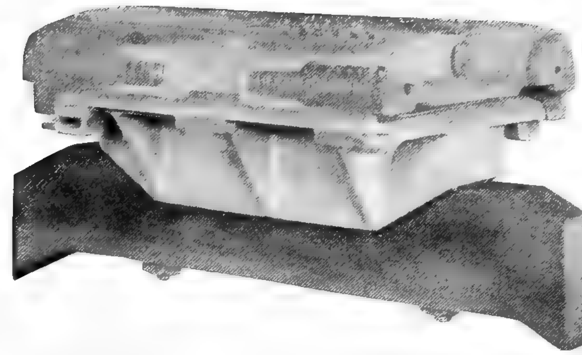


Fig. 1112—Creco Covered Roller Side Bearing Applied to Bearing Bridge of Six-Wheel Truck.

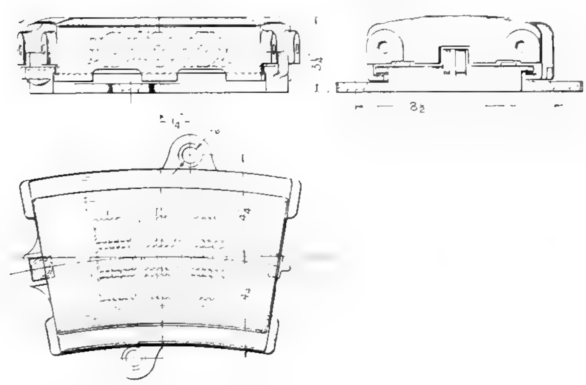


Fig. 1113—Creco Covered Roller Side Bearing for Freight Car Trucks.

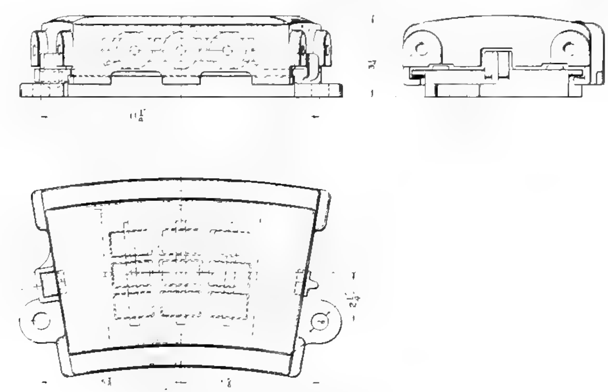


Fig. 1114—Creco Covered Roller Side Bearing for Four-Wheel Passenger Train Car Trucks.

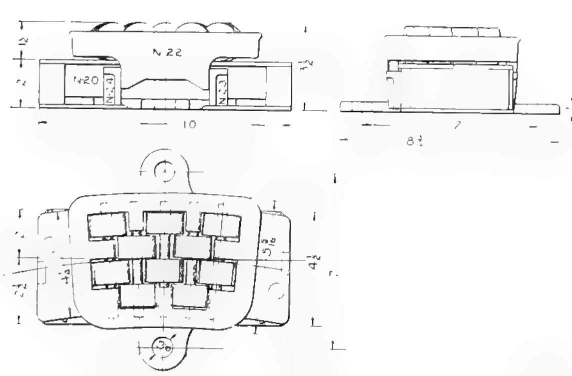


Fig. 1115—Creco Roller Side Bearing for Freight Cars.

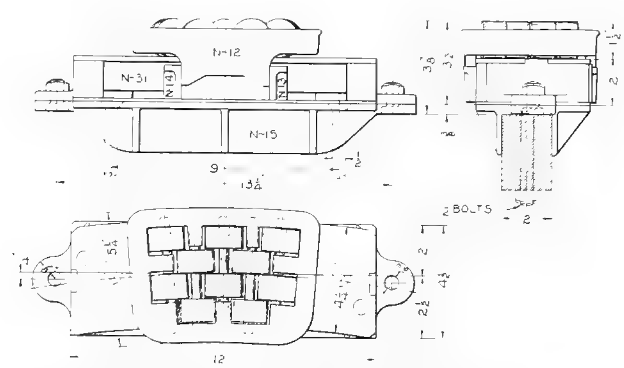


Fig. 1116—Creco Roller Side Bearing No. 7-A for Six-Wheel Passenger Train Car Trucks.

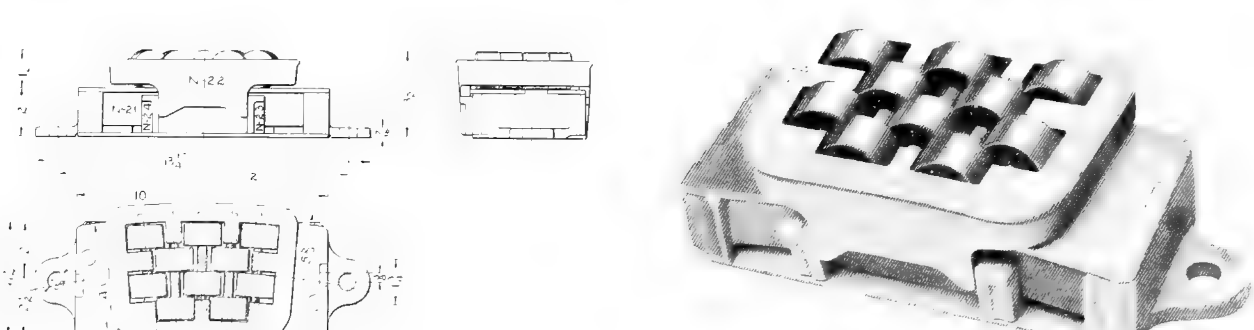


Fig. 1117—Creco Roller Side Bearing No. 4-A for Four-Wheel Passenger Train Car Trucks.
Chicago Railway Equipment Company.

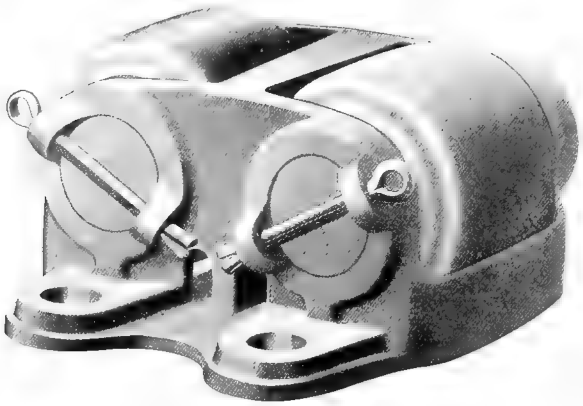


Fig. 1118- Economy Roller Side Bearing

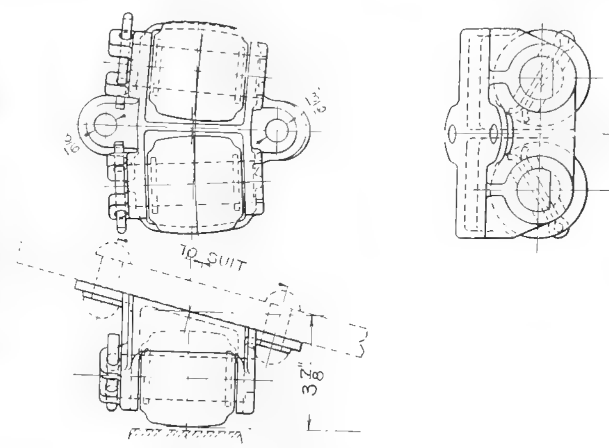


Fig. 1119—Economy Inverted Style Roller Side Bearing for Freight Service.

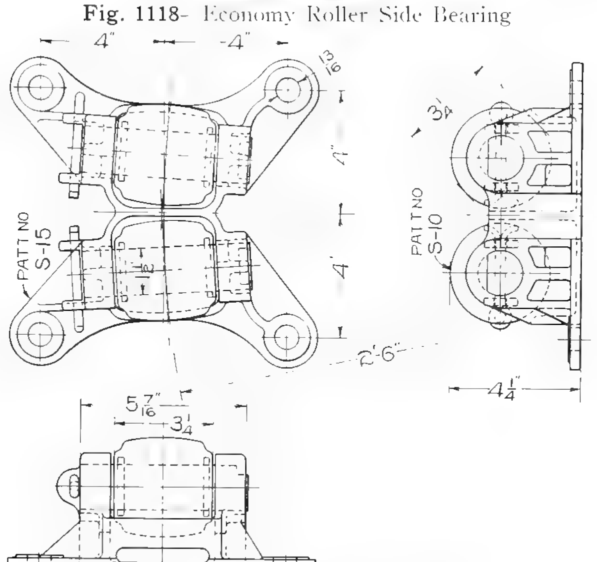


Fig. 1120—Economy Roller Side Bearing for New York Central Lines.

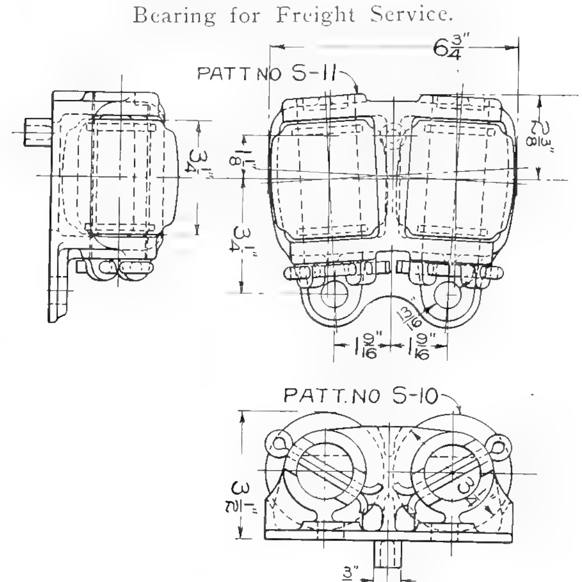


Fig. 1121—Economy Double Roller Side Bearing for Freight Service.

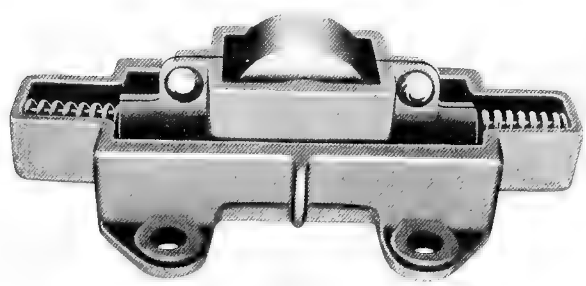


Fig. 1122—Drexel Roller Side Bearing.

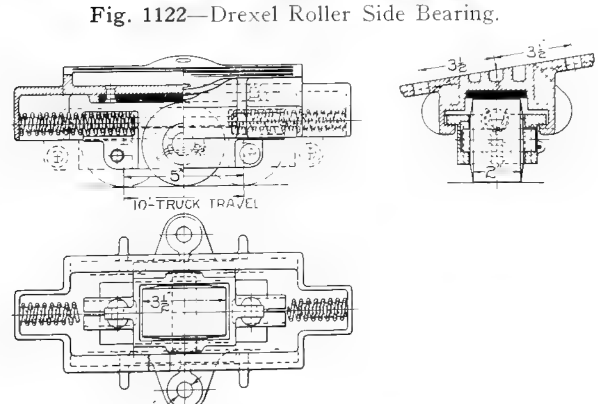


Fig. 1123—Drexel Single Roller Side Bearing for Freight Service.

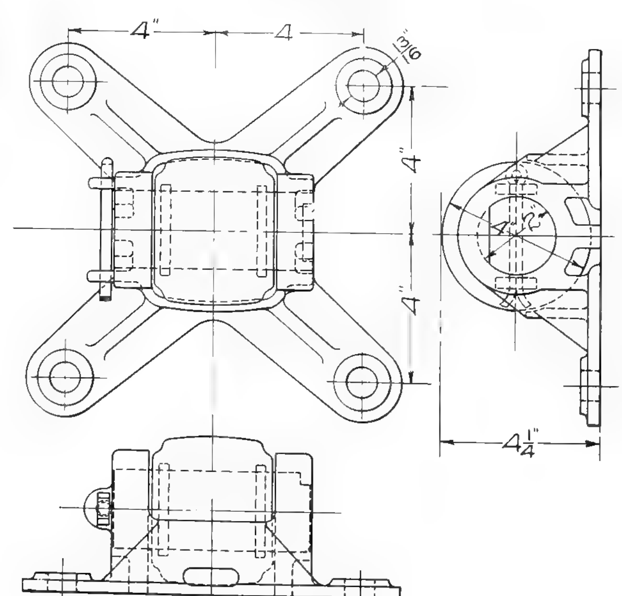


Fig. 1124—Economy Single Roller Side Bearing for Freight Service.

Chicago Railway Equipment Company.

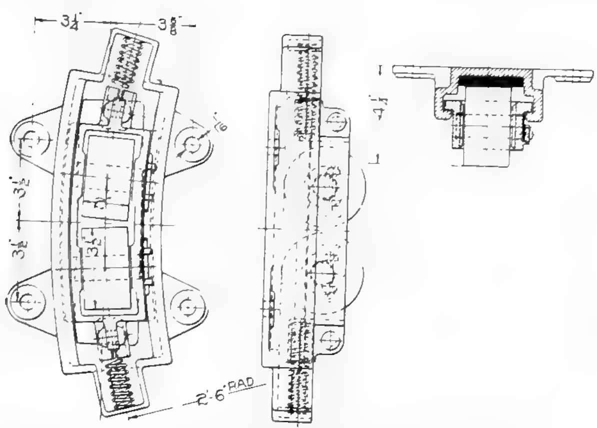


Fig. 1125—Drexel Double Roller Side Bearing for Freight and Passenger Service.

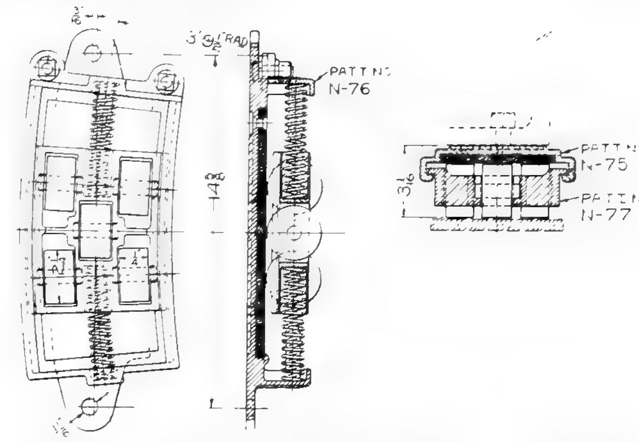


Fig. 1126—Drexel Five-Roller Side Bearing for Passenger Service.

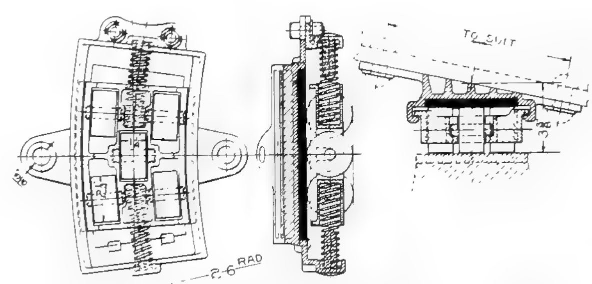


Fig. 1127—Drexel Five-Roller Side Bearing for Freight Service.

Chicago Railway Equipment Company.

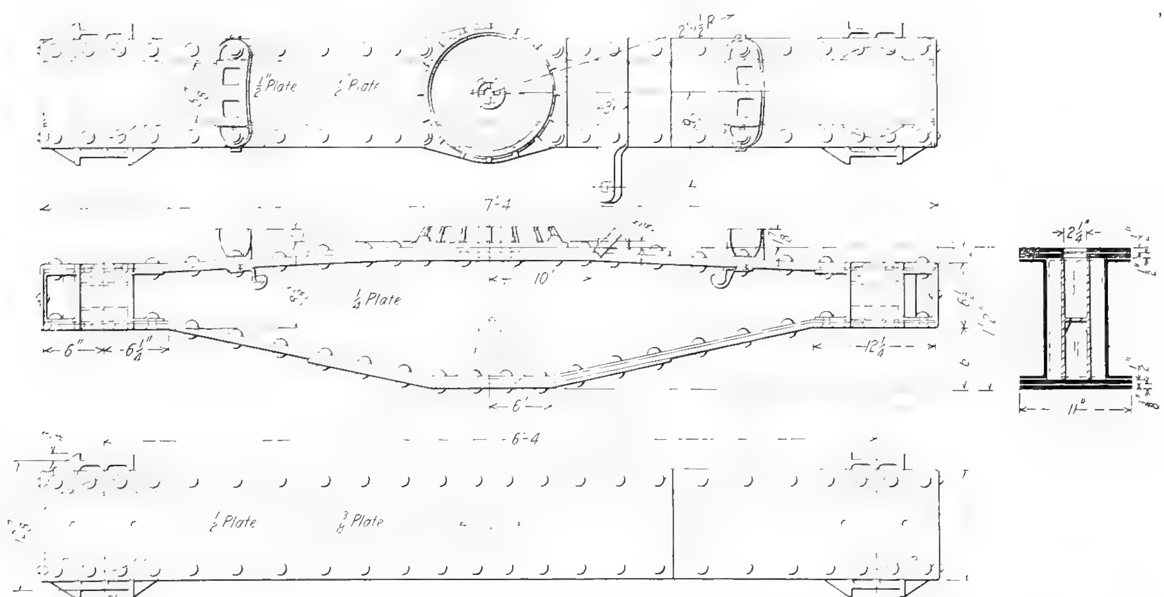


Fig. 1128—American Car & Foundry Company Standard Truck Bolster for 40-Ton Capacity Cars.

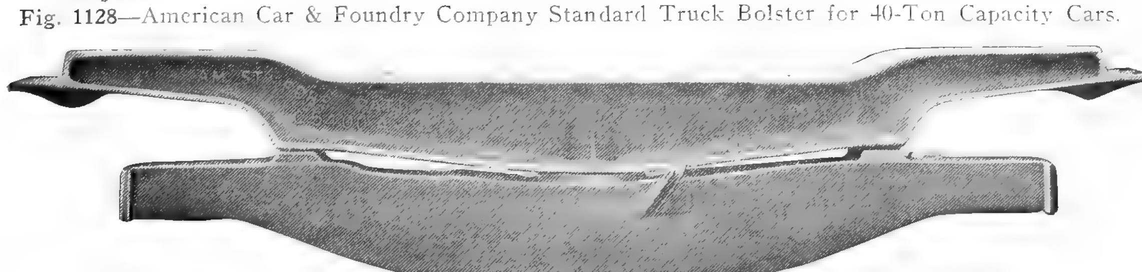


Fig. 1129—Cast Steel Truck and Body Bolsters for Freight Cars. American Steel Foundries.

Note.—For Other Views of Body and Truck Bolsters Combined See Body Bolsters.

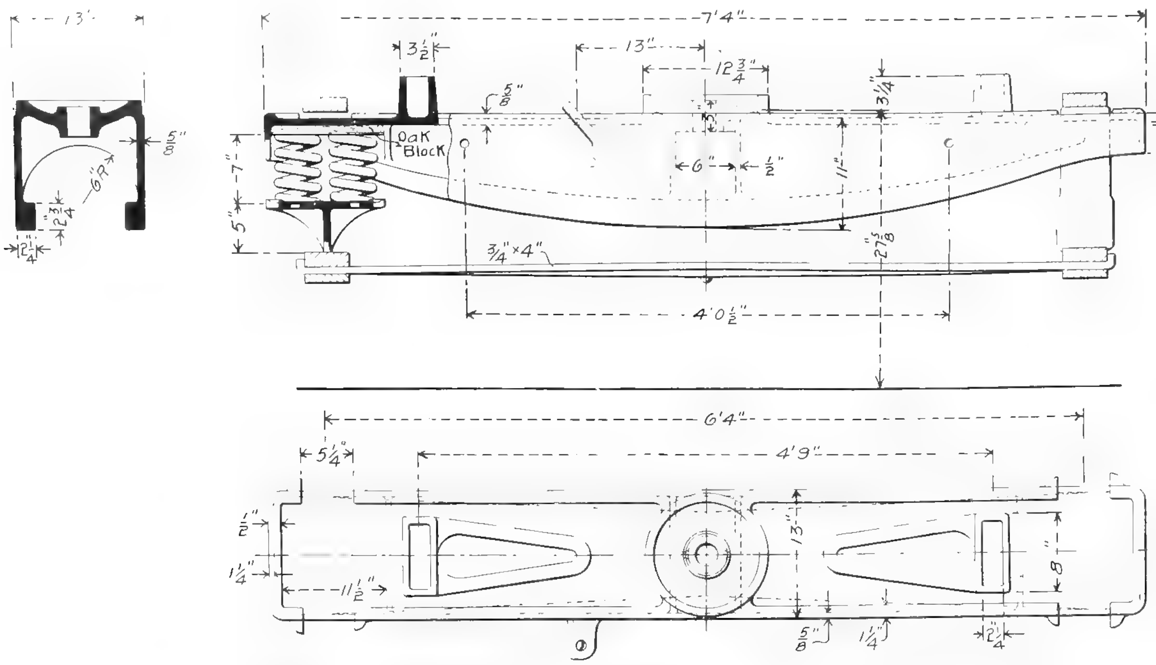


Fig. 1130—Cast Steel Truck Bolster for Freight Cars. American Steel Foundries.

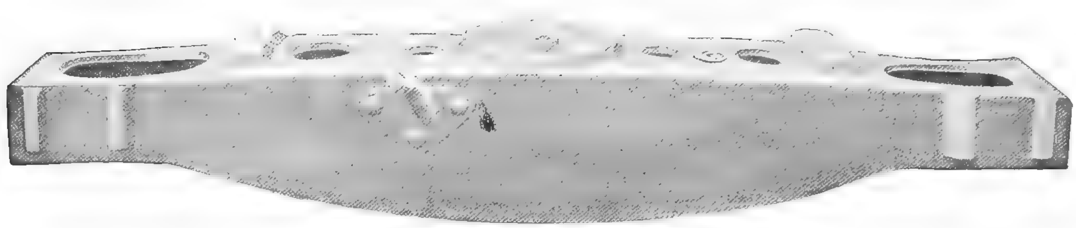


Fig. 1131—Box Shape Cast Steel Truck Bolster for Freight Cars. American Steel Foundries.

Fig. 1132—T-Shape Cast Steel Truck Bolster for 30 to 50-Ton Capacity Freight Cars. American Steel Foundries.

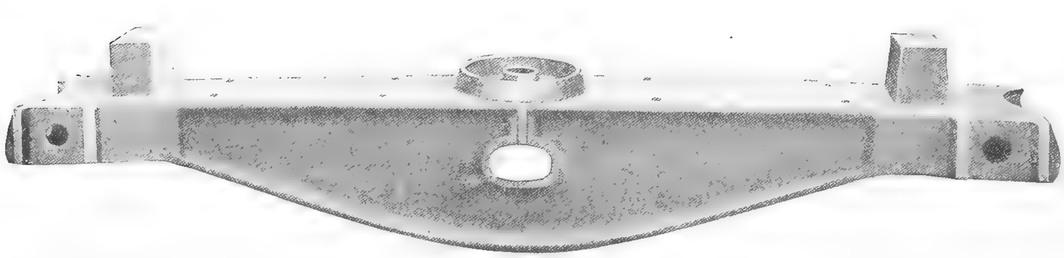


Fig. 1133—I-Shape Cast Steel Truck Bolster for 30 and 40-Ton Capacity Freight Cars. American Steel Foundries.

Fig. 1134—Simplex Truck Bolster for 40-Ton Capacity Freight Cars. American Steel Foundries.

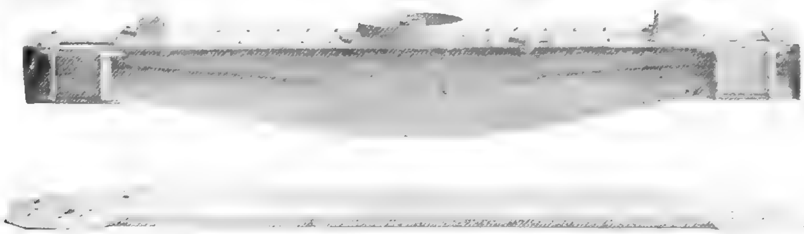


Fig. 1135—Bettendorf Truck Bolster and Spring Plank for Freight Cars. Bettendorf Axle Company.

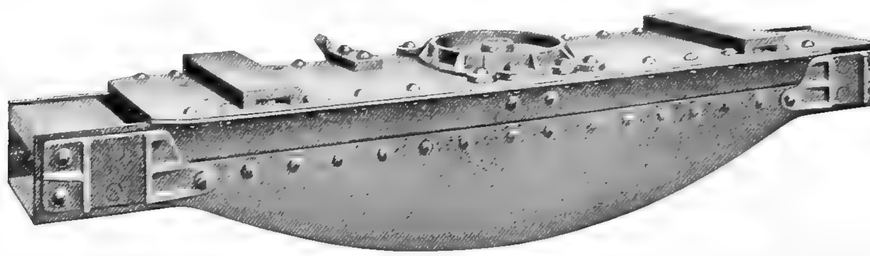


Fig. 1136—Empire Truck Bolster for Freight Cars. U. S. Metal & Manufacturing Company.

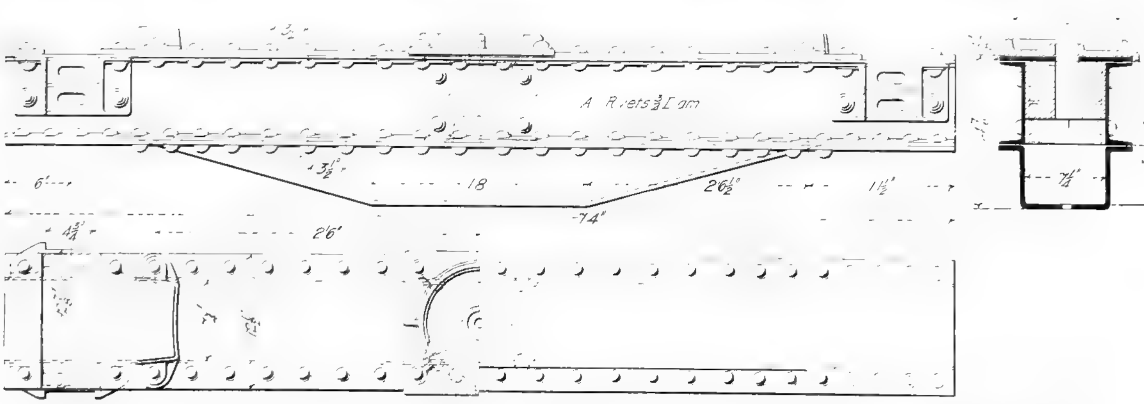


Fig. 1137—Monitor Truck Bolster for 40-Ton Capacity Freight Cars. Chicago Railway Equipment Company.

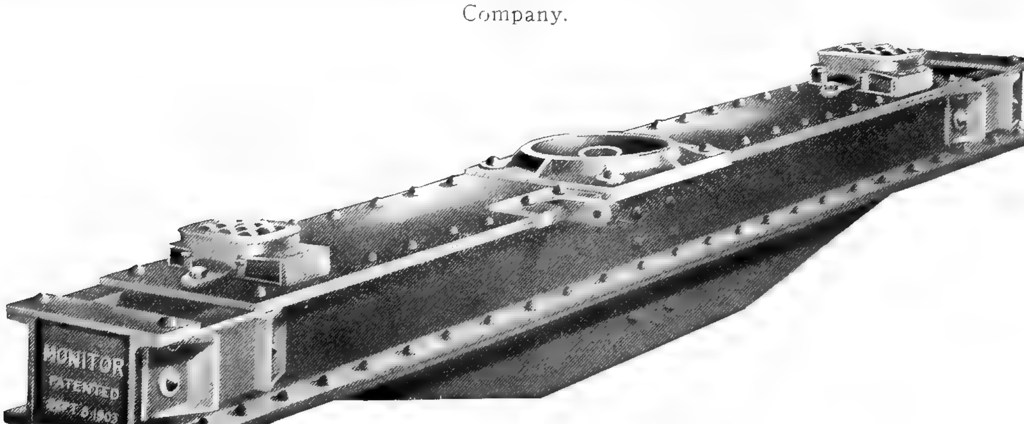


Fig. 1138—Monitor Truck Bolster with Creco Roller Side Bearings for Freight Cars. Chicago Railway Equipment Company.

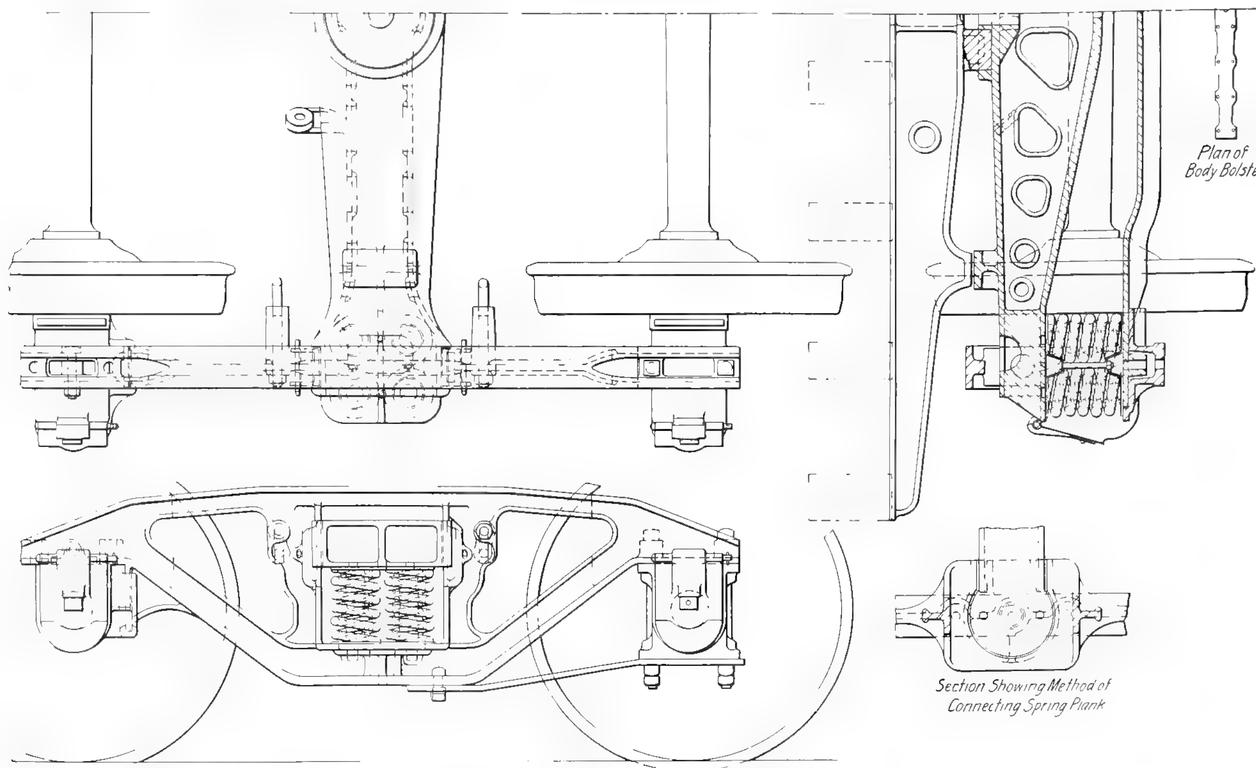


Fig. 1139—Cast-Steel Bolsters and Side Frame.
Pittsburgh Steel Foundry Company.

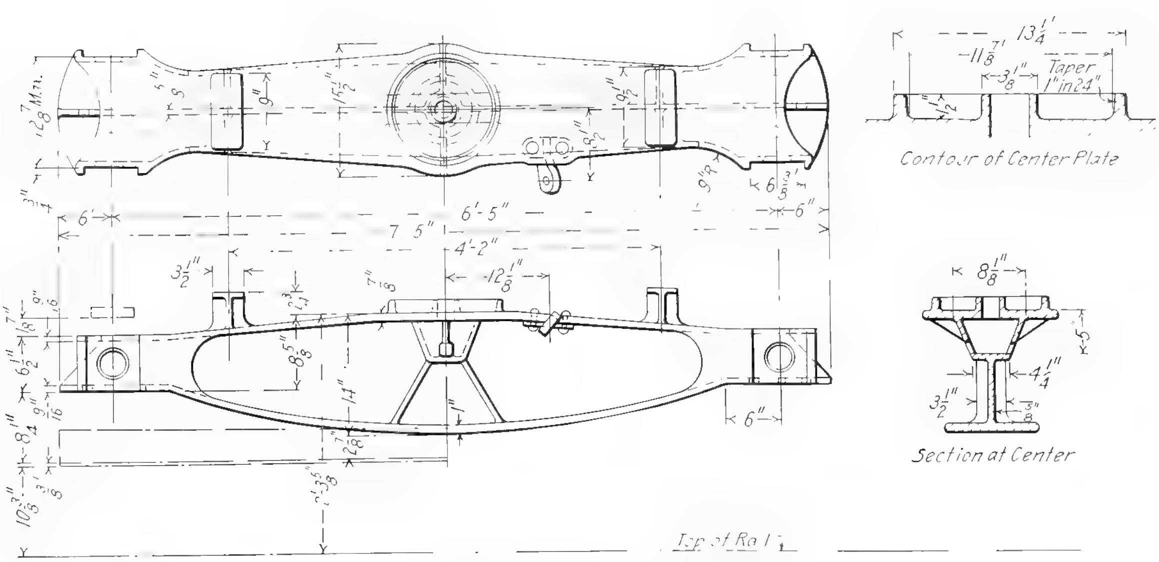


Fig. 1140—Truck Bolster for Freight Cars
Scullin Steel Company.

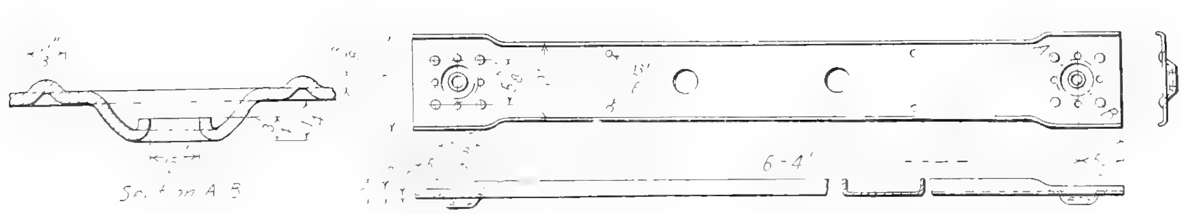


Fig. 1141—Scullin Equalized Spring Plank.
Scullin Steel Company.

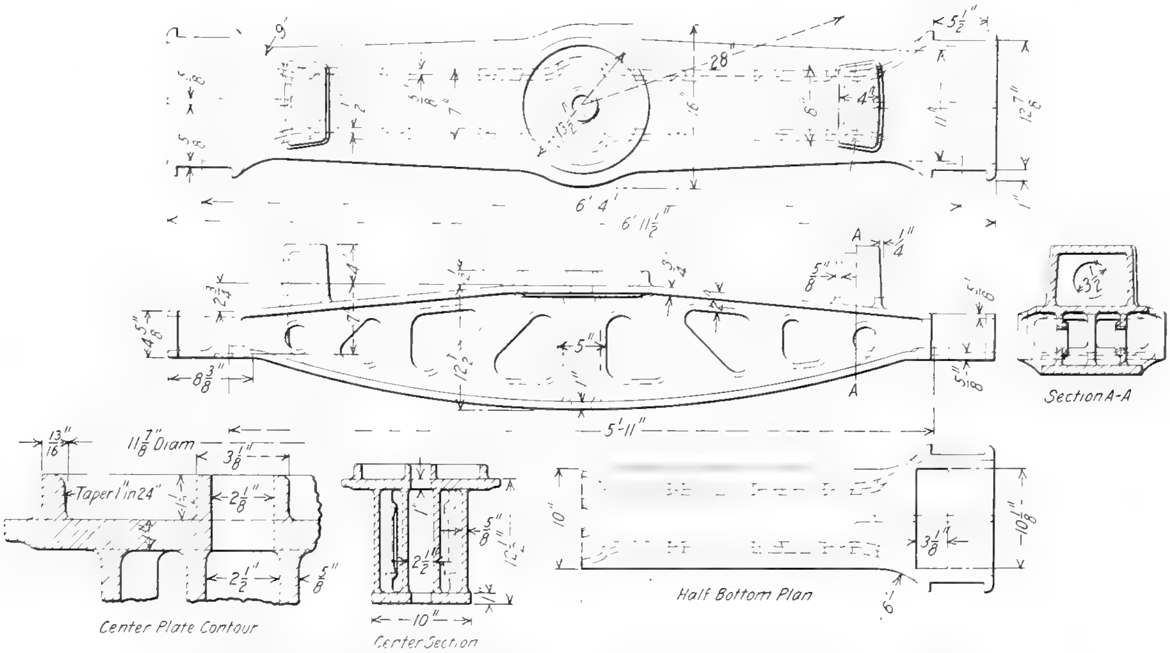


Fig. 1142—Cast Steel Truck Bolster. Pittsburgh Steel Foundry Company.

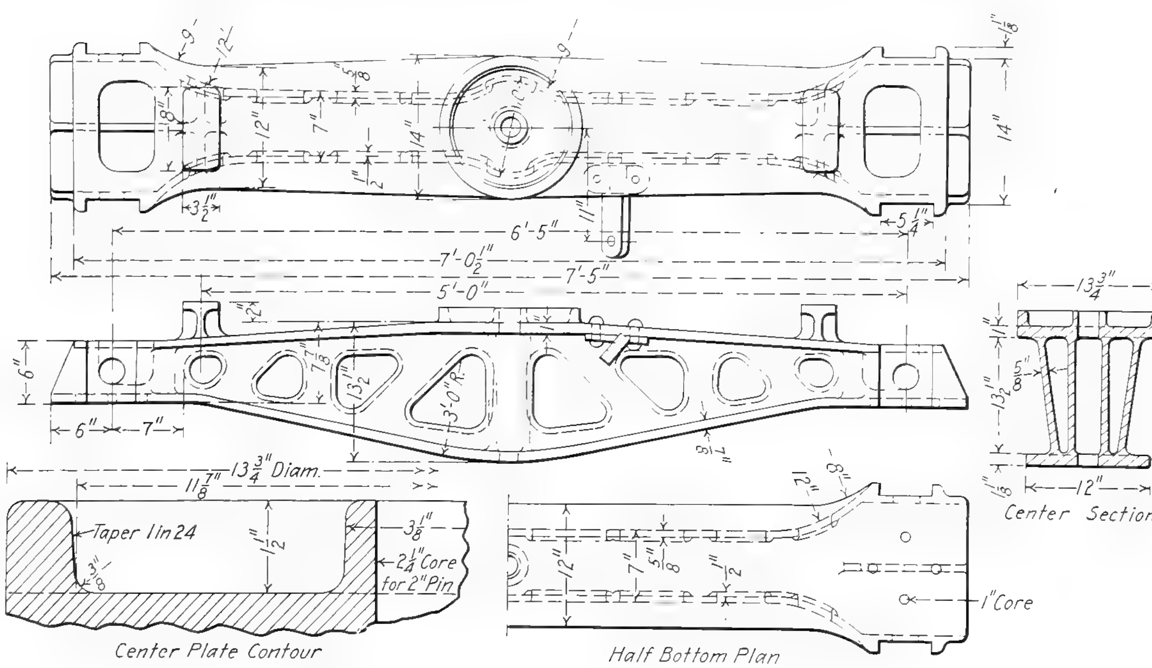


Fig. 1143—Cast Steel Truck Bolster. Pittsburgh Steel Foundry Company.

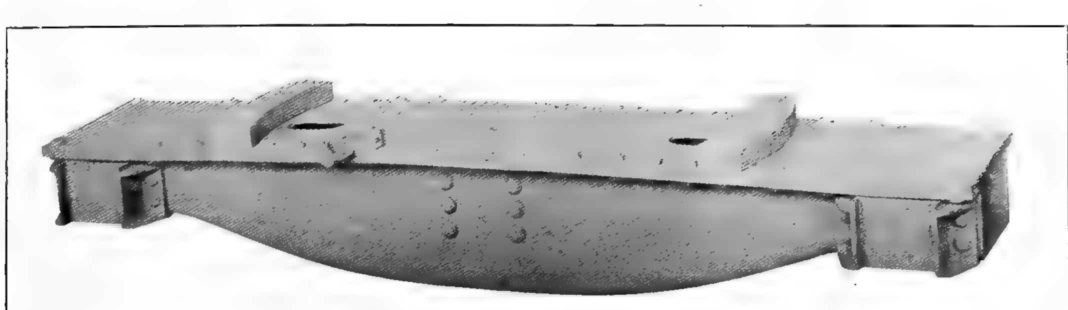


Fig. 1144—Truck Bolster for 70-Ton Capacity Car. Pressed Steel Car Company.

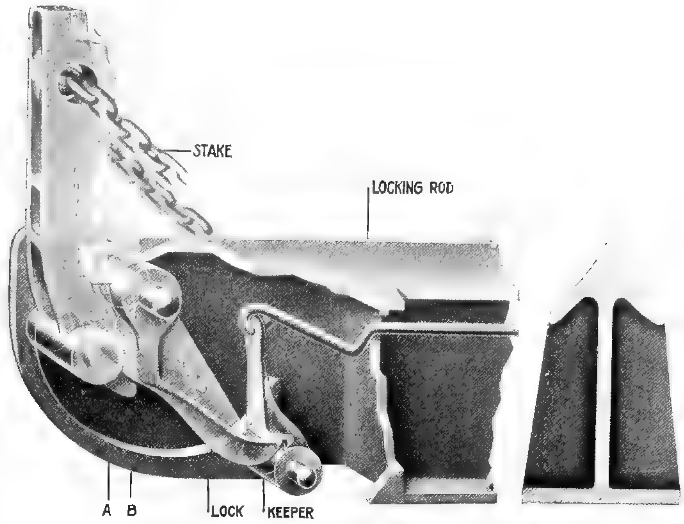


Fig. 1145—End Arrangement Russel Spear-Edge Drop Stake Logging Bunk.
Russel Wheel & Foundry Company.

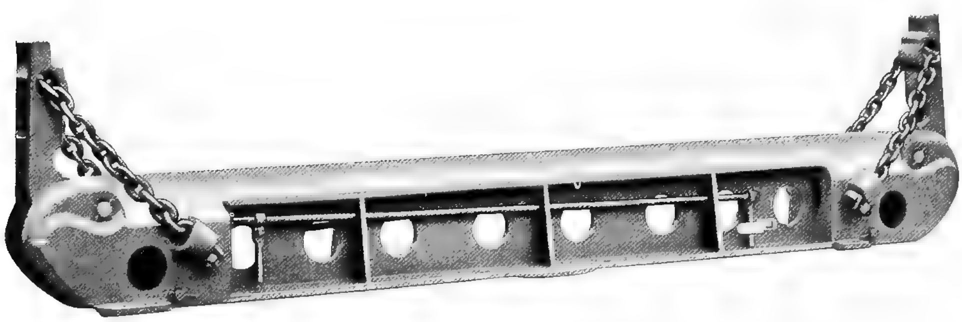


Fig. 1146—Russel Spear-Edge Cast Steel Drop Stake Logging Bunk.
Russel Wheel & Foundry Company.

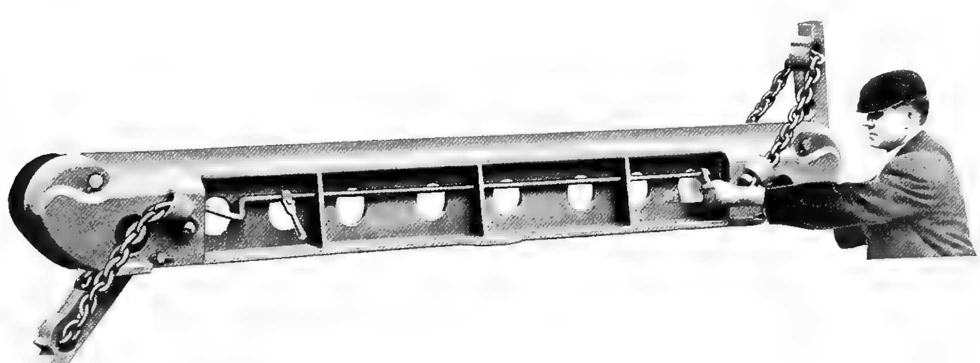


Fig. 1147—Operation of the Russel Spear-Edge Bunk.
Russel Wheel & Foundry Company.

Fig. 1148—Gould Improved Z-Type Cast Steel Truck Bolster for Freight Cars. Gould Coupler Company.

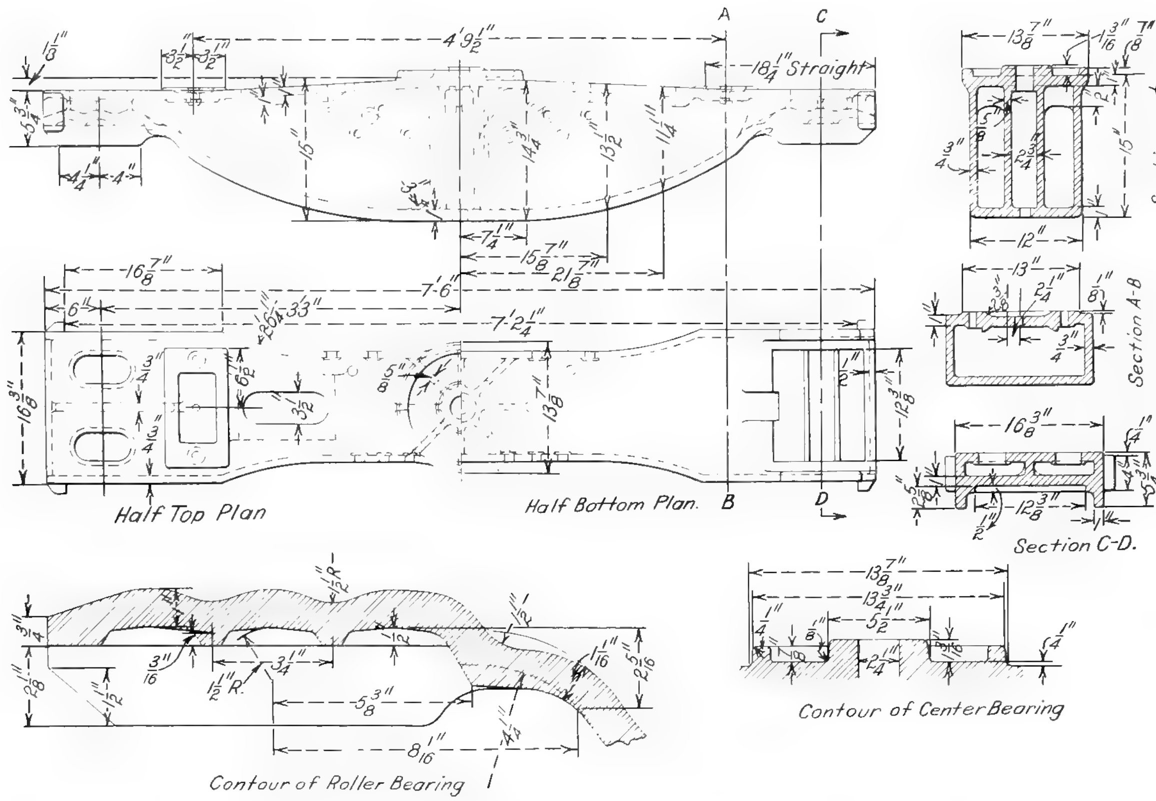


Fig. 1149—Cast Steel Truck Bolster for Baltimore & Ohio 70-Ton Capacity Freight Cars. Buckeye Steel Castings Company.

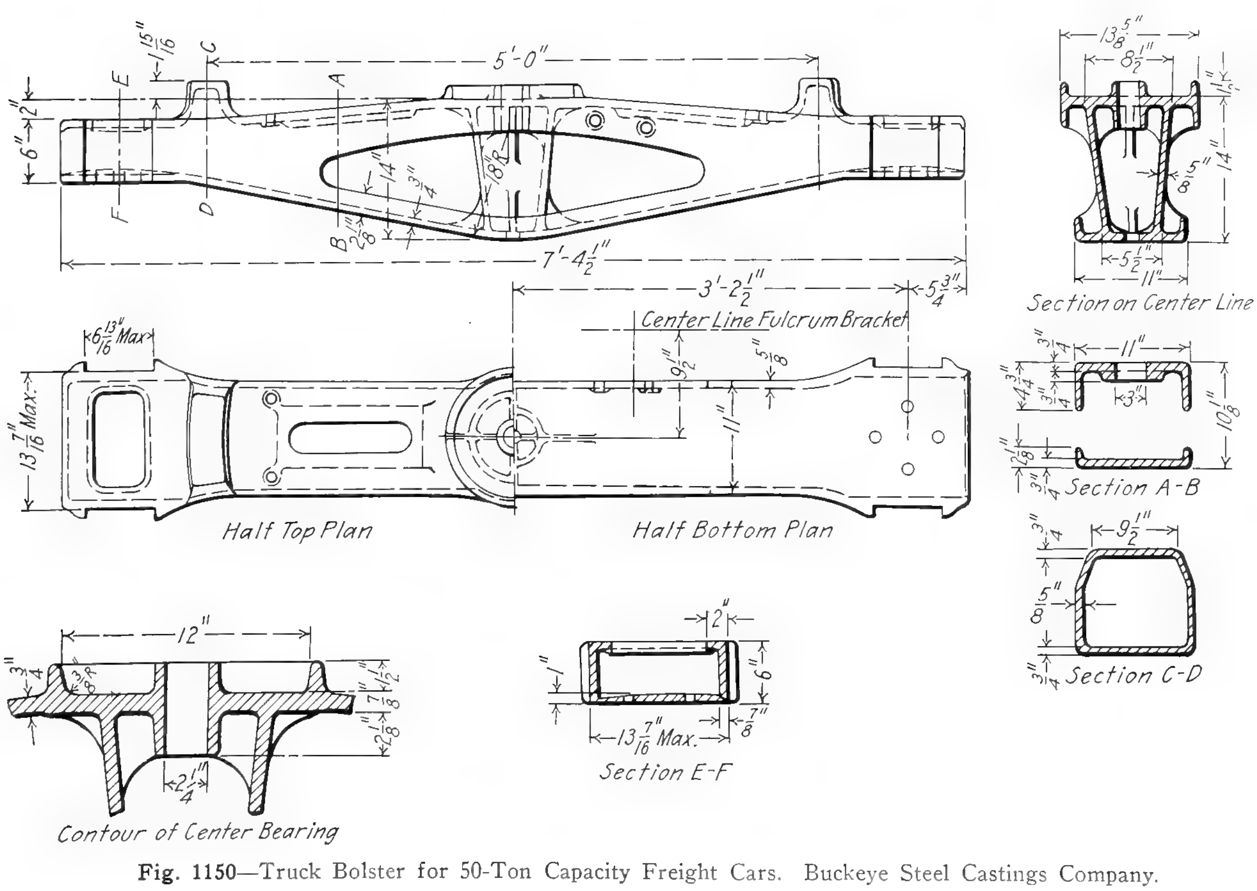


Fig. 1150—Truck Bolster for 50-Ton Capacity Freight Cars. Buckeye Steel Castings Company.

Fig. 1151—Buckeye Cast Steel Truck Bolster for Freight Cars. Buckeye Steel Castings Company.

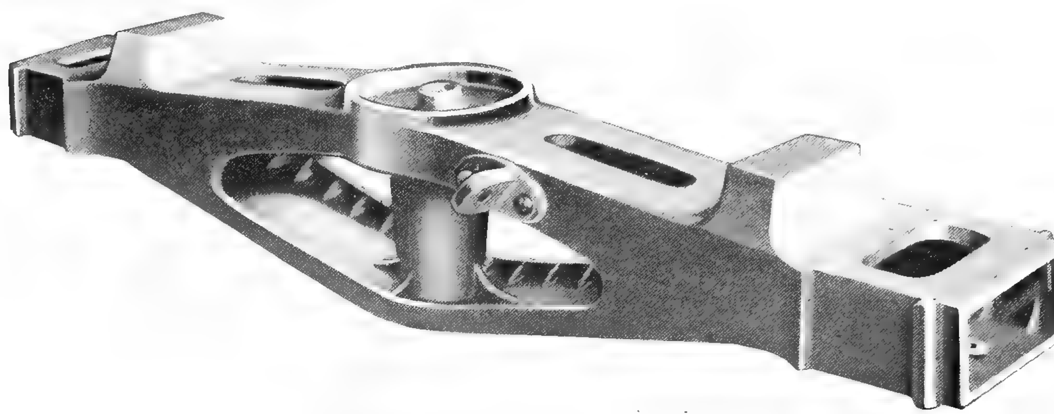


Fig. 1152—Buckeye Cast Steel Truck Bolster for Freight Cars. Buckeye Steel Castings Company.

Fig. 1153—Commonwealth Cast Steel Bolster for Six-Wheel Passenger Train Car Truck. Commonwealth Steel Company

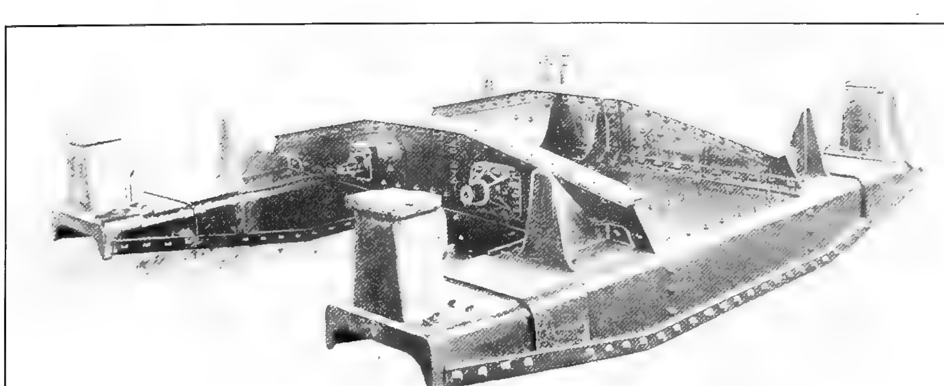


Fig. 1154—Bolster for Pennsylvania Railroad All-Steel Passenger Train Car Truck.

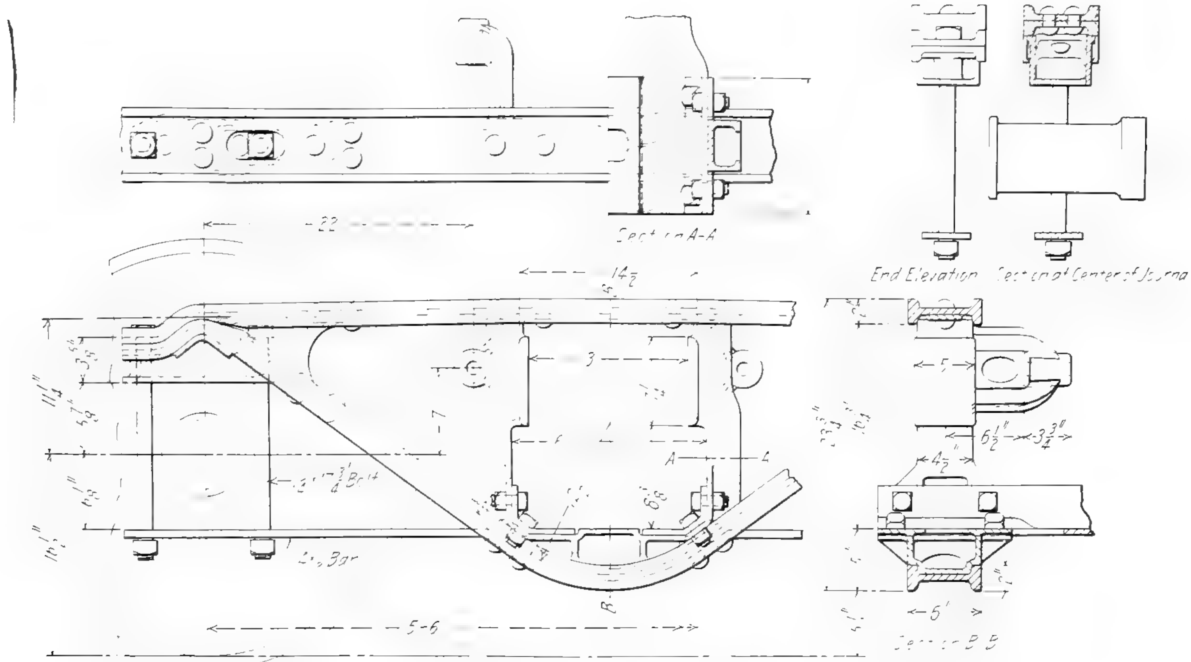


Fig. 1155—Built-Up Steel Side Frame. Summers Steel Car Company

Fig. 1156—Buckeye Pedestal Truck Frame. Buckeye Steel Castings Company.

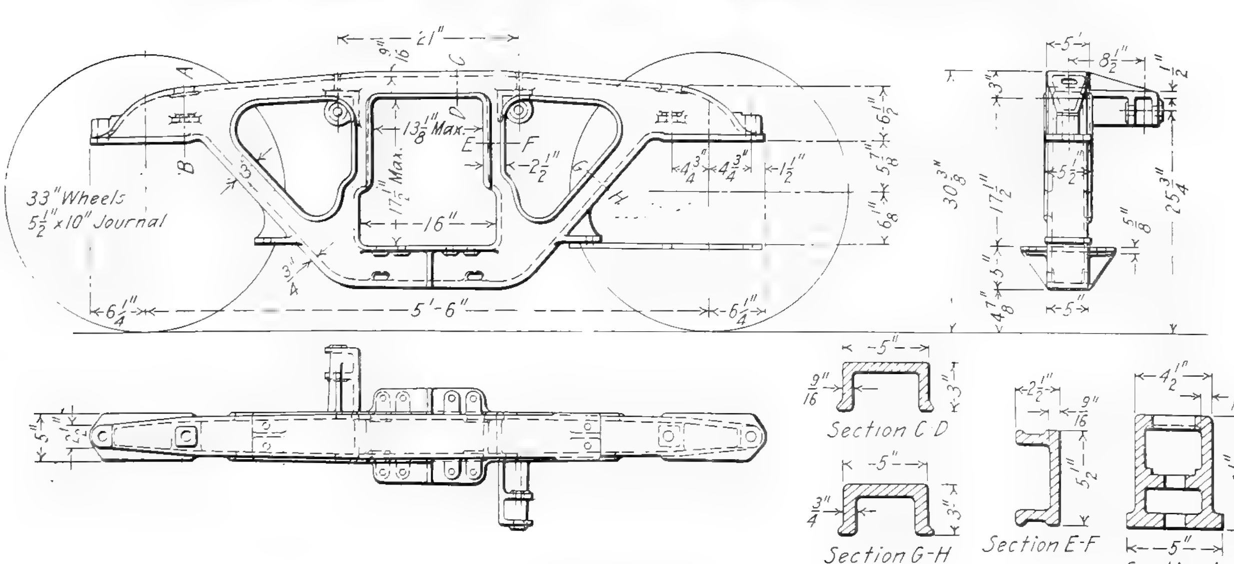


Fig. 1157—Buckeye Channel Section Truck Frame for 50-Ton Capacity Freight Cars. Buckeye Steel Castings Company.

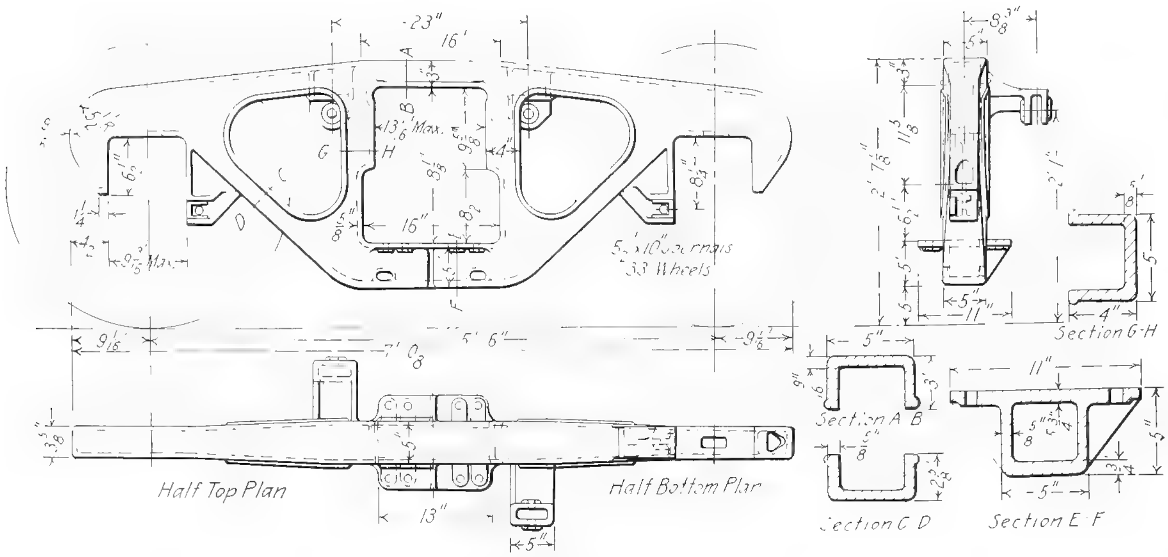


Fig. 1158—Buckeye Pedestal Channel Section Side Frame for 50-Ton Capacity Freight Cars. Buckeye Steel Castings Company.

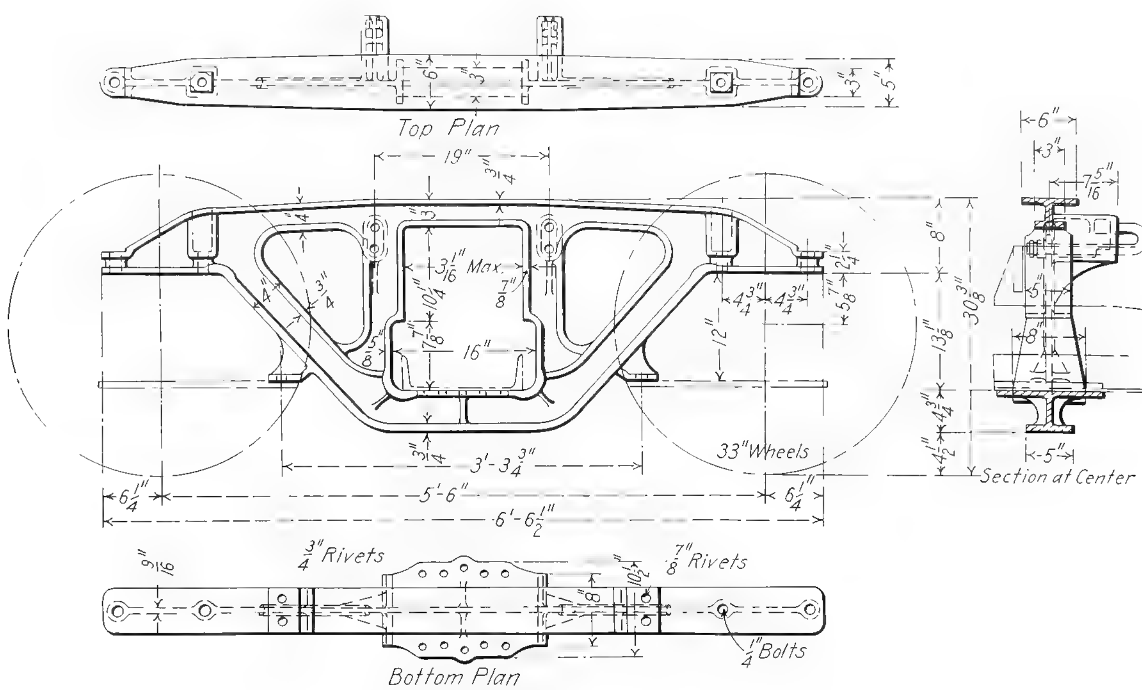


Fig. 1159—Truck Side Frame for Buffalo, Rochester & Pittsburgh 50-Ton Capacity Gondola Cars. Scullin Steel Company.

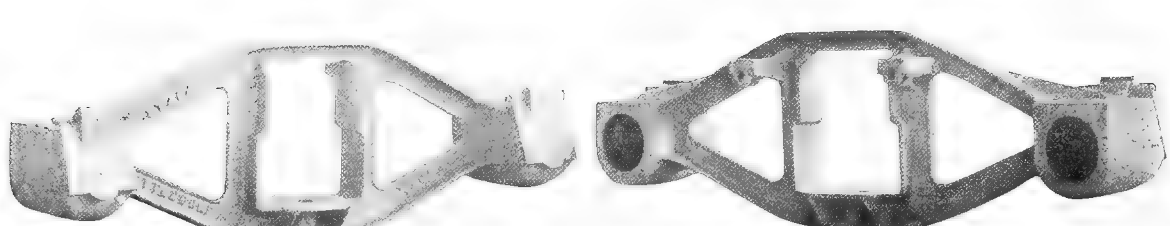


Fig. 1160—Bettendorf Cast Steel Side Frame for Freight Car Trucks. The Bettendorf Company.

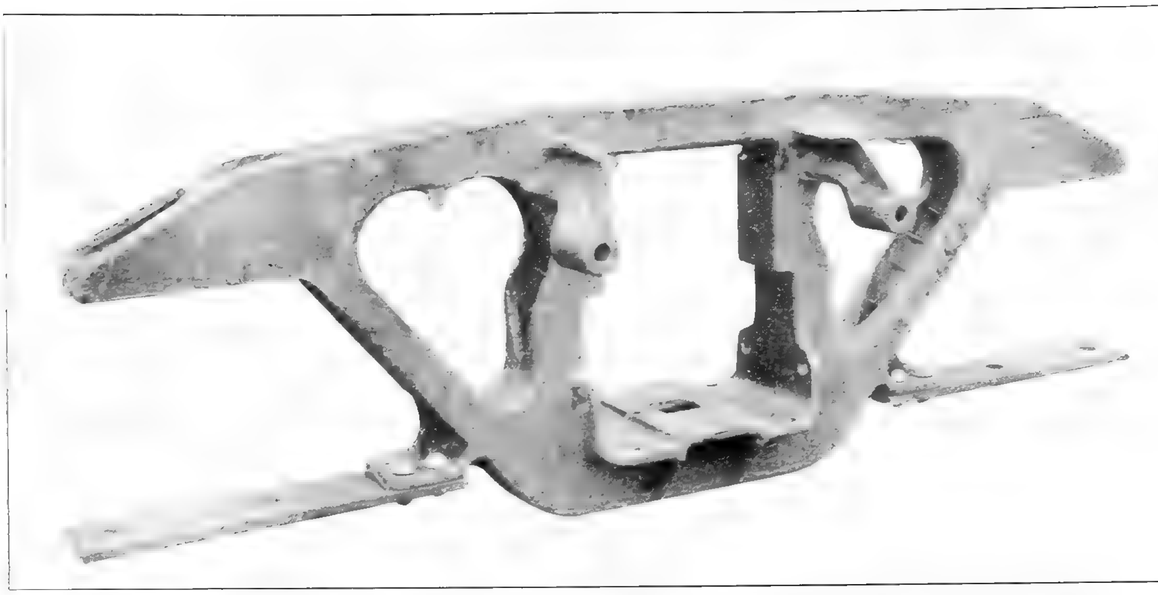


Fig. 1161 Cast Steel Truck Side Frame for Pennsylvania Railroad 70-Ton Capacity Freight Cars.

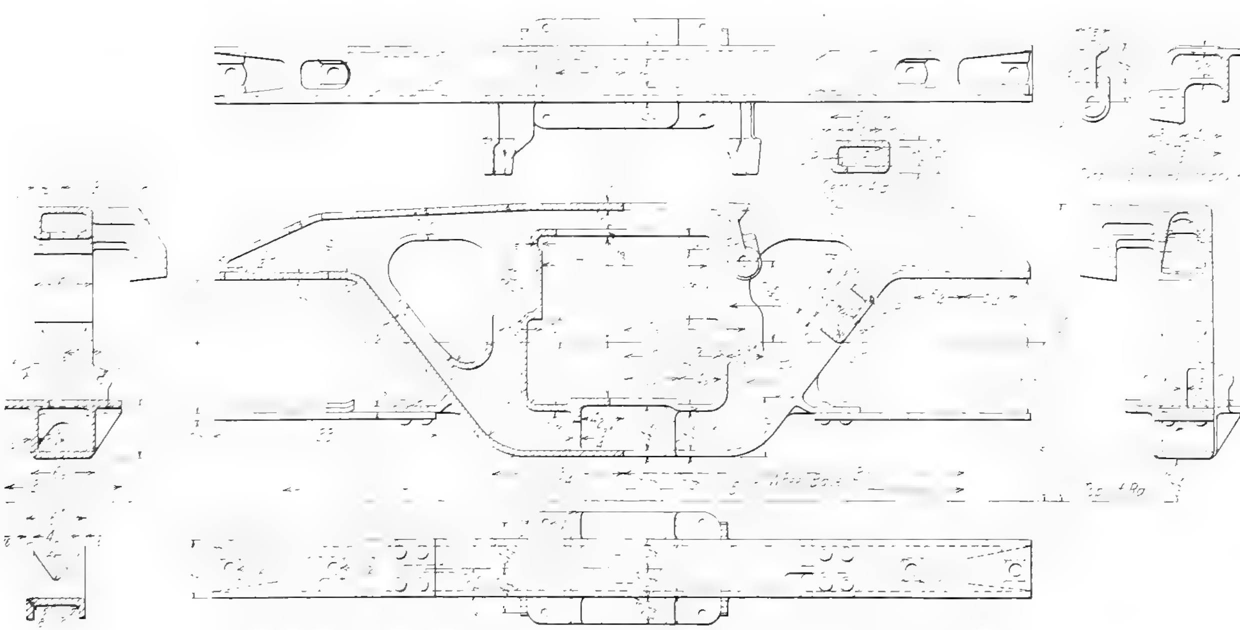


Fig. 1162—Side Frame for Trucks of Pennsylvania Railroad 70-Ton Capacity Freight Cars.

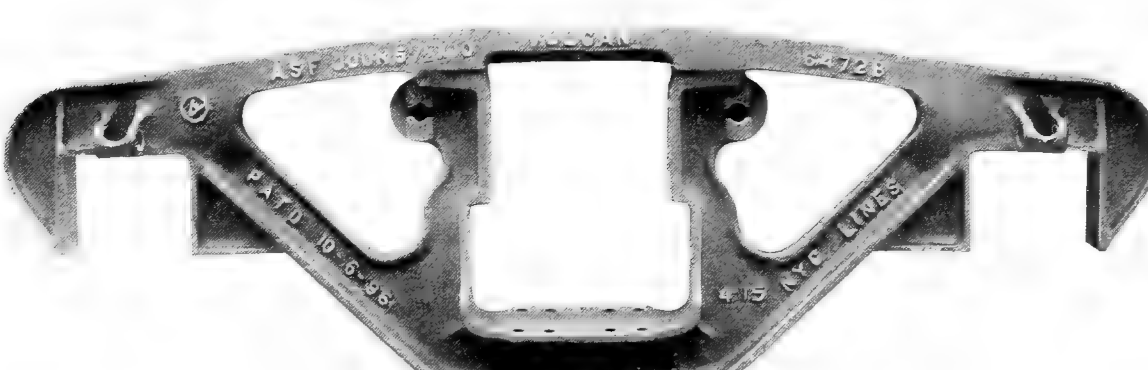


Fig. 1163—Vulcan Cast Steel Truck Side Frame. American Steel Foundries

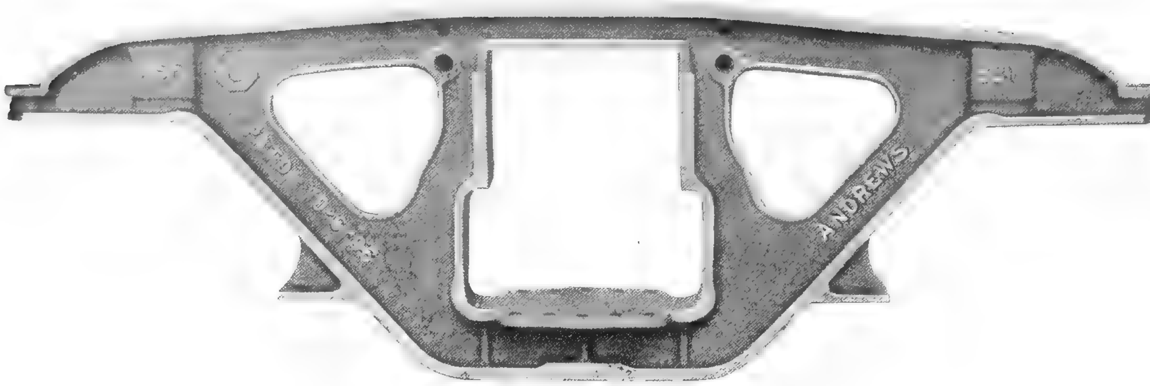


Fig. 1164—Andrews Cast Steel Freight Car Truck Side Frame for Use with Short Tie Bars. American Steel Foundries.

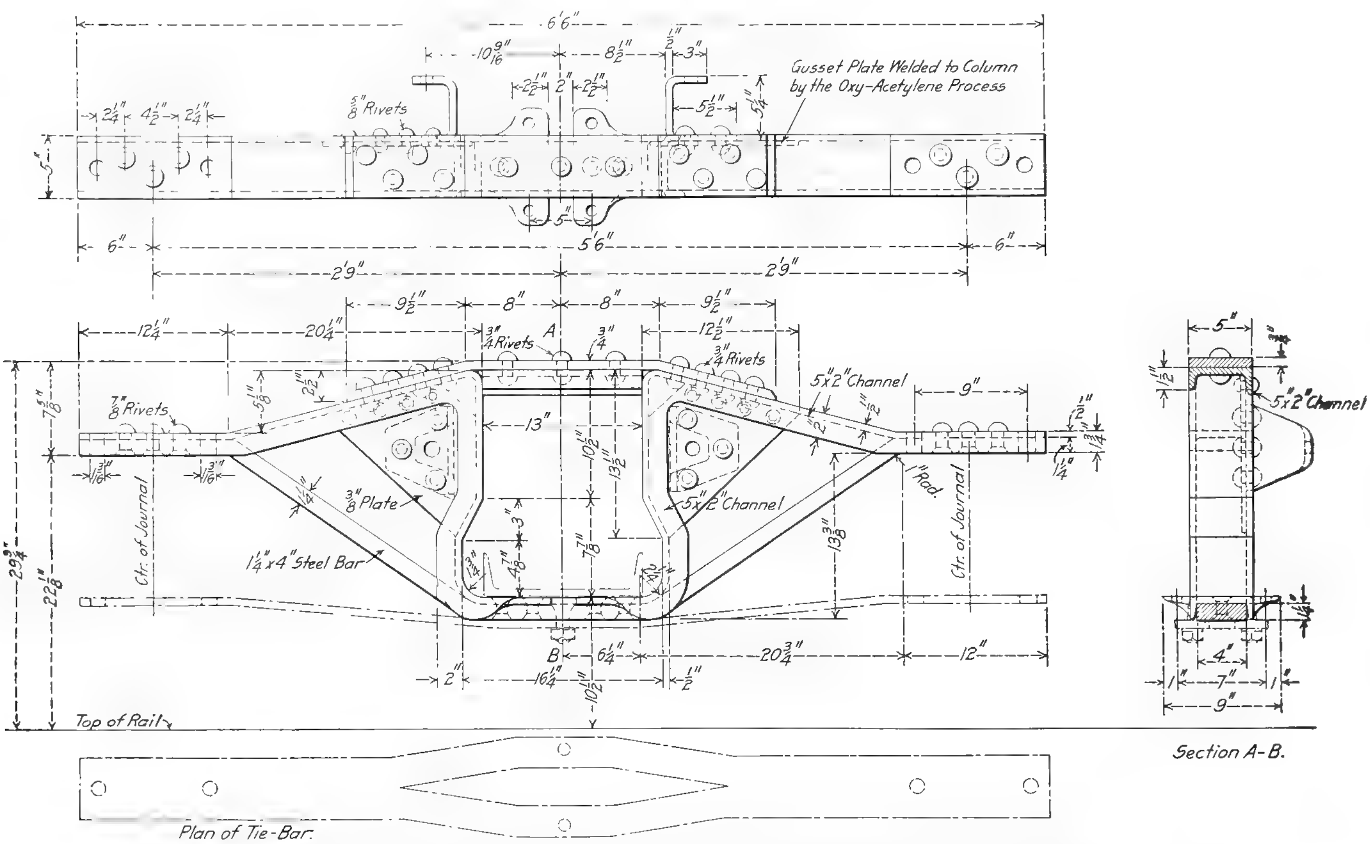


Fig. 1165—Freight Car Truck Side Frame Built of Rolled Steel Members Riveted Together. Murphy Equipment Company.

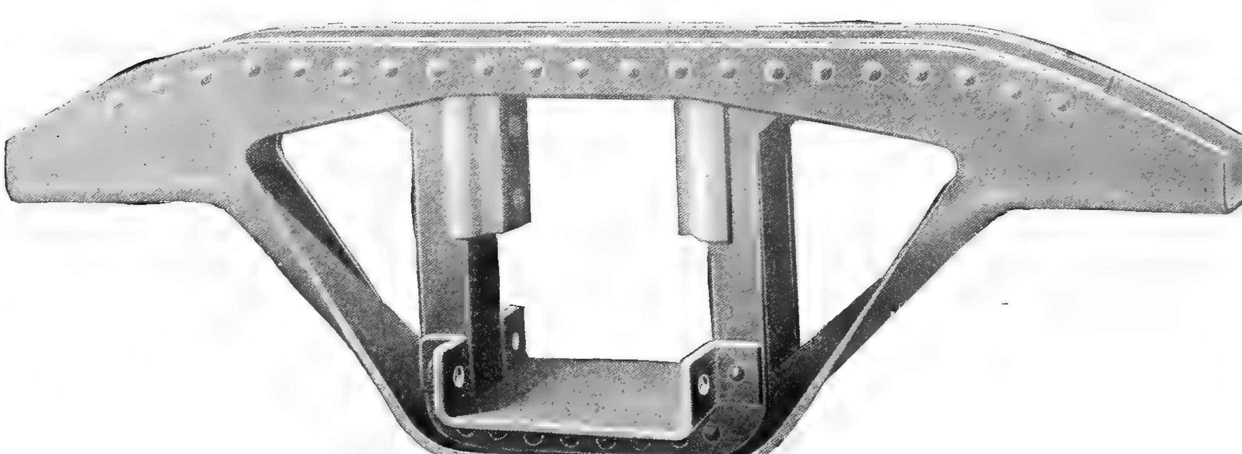


Fig. 1166—Forsythe Forged Steel Truck Side Frame. Allegheny Steel Company.

Fig. 1167—Commonwealth Cast Steel Center Frame for Four and Six-Wheel Passenger Train Car Trucks. Commonwealth Steel Company.

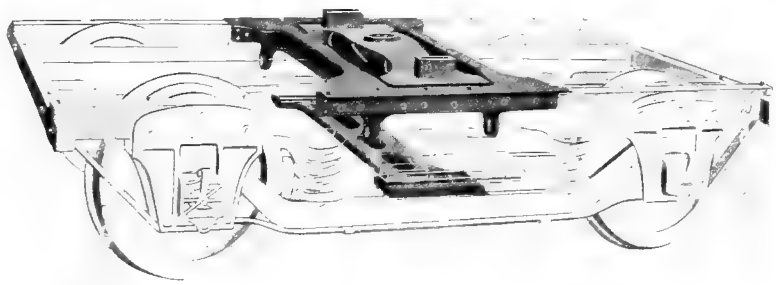


Fig. 1168—Commonwealth Cast Steel Center Frame Applied to Four-Wheel Truck. Commonwealth Steel Company

Fig. 1169—Single Coil Controller Spring.

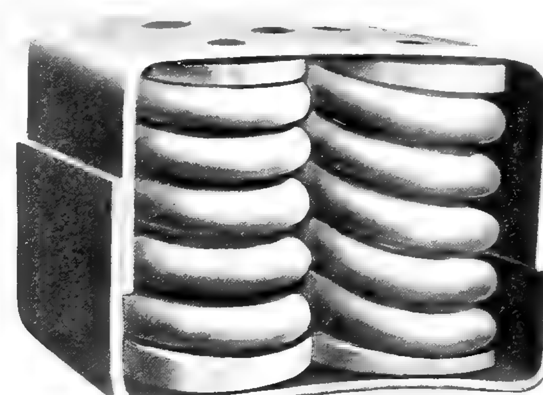


Fig. 1170—Double Coil Controller Spring.

American Steel Foundries.

Fig. 1171—Cast Steel Combined Column or Bolster Guides and Spring Seats for Arch Bar Trucks. American Steel Foundries.

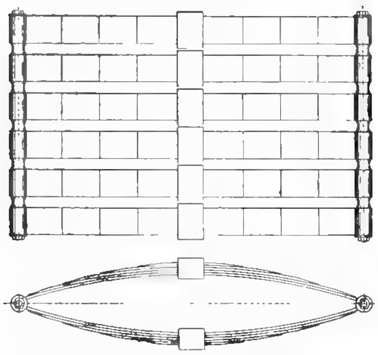


Fig. 1172—Sextuple Elliptic Spring.

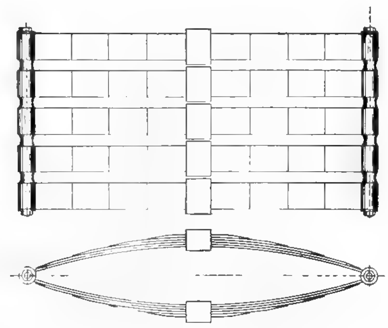


Fig. 1173 -Quintuple Elliptic Spring.

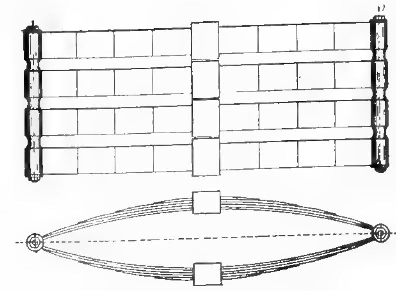


Fig. 1174—Quadruple Elliptic Spring.

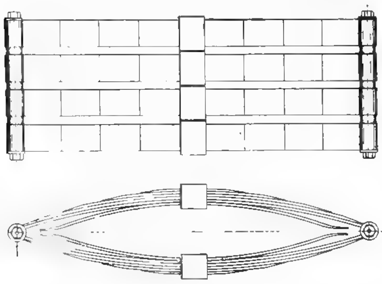


Fig. 1175—Graduated Quadruple Elliptic Spring.

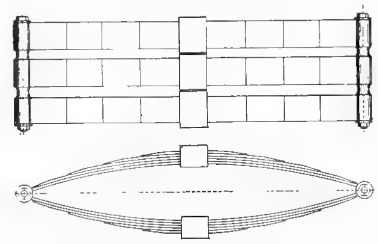


Fig. 1176—Triple Elliptic Spring.

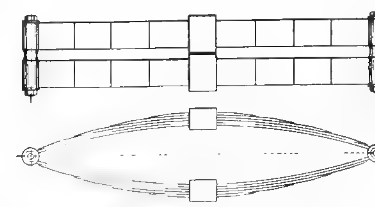


Fig. 1177—Double Elliptic Spring.

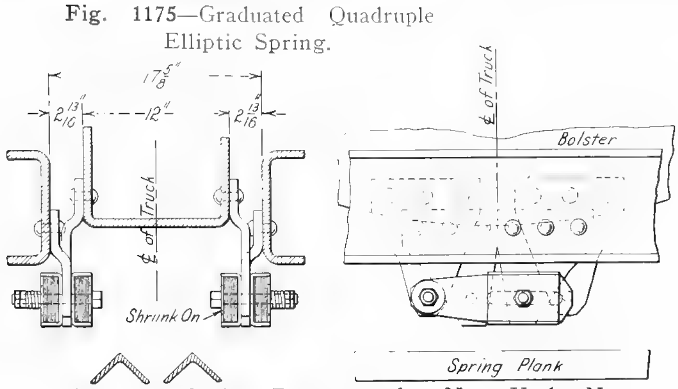


Fig. 1178—Spring Dampener for New York, New Haven & Hartford Electric Motor Truck.

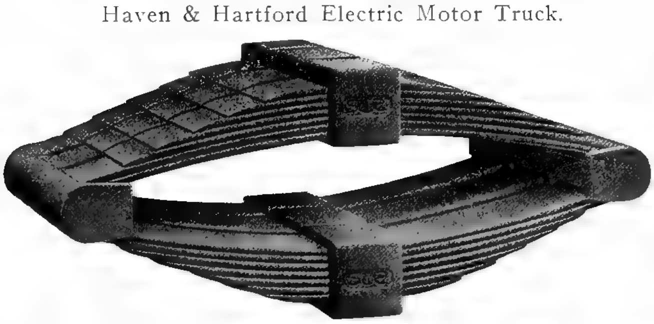


Fig. 1179—Triple Elliptic Bolster Spring. Standard Steel Works Company.

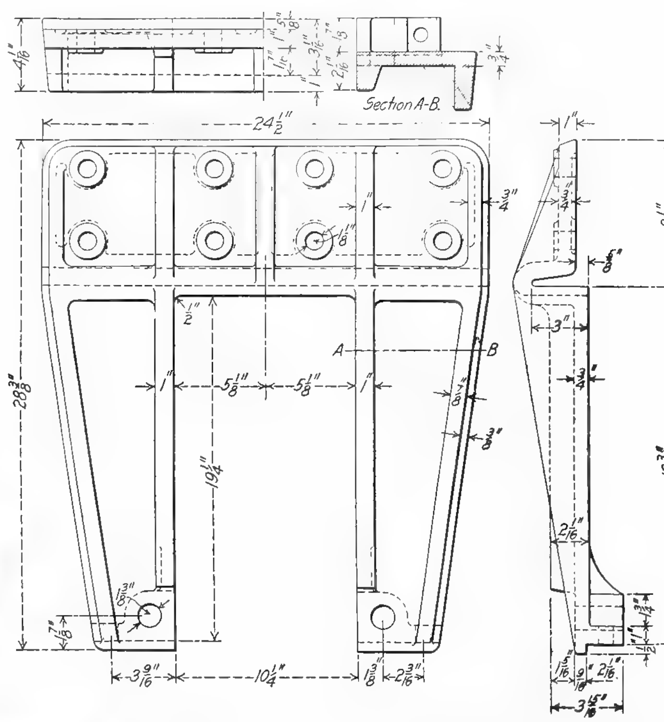


Fig. 1180—Pedestal of Six-Wheel Truck for Pittsburgh & Lake Erie 100-Ton Capacity Flat Car.

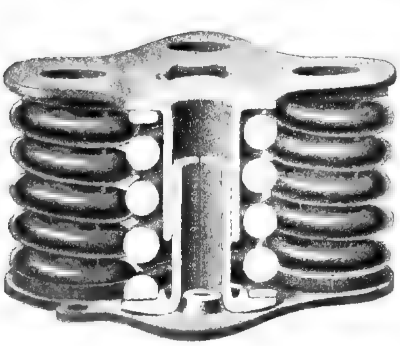


Fig. 1181—McCord Spring Dampener. McCord & Company.

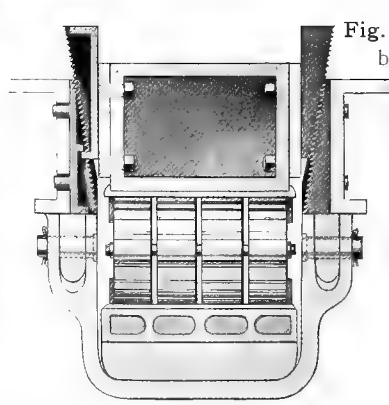


Fig. 1182—Automatic Adjustable Chafing Plate for Passenger Trucks. Commonwealth Steel Company.

Fig. 1183—Four-Coil Bolster Spring.

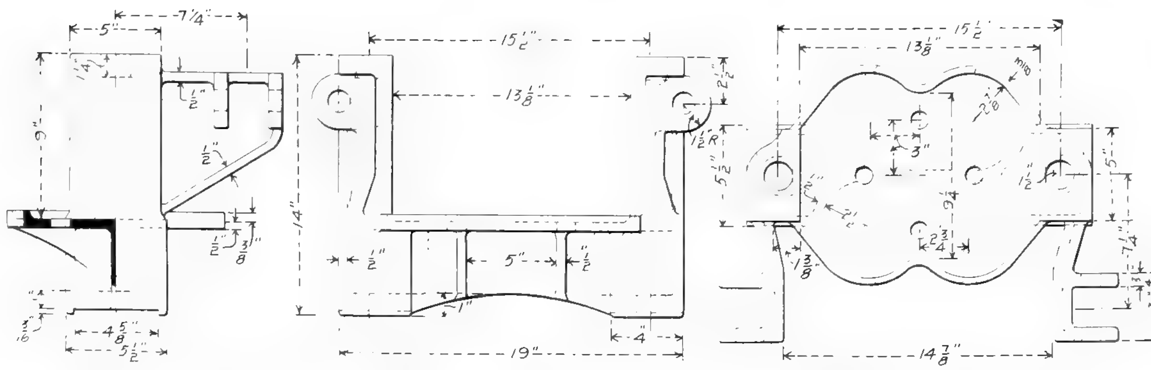


Fig. 1184—Cast Steel Combined Truck Column or Bolster Guide, Brake Hanger and Spring Seat. American Steel Foundries.

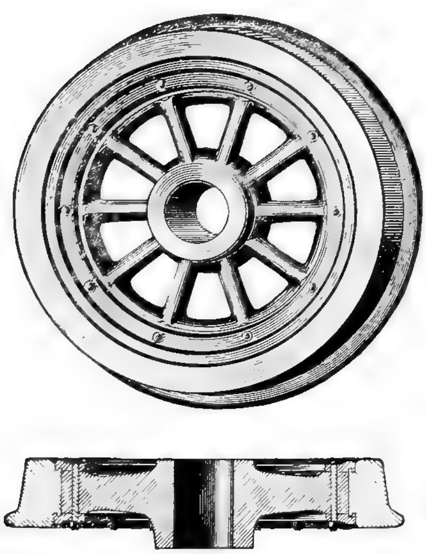


Fig. 1185—No. 3 Krupp Wheel. Cast Iron Spoke Center with Tire Secured by Wrought Iron Retaining Rings.

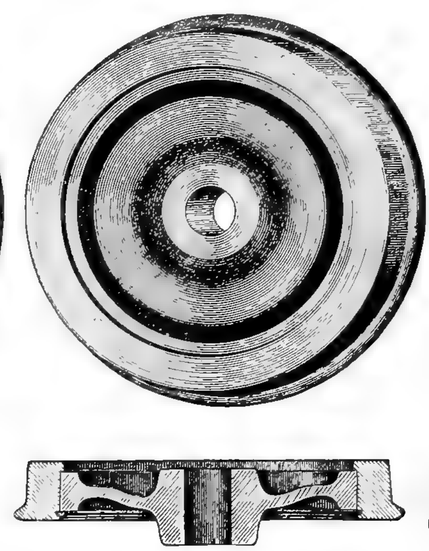


Fig. 1186—No. 14 Krupp Wheel. Forged Steel Disc Center with Tire Secured by Bute Fastening.

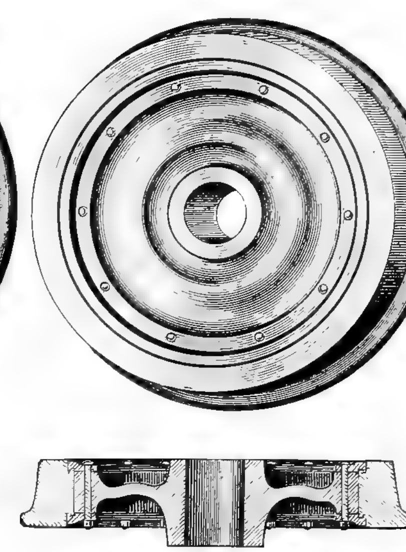


Fig. 1187—No. 1 Krupp Wheel. Forged Steel Disc Center with Tire Secured by Wrought Iron Retaining Rings.

Thomas Prosser & Son.

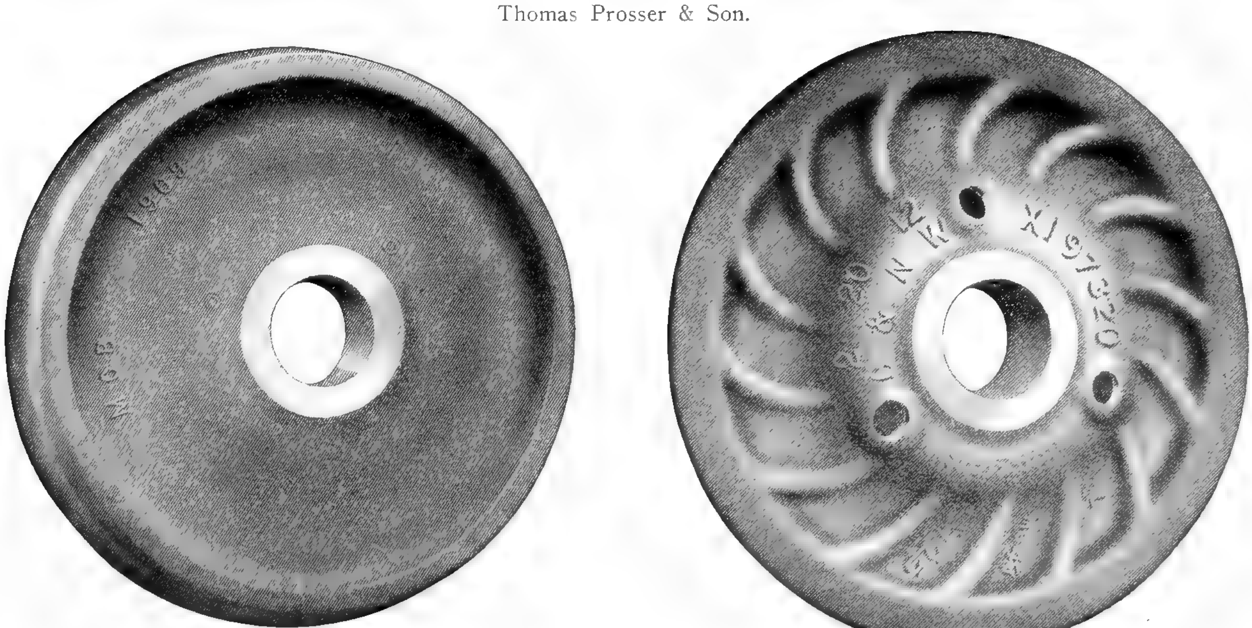


Fig. 1188—M. C. B. Standard Cast Iron Wheel for 50-Ton Capacity Freight Cars. Weight, 725 lbs. Association of Manufacturers of Chilled Car Wheels.

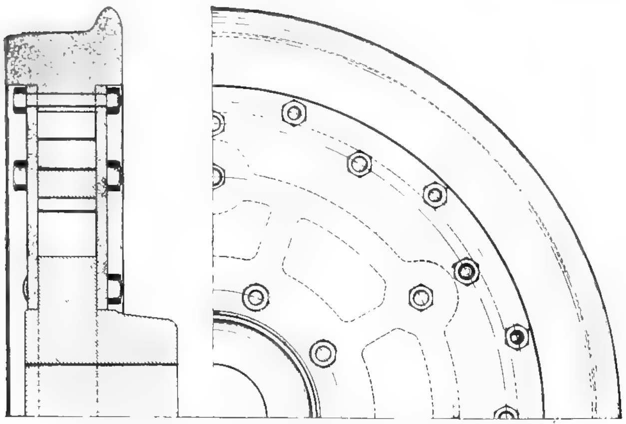


Fig. 1189—Paige Plate Coach Wheel. Cast Iron Spider with Steel Plates Secured by Bolts.

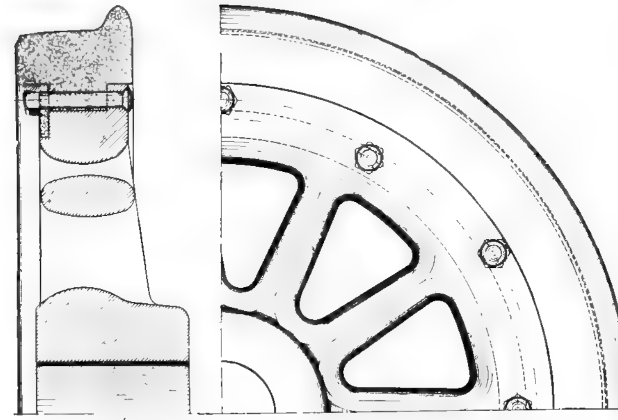


Fig. 1190—Paige Spoke Coach Wheel. Cast Iron Spoke Center with Tire Secured by Shrinkage, Retaining Rings and Bolts.

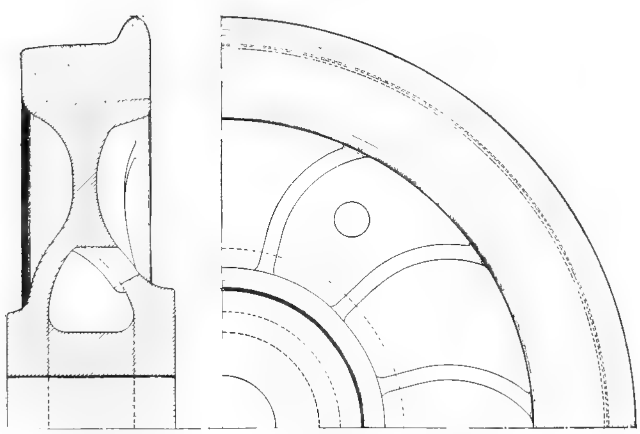


Fig. 1191—Fused Coach Wheel. Cast Iron Plate Center with Tire Secured by Welding.

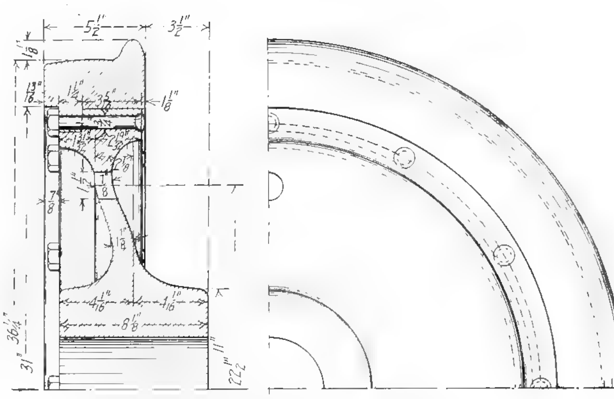


Fig. 1192—Bolted Type Coach Wheel with Cast Steel Plate Center.

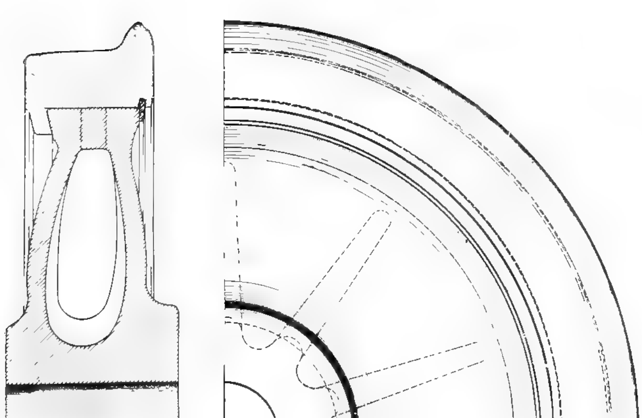


Fig. 1193—National No. 2 Coach Wheel. Cast Iron Double Plate Center, Having Internal Ribs, with Tire Secured by Shrinkage and Gibson Retaining Ring.

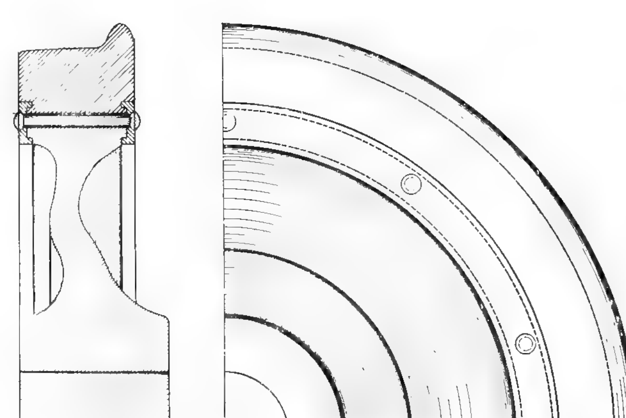


Fig. 1194—National No. 6 Coach Wheel. Wrought Iron Disc Center with Tire Secured by Shrinkage and Double Lip Retaining Rings.

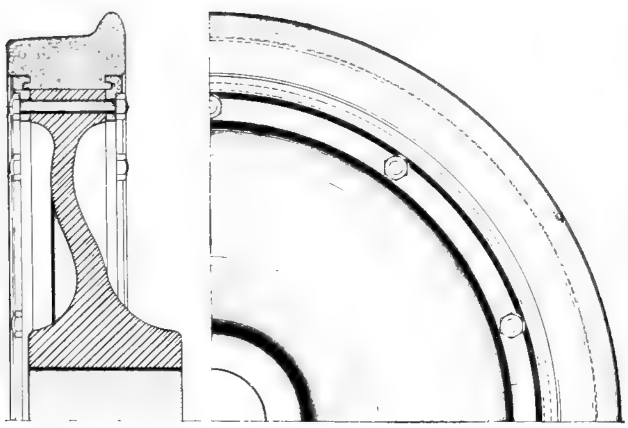


Fig. 1195—National No. 6 Coach Wheel. Wrought Iron Disc Center with Tire Secured by Shrinkage and Mansell Retaining Rings.

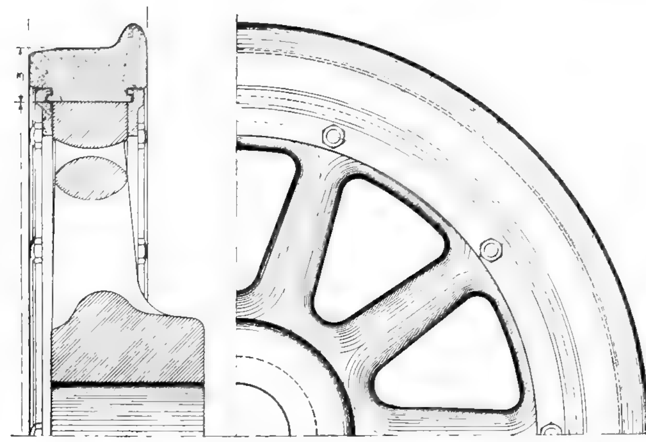


Fig. 1196—National No. 3 Coach Wheel. Cast Iron Spoke Center with Tire Secured by Shrinkage and Mansell Retaining Rings.

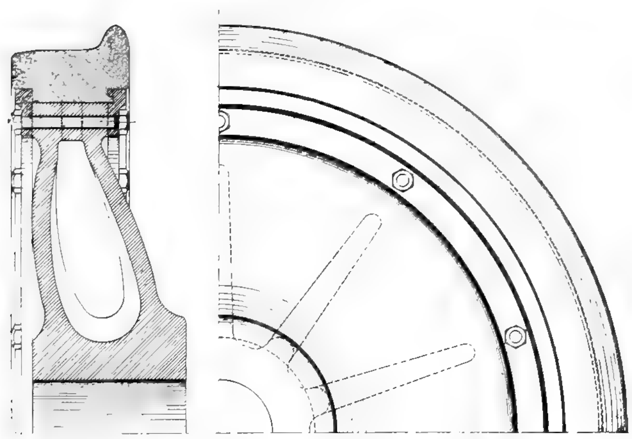


Fig. 1197—National No. 4 Coach Wheel. Cast Iron Double Plate Center, Having Internal Ribs, with Tire Secured by Shrinkage and Mansell Retaining Rings.

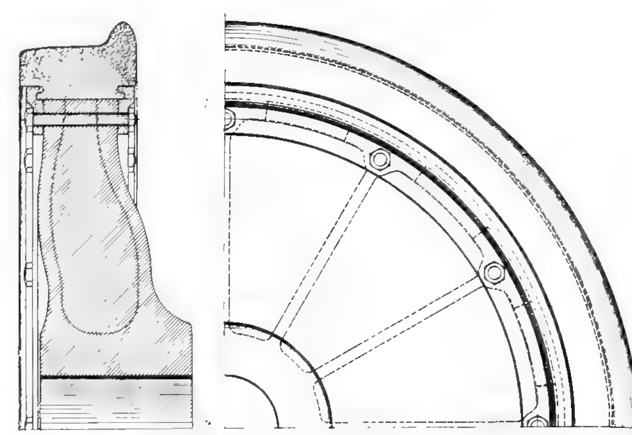


Fig. 1198—Allen No. 9 Coach Wheel. Cast Iron Double Plate Center with Tire Secured by Shrinkage and Mansell Retaining Rings.

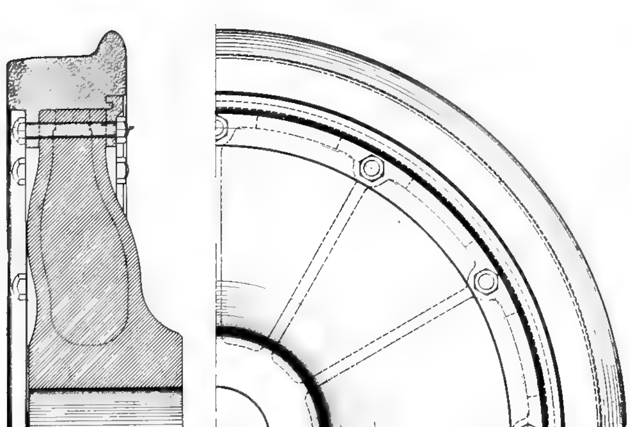


Fig. 1199—Allen No. 11 Coach Wheel. Cast Iron Double Plate Center, Having Internal Spokes, with Tire Secured by Shrinkage, Bolts and Mansell Retaining Rings.

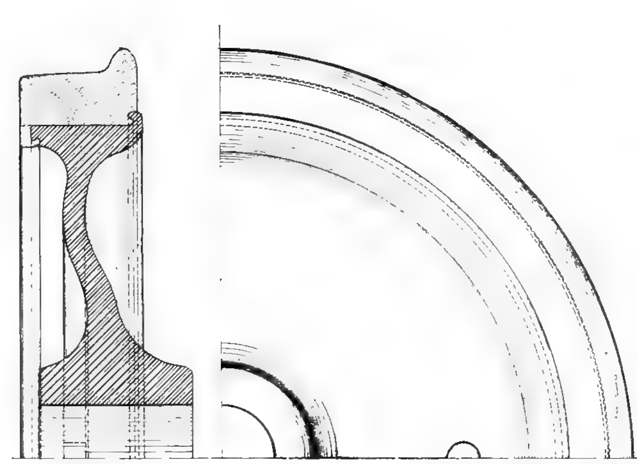


Fig. 1200—Boies No. 2 Coach Wheel. Wrought Iron Disc Center with Tire Secured by Shrinkage and Integral Lock.

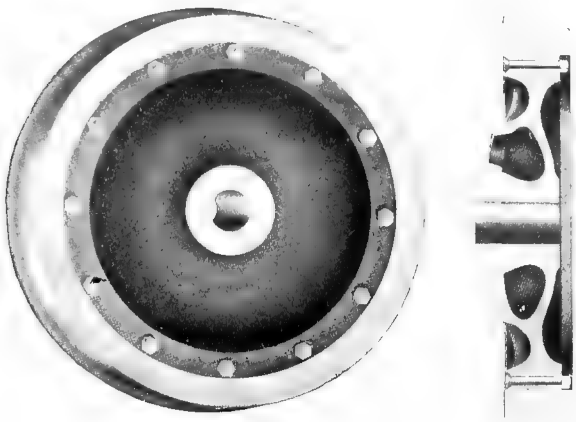


Fig. 1201—Cast Iron Plate Center with Tire Held by Shrinkage and Bolts.

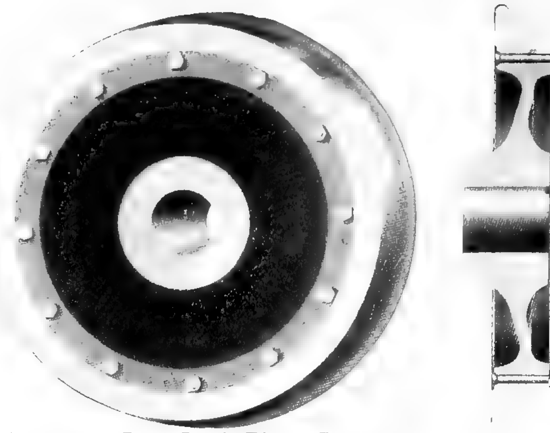


Fig. 1202—Cast Steel Plate Center with Tire Held by Shrinkage and Bolts.

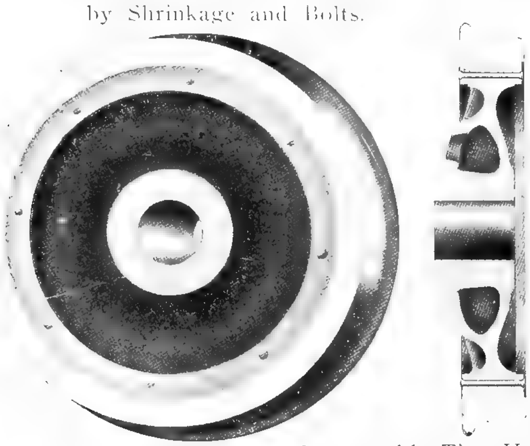


Fig. 1203—Cast Iron Plate Center with Tire Held by Shrinkage, Double Lip Retaining Rings and Rivets.

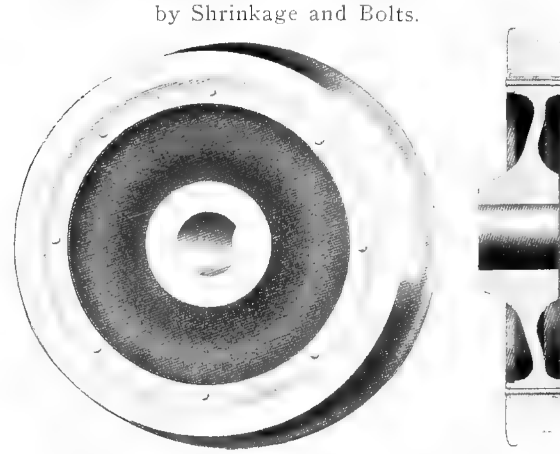


Fig. 1204—Cast Steel Plate Center with Tire Held by Shrinkage, Double Lip Retaining Rings and Rivets.

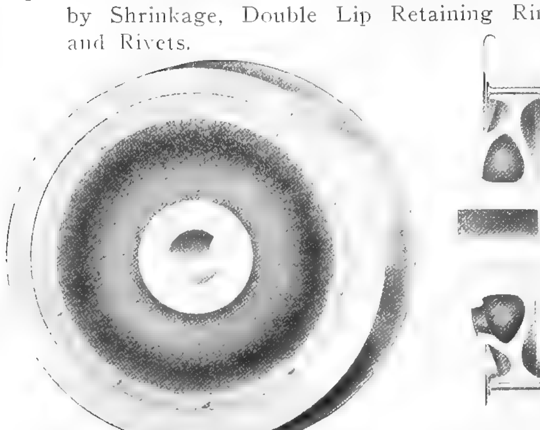


Fig. 1205—Cast Iron Plate Center with Tire Held by Shrinkage, Mansell Retaining Rings and Rivets.

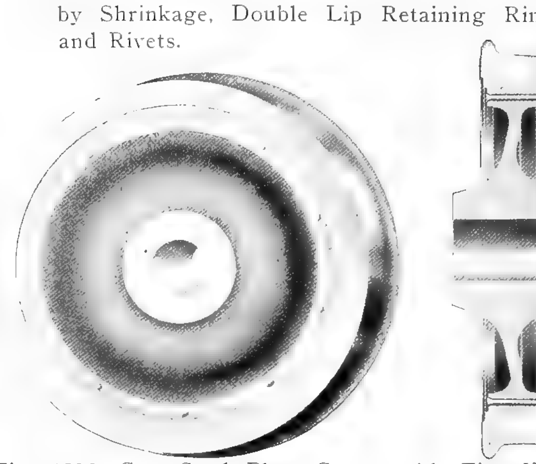


Fig. 1206—Cast Steel Plate Center with Tire Held by Shrinkage, Mansell Retaining Rings and Rivets.

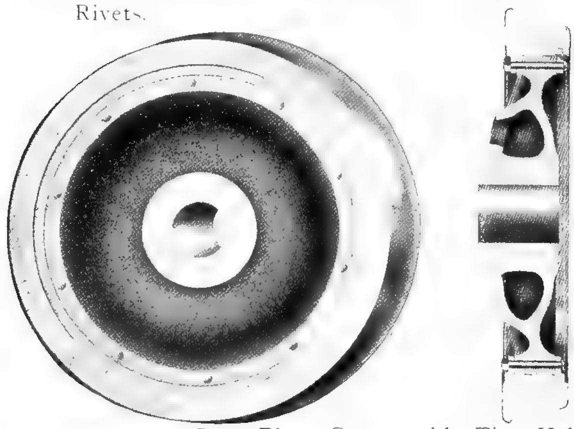


Fig. 1207—Cast Iron Plate Center with Tire Held by Shrinkage, Mansell Retaining Rings and Bolts.

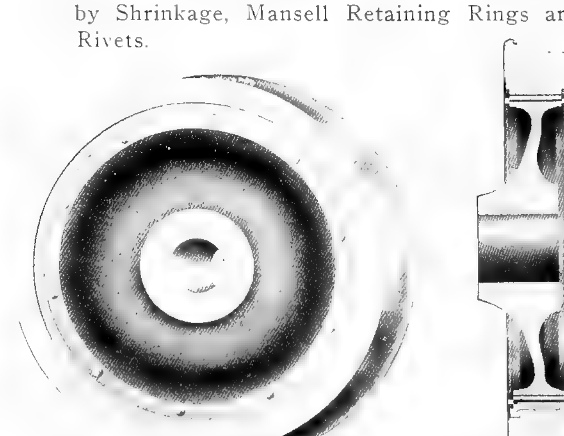


Fig. 1208—Cast Steel Plate Center with Tire Held by Shrinkage, Mansell Retaining Rings and Bolts.

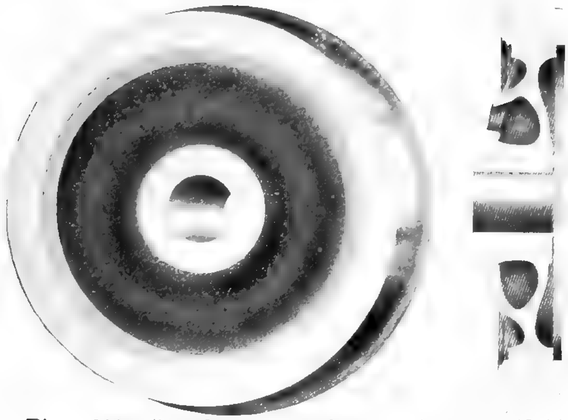


Fig. 1209—Cast Iron Plate Center with Tire Held by Shrinkage and Gibson Retaining Ring.

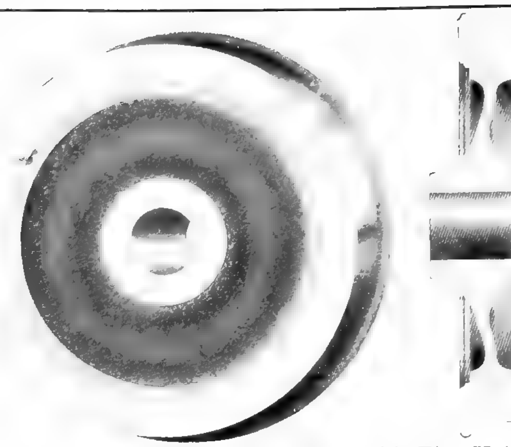


Fig. 1210—Cast Steel Plate Center with Tire Held by Shrinkage and Gibson Retaining Ring.

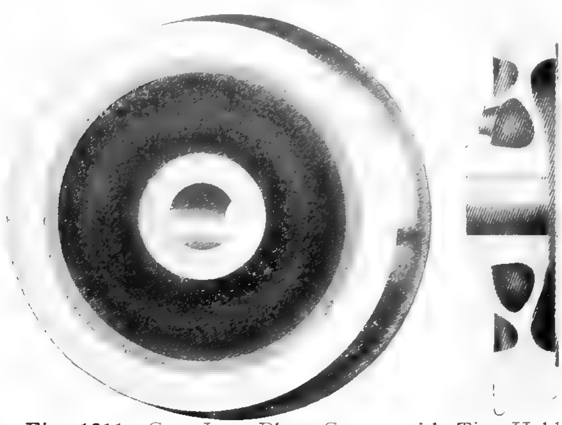


Fig. 1211—Cast Iron Plate Center with Tire Held by Shrinkage and Shoulder.

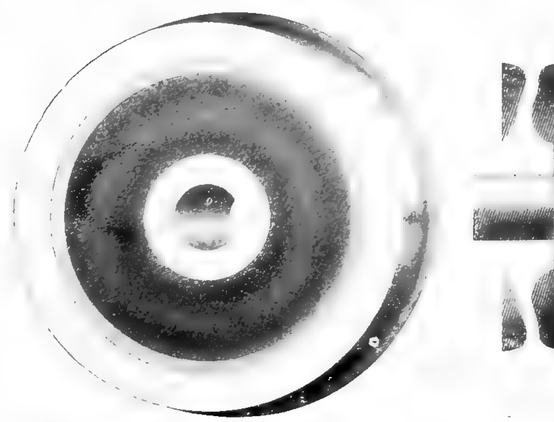


Fig. 1212—Cast Steel Plate Center with Tire Held by Shrinkage and Shoulder.

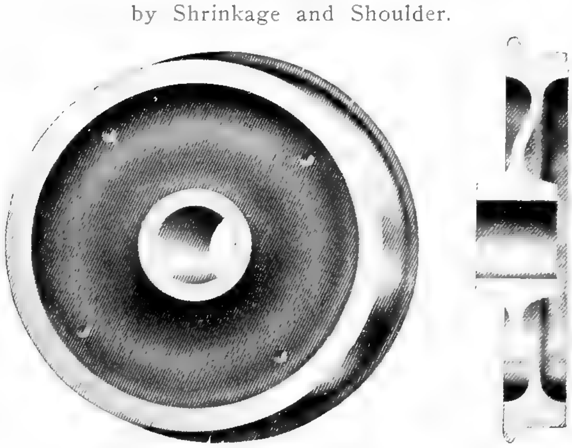


Fig. 1213—Solid Rolled Steel Wheel. Standard Steel Works Company.

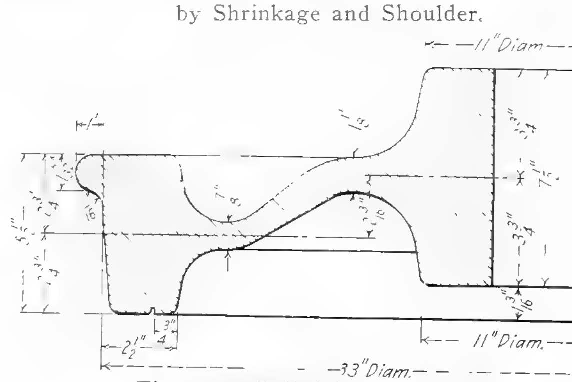


Fig. 1214—Rolled Steel Wheel. Standard Steel Works Company.

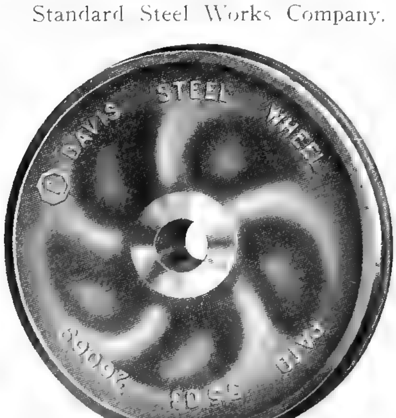


Fig. 1215—Davis Cast Steel Wheel. Weight of 33 in., 600 lbs.; 36 in., 675 lbs. American Steel Foundries.

Fig. 1216—Solid Forged and Rolled Steel Freight Car Wheel. Carnegie Steel Company.

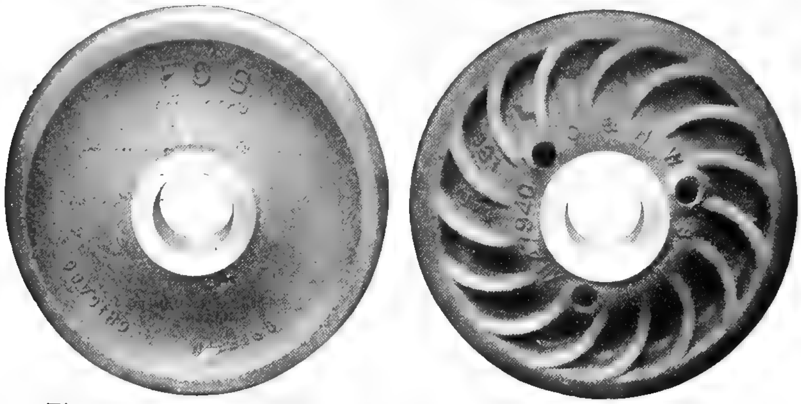


Fig. 1217—F. C. S. Wheel for Freight and Passenger Service.

Fig. 1218—F. C. S Wheel for Street and Interurban Service.

Griffin Wheel Company.

Fig. 1219—F. C. S. Wheel for Street and Interurban Service. Griffin Wheel Company.

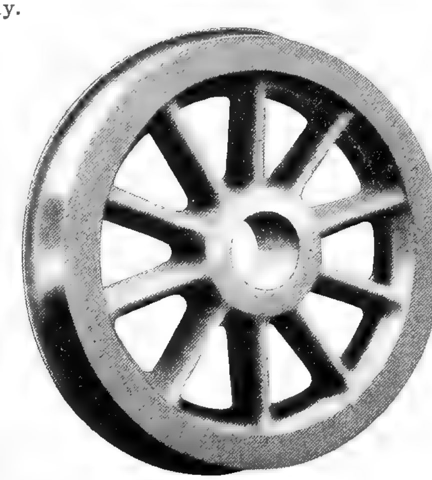


Fig. 1220—Steel Spoke Wheel. Lobdell Car Wheel Company.

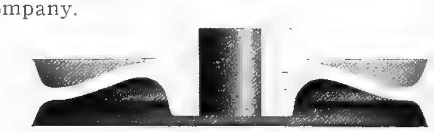


Fig. 1221—Schoen Steel Wheel. Carnegie Steel Company.

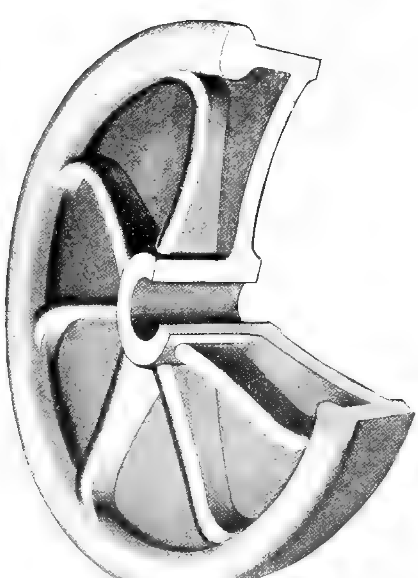


Fig. 1222—Single Plate Chilled Cast Iron Wheel.

Fig. 1223—Double Plate Chilled Cast Iron Wheel.

Lobdell Car Wheel Company.

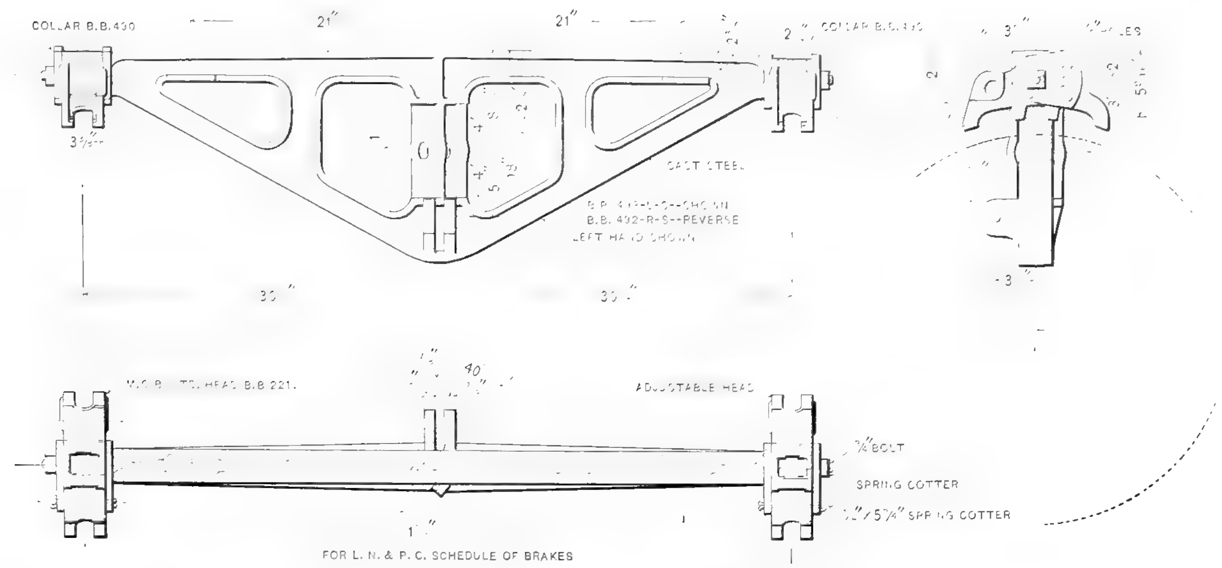


Fig. 1224—Vulcan Brake Beam. American Steel Foundries.

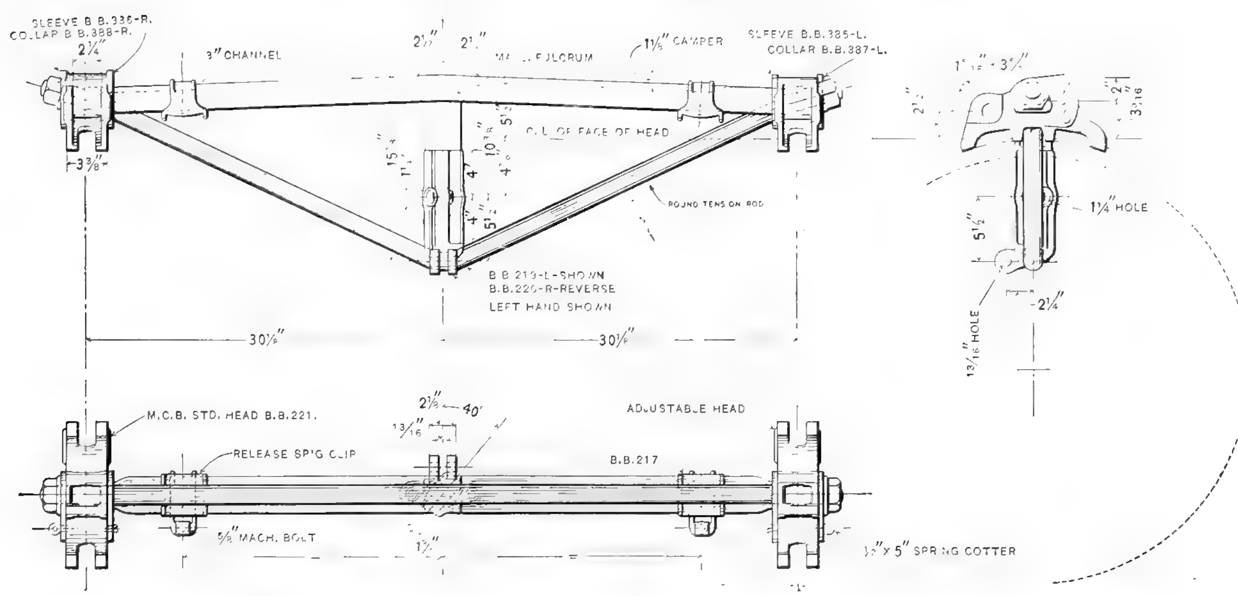


Fig. 1225—Hercules Brake Beam for Four-Wheel Passenger Train Car Trucks. American Steel Foundries.

Fig. 1226—Acme Brake Beam for Short Wheel Base Freight Car Trucks American Steel Foundries.

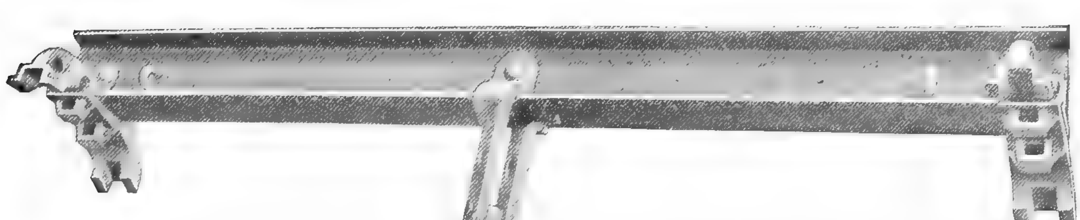


Fig. 1227—Acme Brake Beam for Freight Car Trucks. American Steel Foundries

Fig. 1228—Ajax No. 102 Freight Brake Beam. No. 2 M. C. B. Standard.

Fig. 1229—Ajax No. 105 Freight Brake Beam, 15,000 lbs. Capacity.

Fig. 1230—Vulcan No. 121 Cast Steel, Adjustable Head, High Speed Passenger Brake Beam for Four-Wheel Trucks. For Use With P-C or L-N Air Brake Equipment

Fig. 1231—Hercules Adjustable Head Brake Beam for Four-Wheel High Speed Passenger Service.

Fig. 1232—Hercules Adjustable Head Brake Beam for Six-Wheel High Speed Passenger Service

American Steel Foundries.

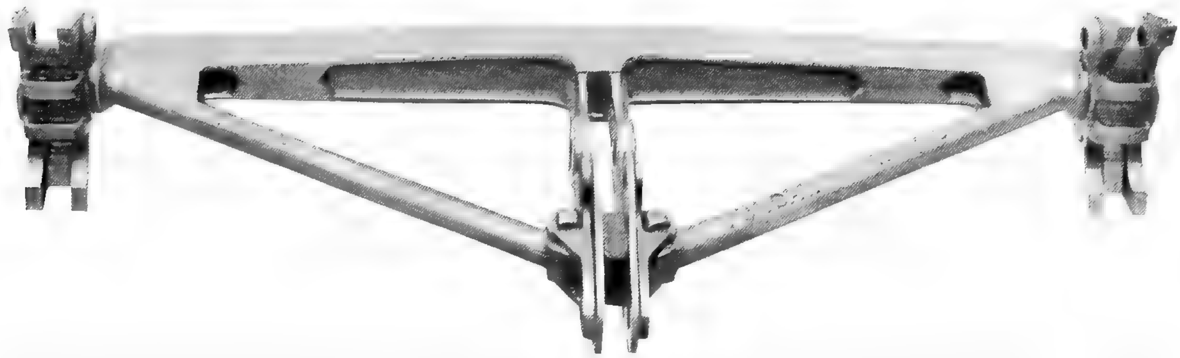


Fig. 1233—Vulcan No. 123 Cast Steel, Adjustable Head, High Speed Passenger Brake Beam for Six-Wheel Trucks. American Steel Foundries.

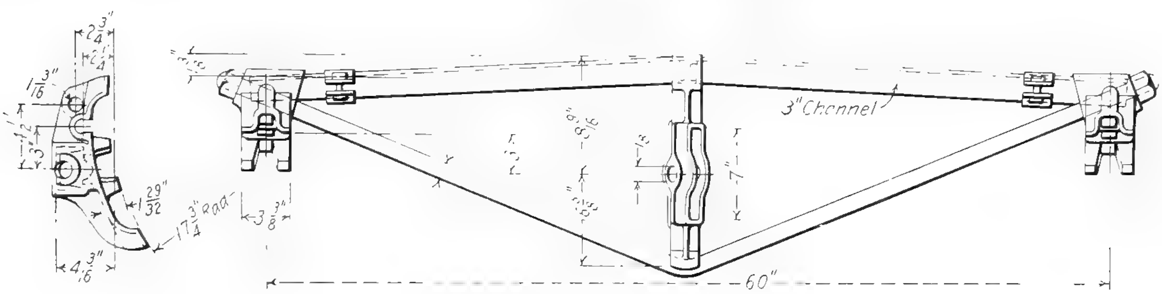


Fig. 1234—No. 2 Buffalo Brake Beam. Buffalo Brake Beam Company.

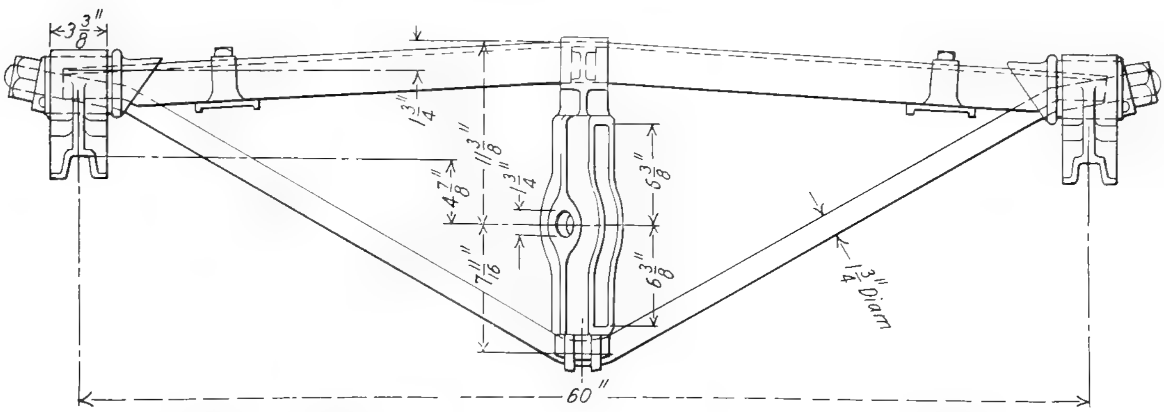


Fig. 1235—Buffalo Trussed Brake Beam No. 7. Buffalo Brake Beam Company.

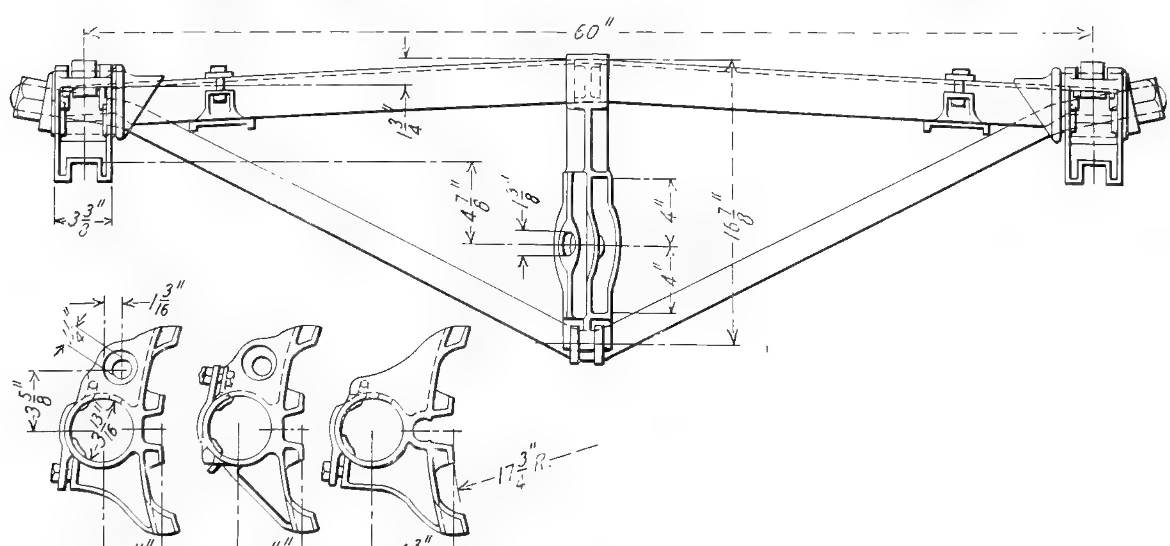


Fig. 1236—Buffalo Trussed Brake Beam No. 5. Buffalo Brake Beam Company.

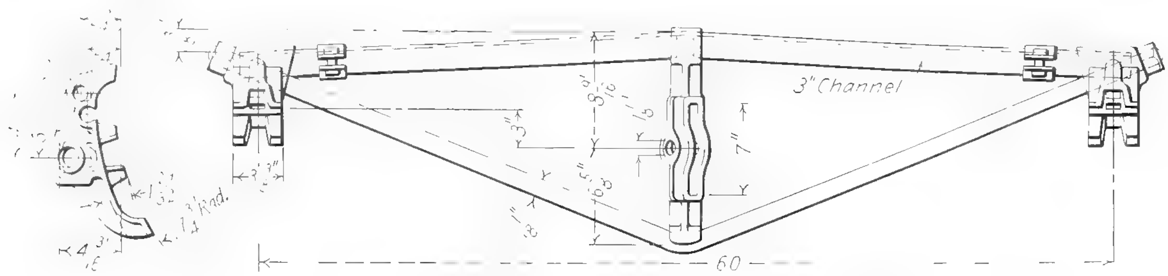


Fig. 1237—No. 1 Buffalo Brake Beam. Buffalo Brake Beam Company.

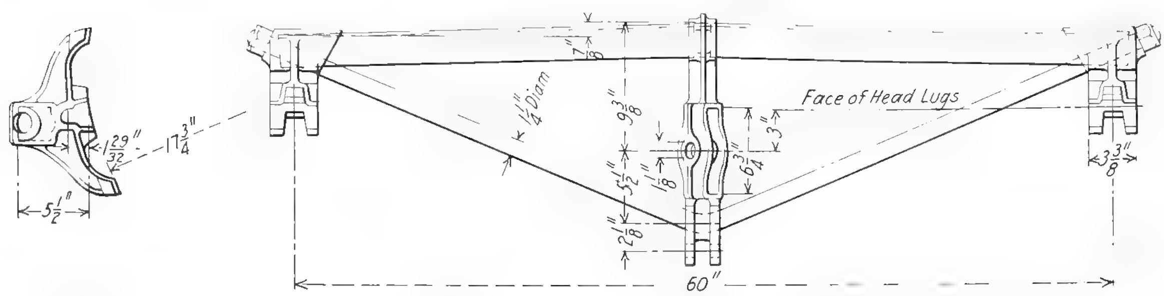


Fig. 1238—No. 3, 15,000 lbs. Capacity Buffalo Trussed Brake Beam. Buffalo Brake Beam Company.

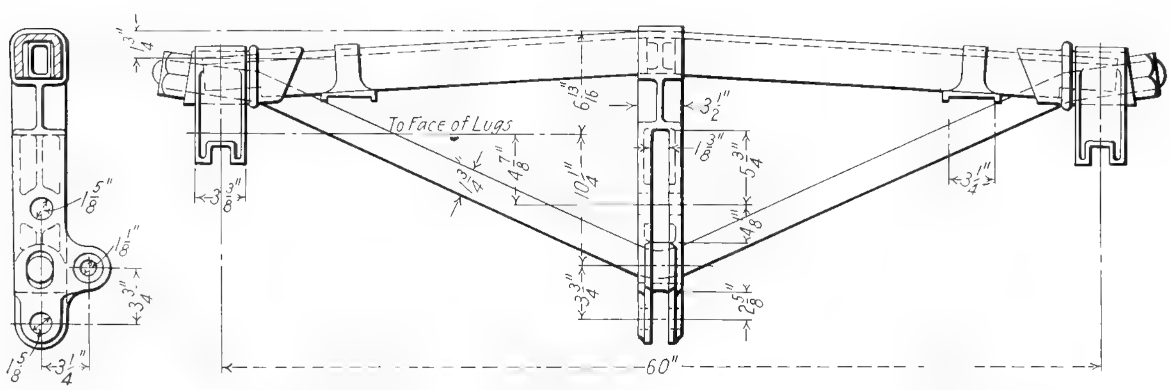


Fig. 1239—No. 7 Buffalo Trussed Brake Beam. Buffalo Brake Beam Company.

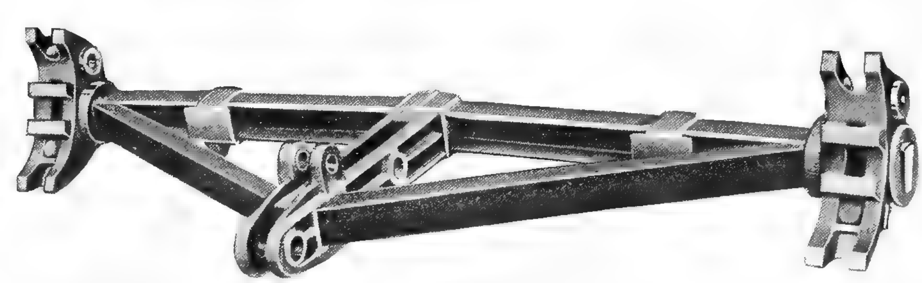


Fig. 1240—Huntoon P. C. Passenger Brake Beam. Joliet Railway Supply Company.

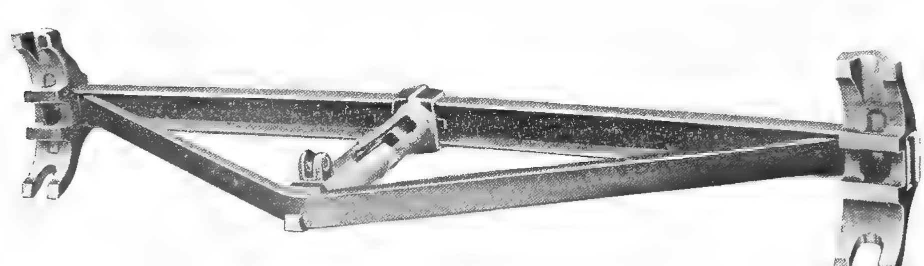


Fig. 1241—Huntoon Standard Freight Brake Beam. Joliet Railway Supply Company.

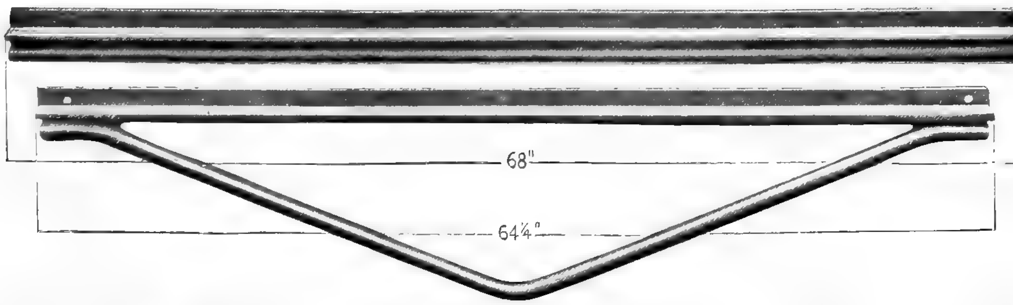
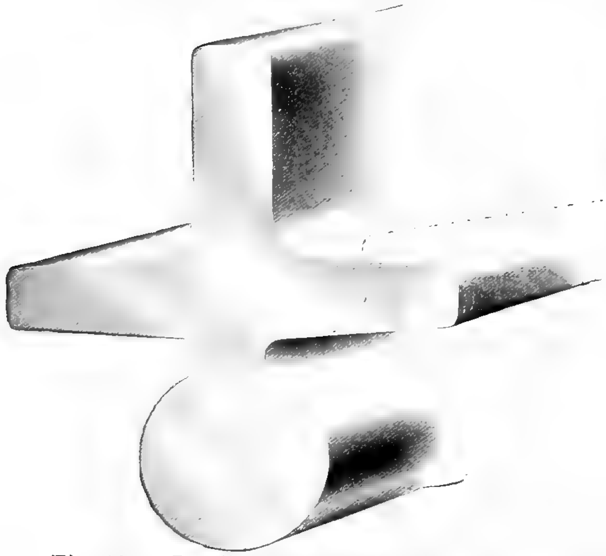


Fig. 1242—Method of Manufacture of Davis Solid Truss Brake Beam. Davis Brake Beam Company.



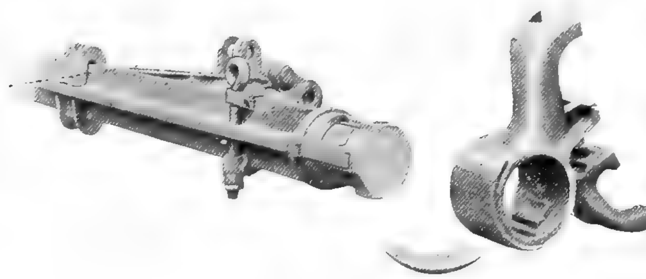


Fig. 1244—End of High Speed Brake Beam with Adjustable Head Removed to Show Locking Device. Davis Brake Beam Company.

Fig. 1243—Detail of Davis Brake Beam Section.

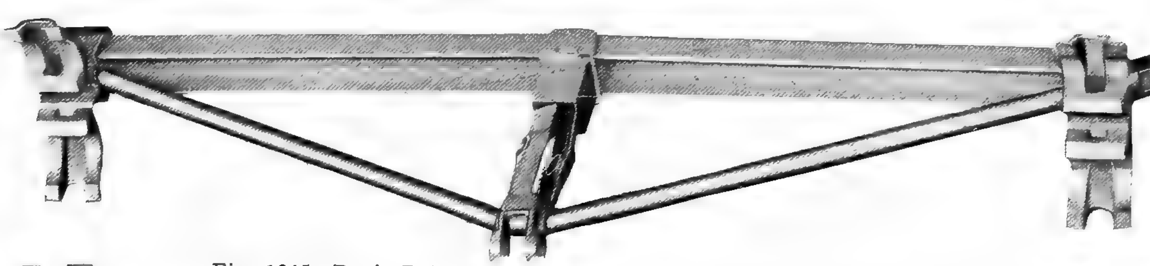


Fig. 1245—Davis Built-Up Brake Beam. Davis Brake Beam Company.

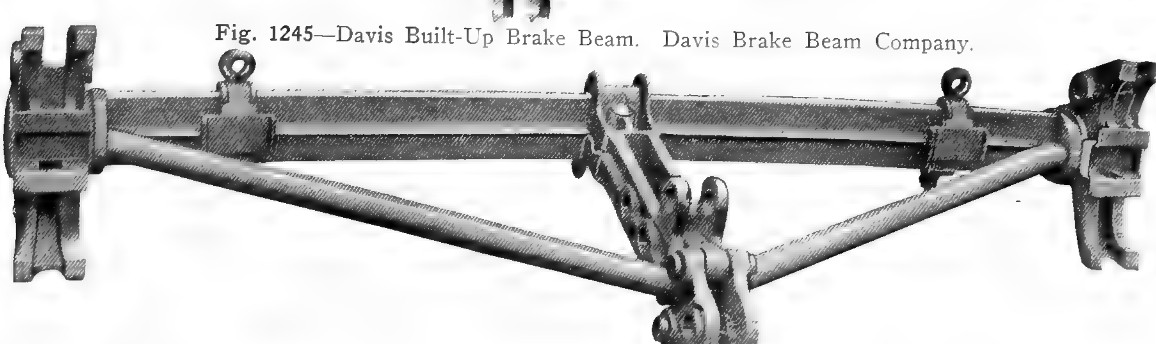


Fig. 1246—Davis Solid Truss Brake Beam No. 4 with Adjustable Heads and Forged Steel Strut Extension for High Speed Passenger Service. Davis Brake Beam Company.

Fig. 1247—Davis Solid Truss Brake Beam No. 2, 12,000 lbs. Capacity for Freight Service. Davis Brake Beam Company.

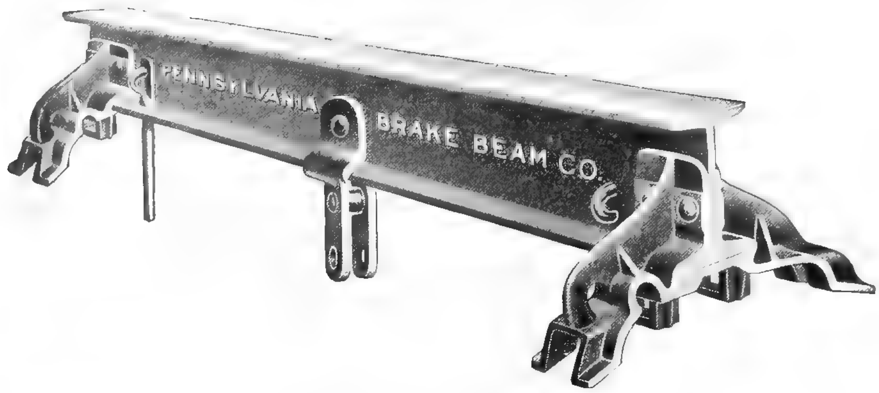


Fig. 1248 -Standard I-Beam Brake Beam with Drop Forged Fulcrum.

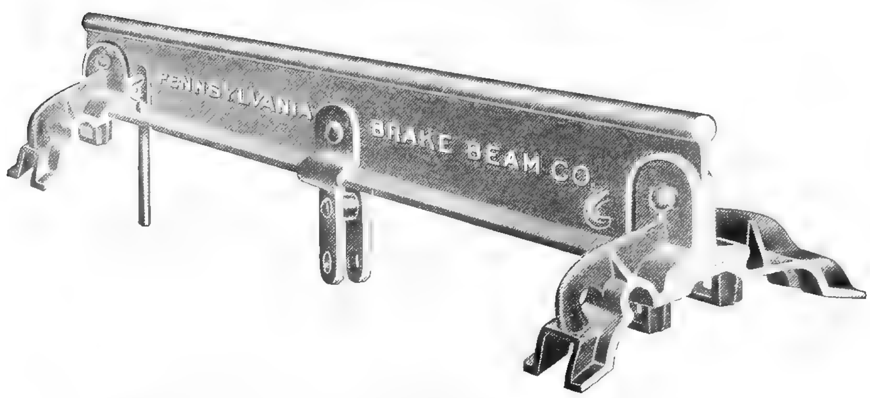


Fig. 1249—Standard Deck Beam Brake Beam with Malleable Iron Fulcrum.

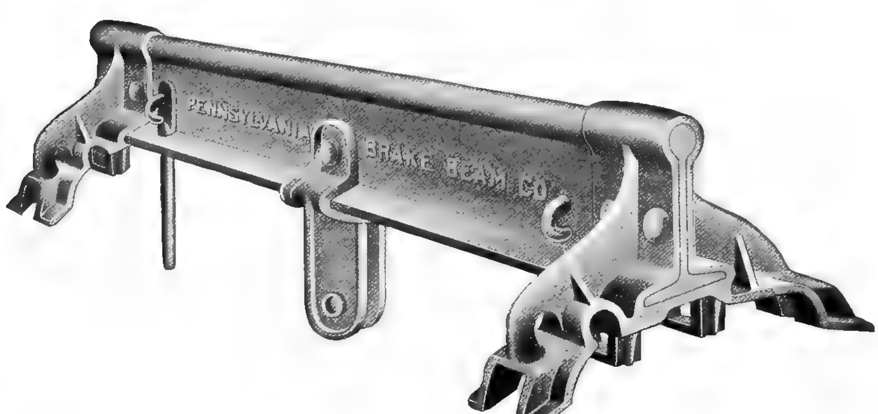


Fig. 1250—Standard Deck Beam Brake Beam with Drop Forged Fulcrum.

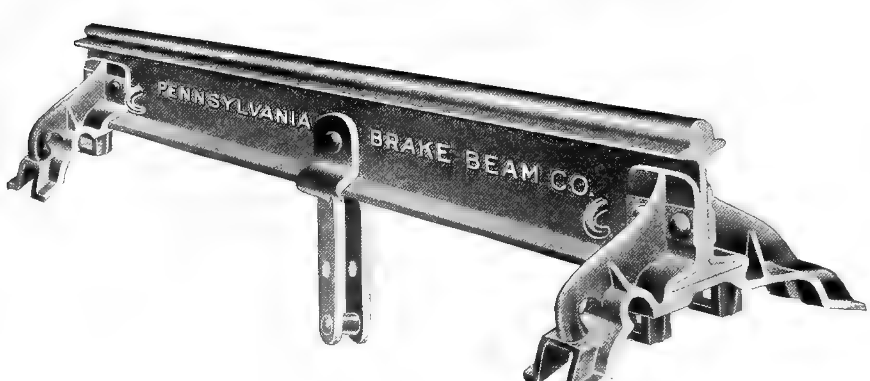


Fig. 1251—Special Combination Deck and I-Beam Section Brake Beam with Drop Forged Fulcrum.
Pennsylvania Brake Beam Company.

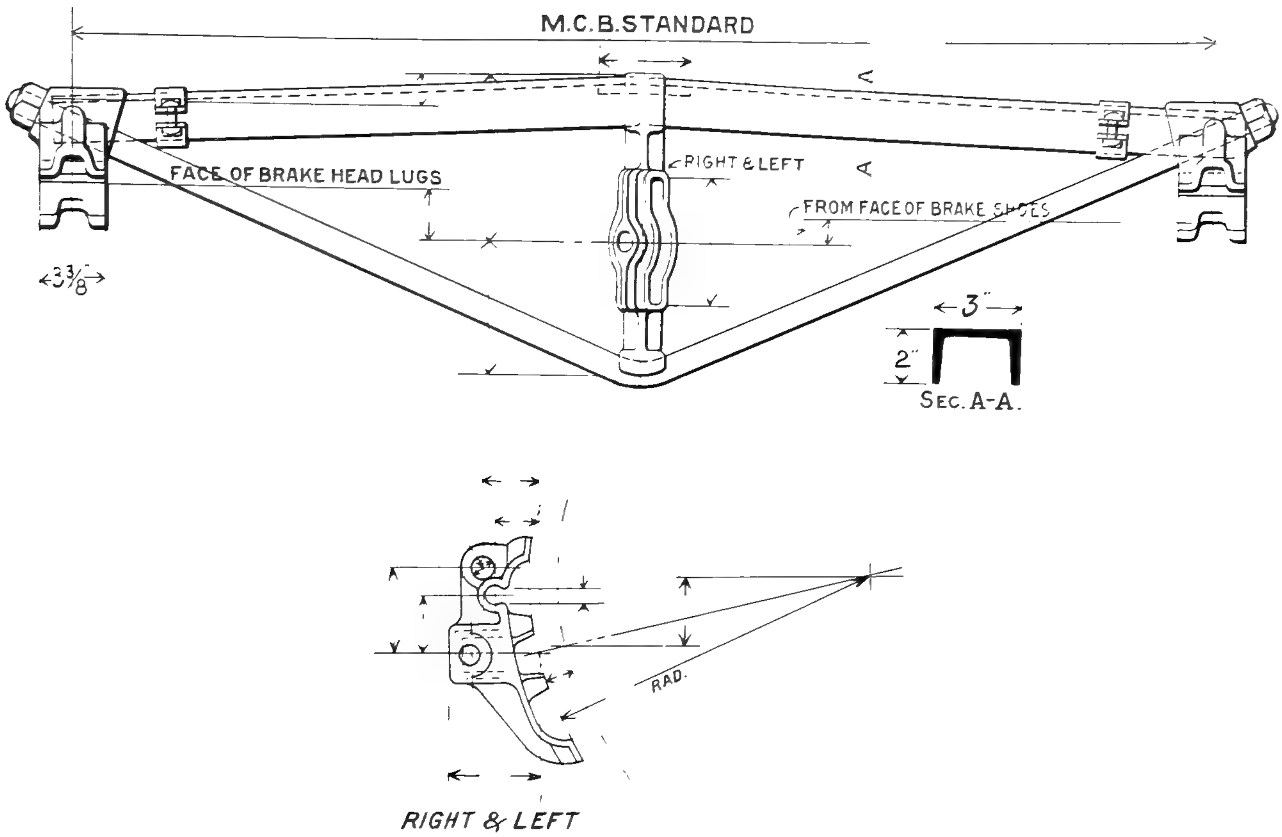


Fig. 1252—Pennsylvania Trussed Brake Beam, No. 1 and No. 2. Pennsylvania Brake Beam Company.

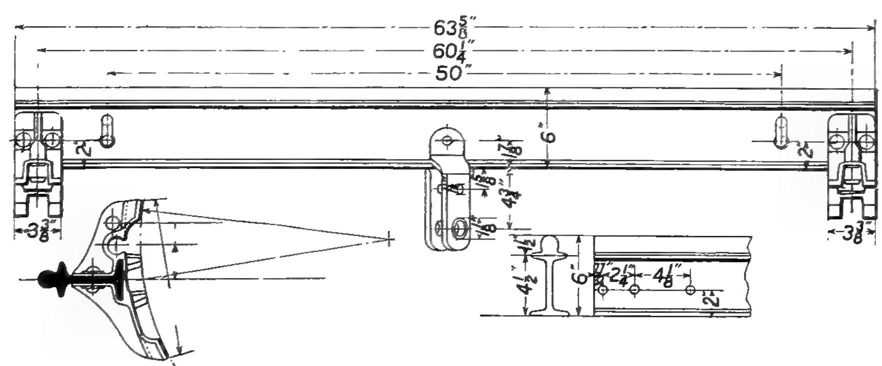


Fig. 1253—Special Combination Deck and I-Beam Section Brake Beam for Heavy Freight Service. Pennsylvania Brake Beam Company.

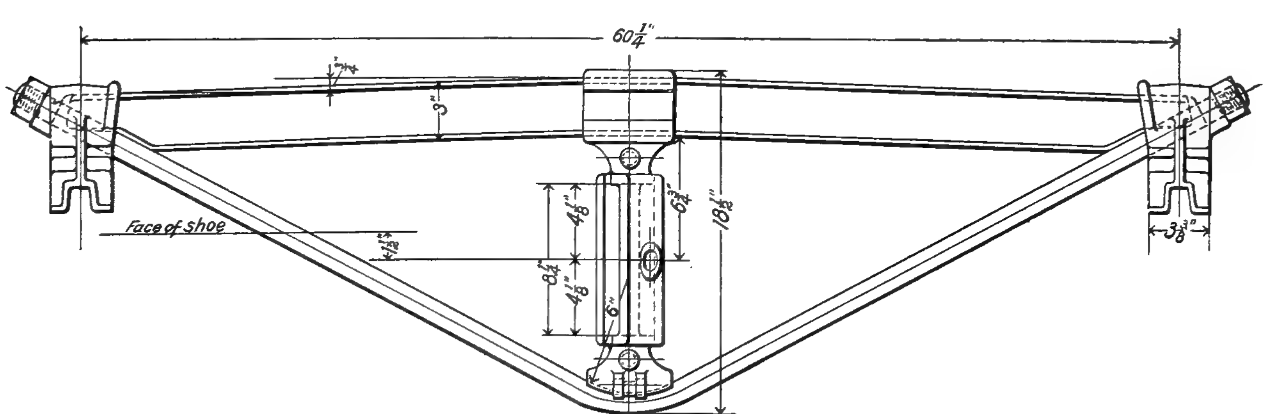


Fig. 1254—Trussed Brake Beam. Pennsylvania Brake Beam Company.

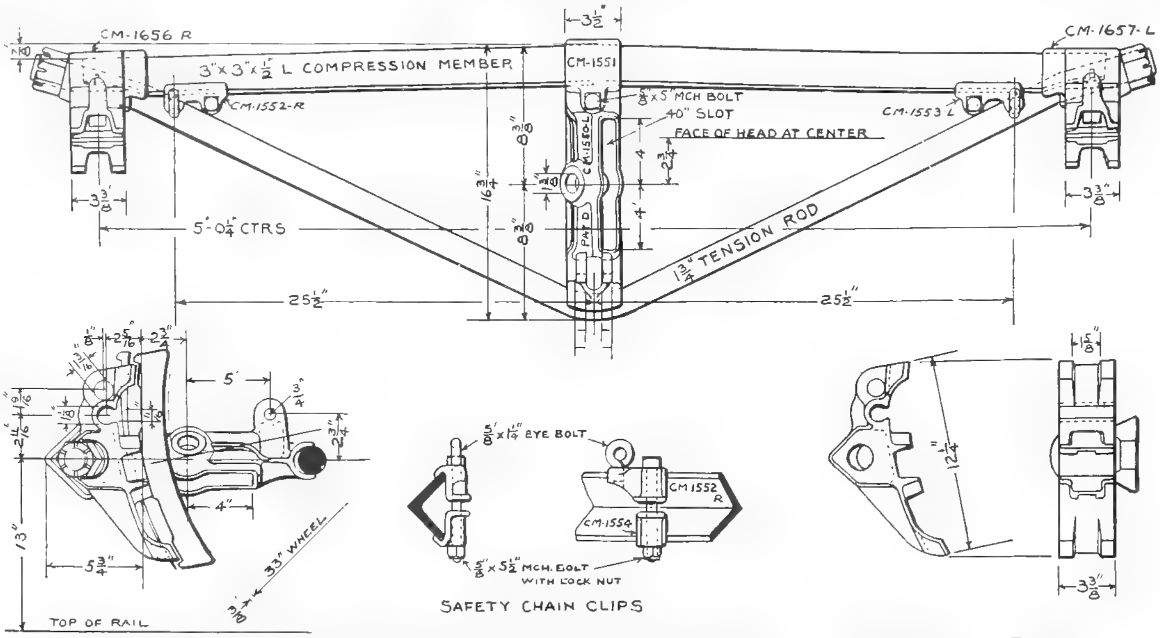


Fig. 1255—Waycott Brake Beam with Rigid Heads for High Speed Four-Wheel Trucks. Damascus Brake Beam Company.

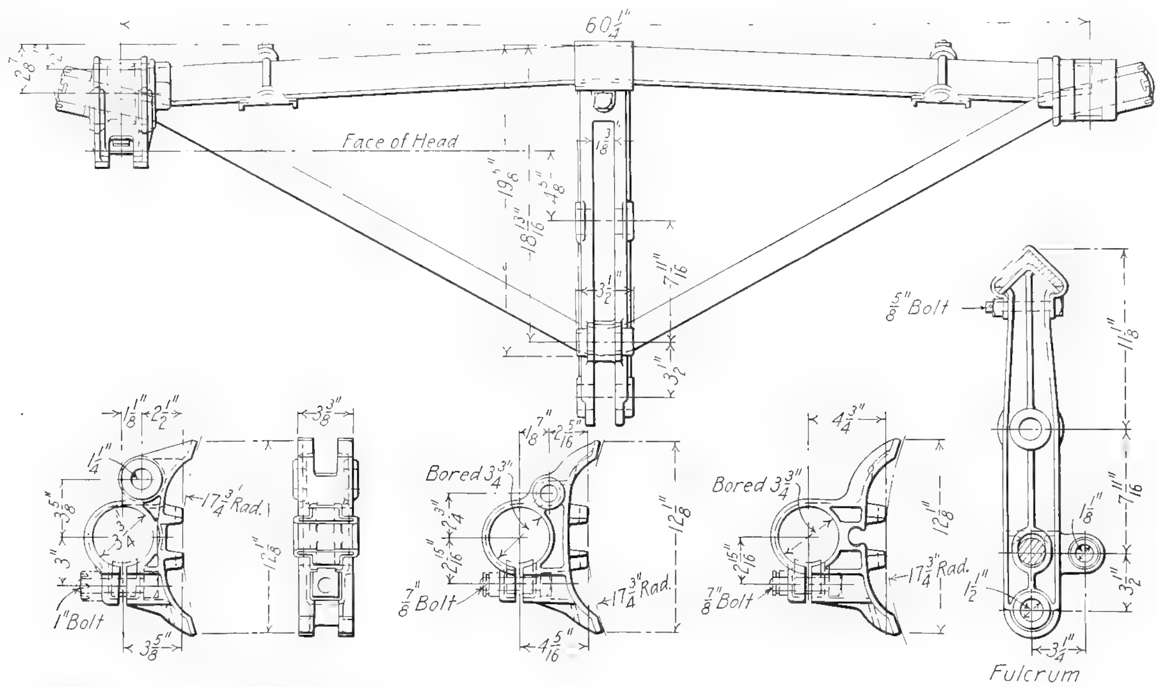


Fig. 1256—No. 2 Waycott Special High Speed Brake Beam for PC Brakes. Damascus Brake Beam Company.

Fig. 1257—No. 2 Waycott Special High Speed Brake Beam. Damascus Brake Beam Company.

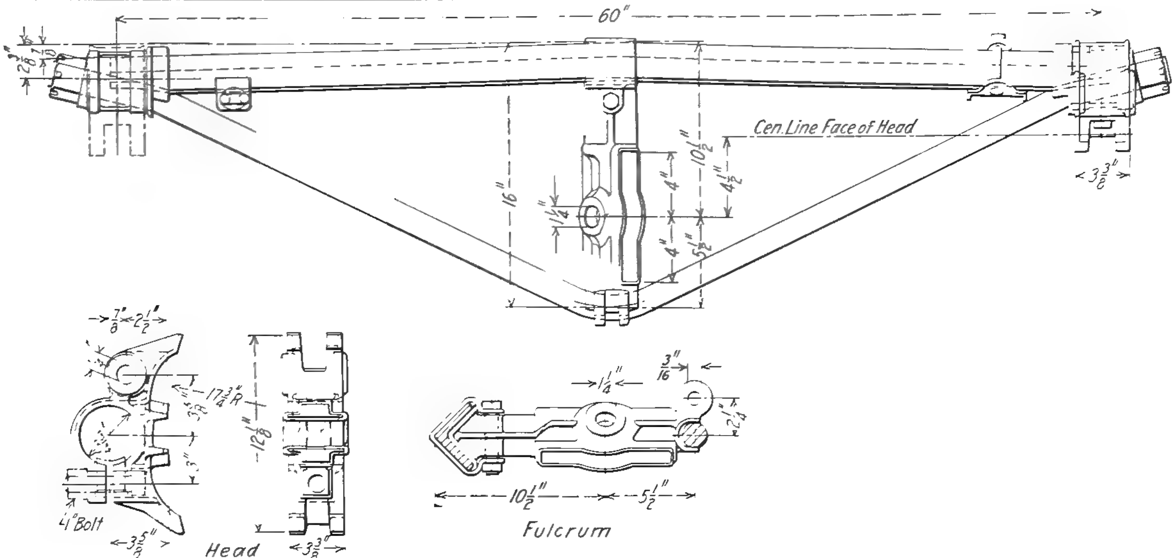


Fig. 1258—No. 1 Waycott Special High Speed Brake Beam. Damascus Brake Beam Company.

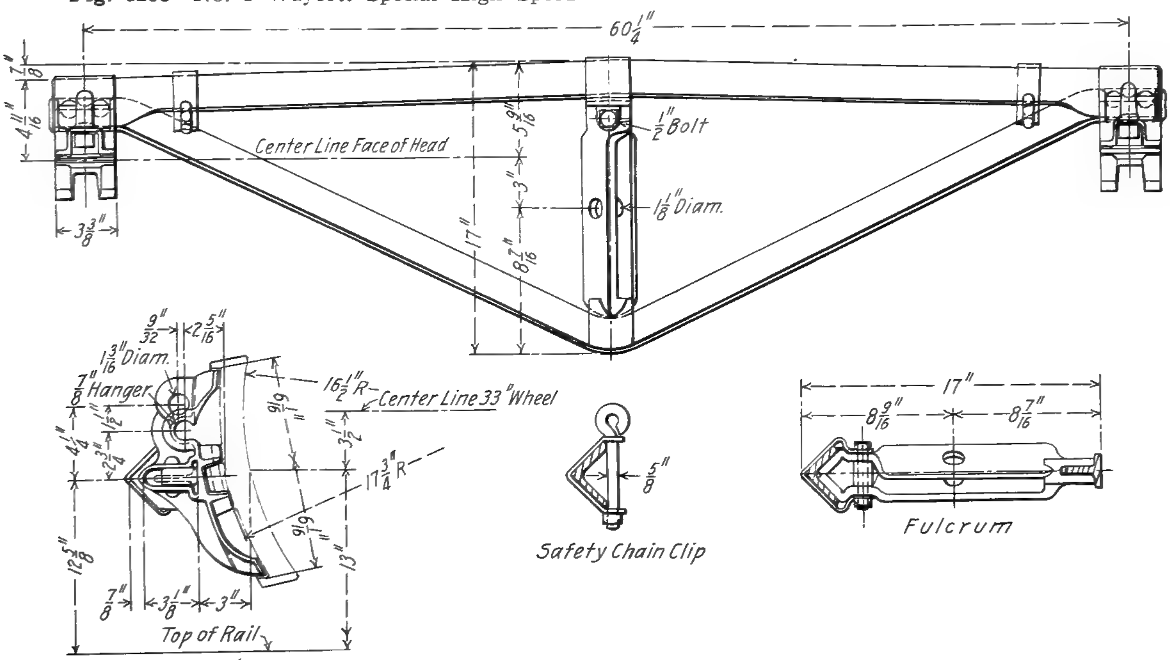


Fig. 1259—No. 2 Waycott Freight Brake Beam with Forged Steel Fulcrum. Damascus Brake Beam Company.

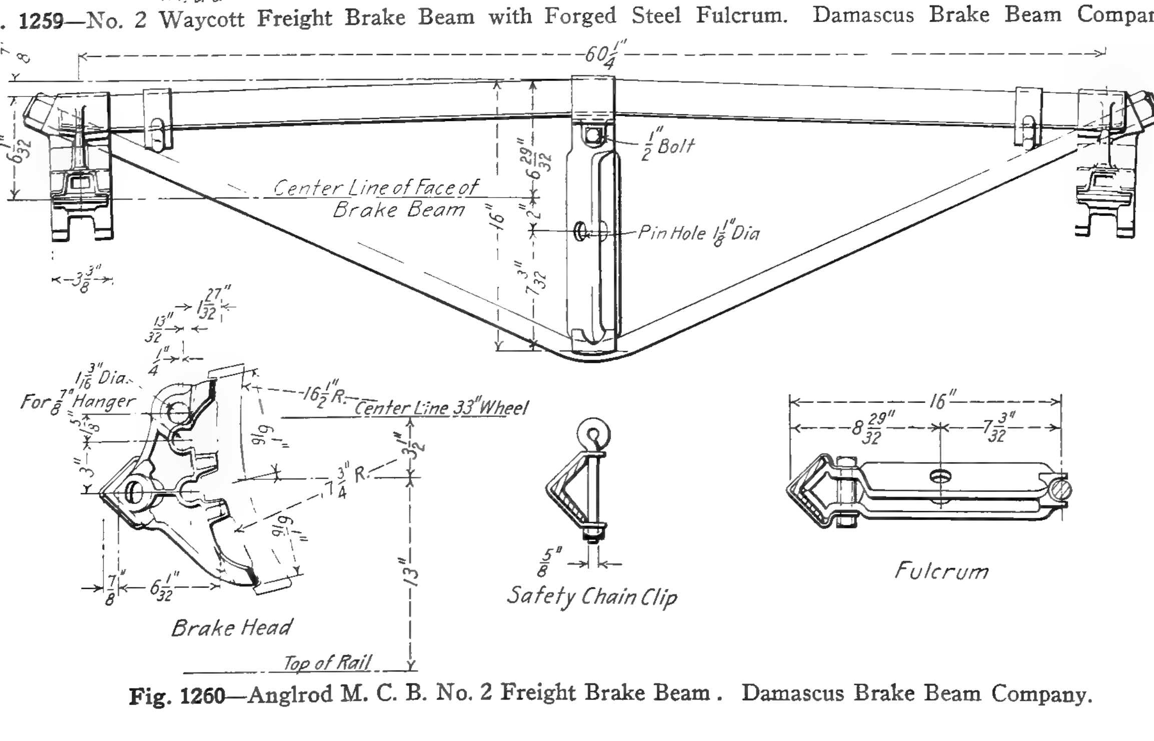


Fig. 1260—Anglrod M. C. B. No. 2 Freight Brake Beam. Damascus Brake Beam Company.

Fig. 1261—Angle-rod Brake Beam with Forged Steel Fulcrum. Damascus Brake Beam Company.

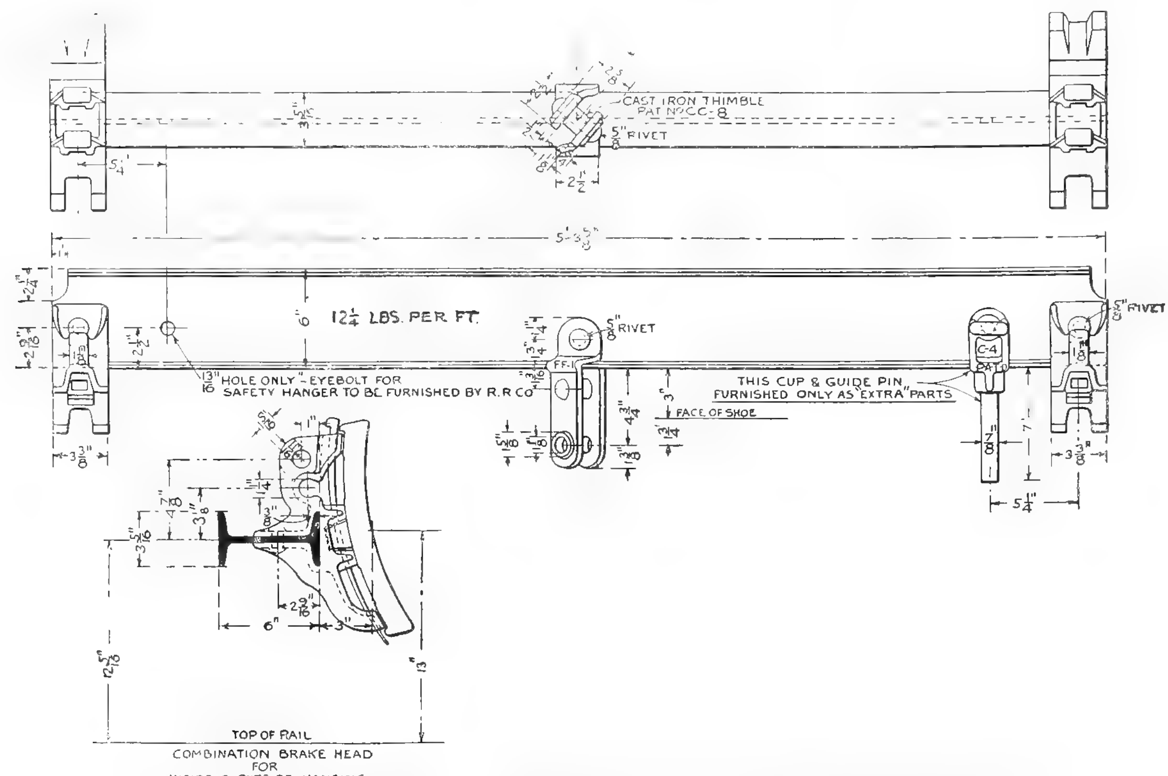


Fig. 1262 -Damascus Brake Beam for Inside or Outside Hanging. Damascus Brake Beam Company.

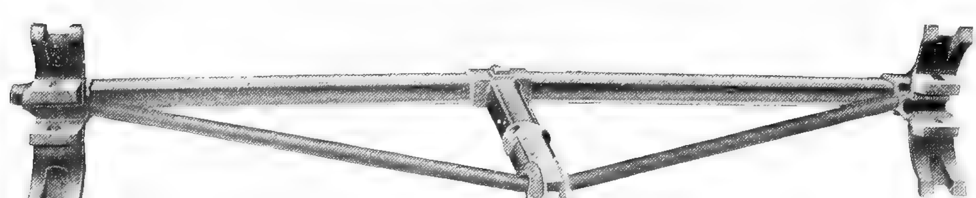


Fig. 1263—Creco Standard Freight Brake Beam. Chicago Railway Equipment Company.

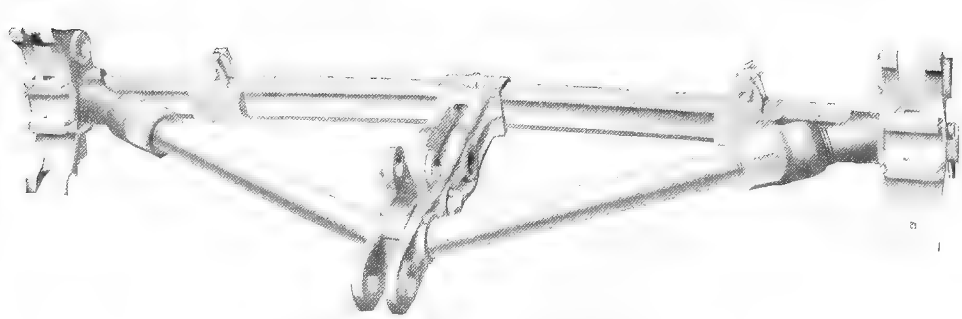


Fig. 1264—P C Creco Triple Brake Beam.
Chicago Railway Equipment Company.

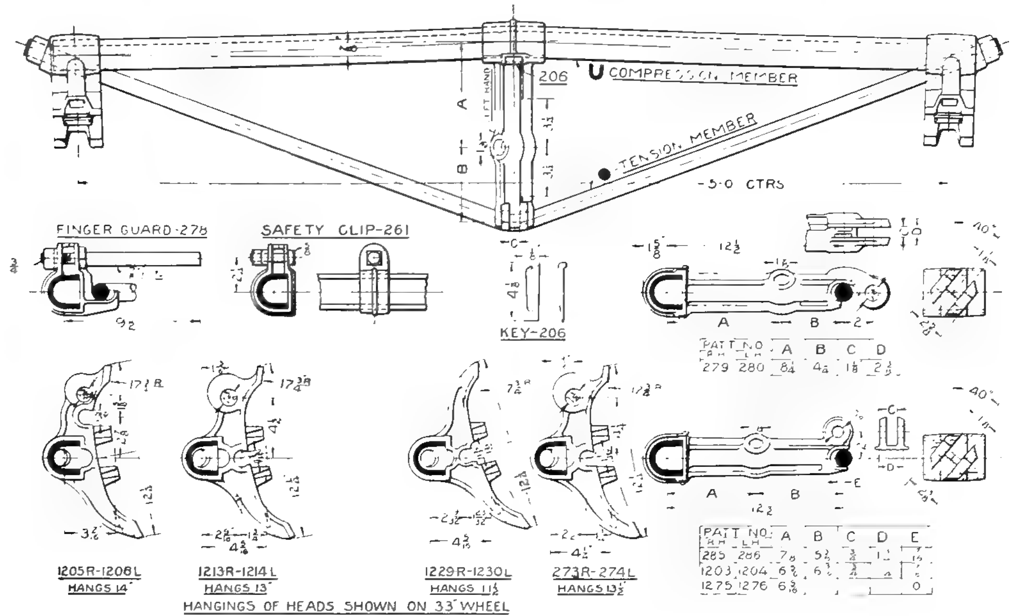


Fig. 1265—Creco Freight Brake Beam for M. C. B. No. 1 and No. 2 Capacities.

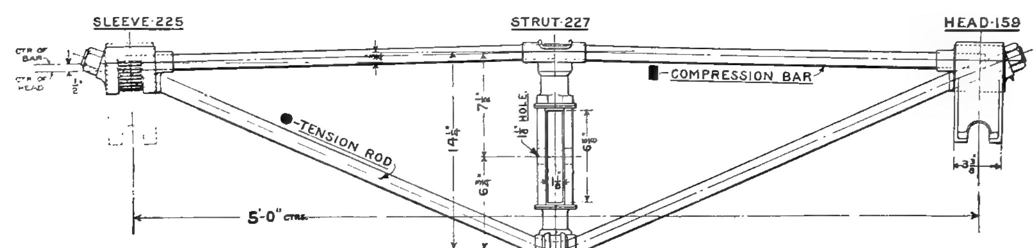


Fig. 1266—Diamond Adjustable Brake Beam for Freight Service.

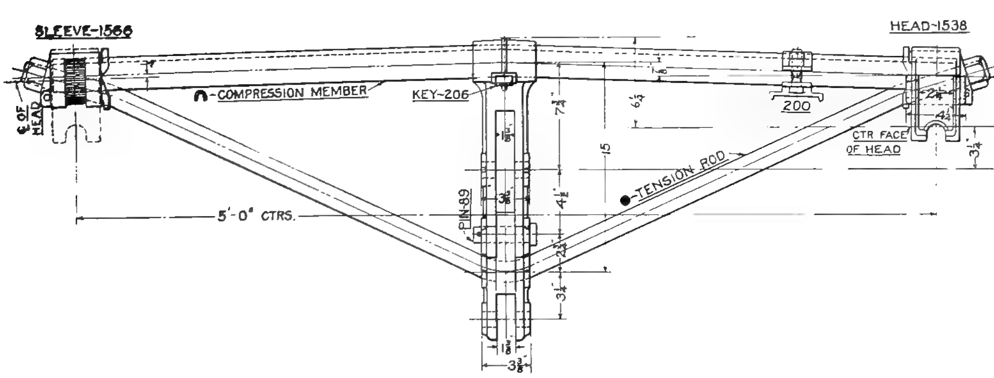


Fig. 1267—E L Creco Triple Brake Beam for High Speed Six-wheel Trucks.

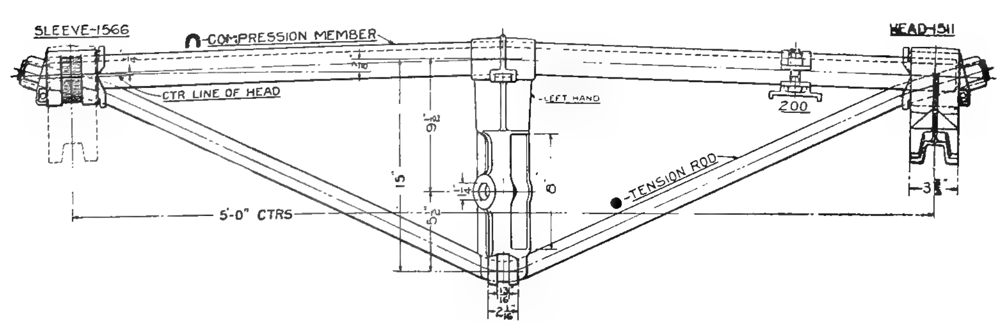


Fig. 1268—Creco Double Brake Beam for Four-Wheel Passenger Trucks.
Chicago Railway Equipment Company.

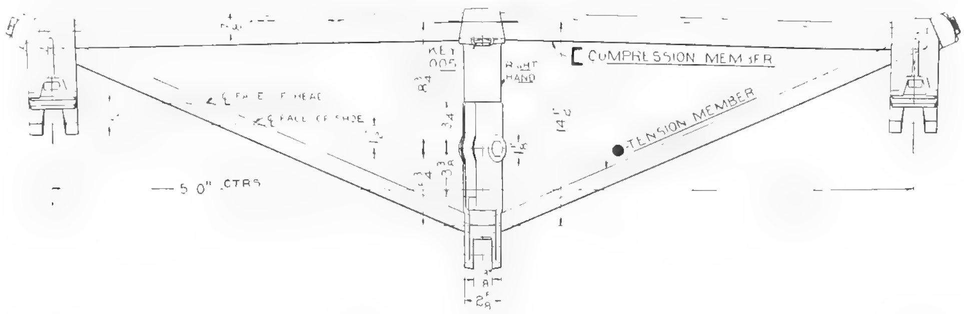


Fig. 1269—Drexel Brake Beam with Keyed Strut for Special Freight Service.

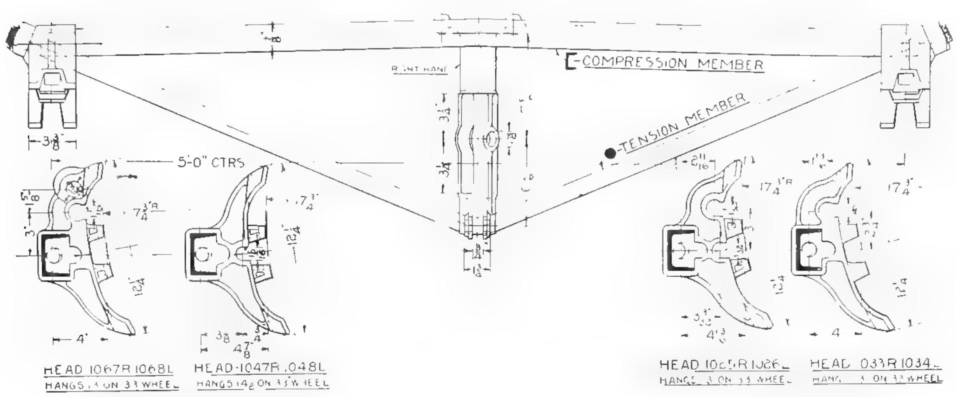


Fig. 1270—Drexel Freight Brake Beam for M. C. B. No. 2 Capacity.

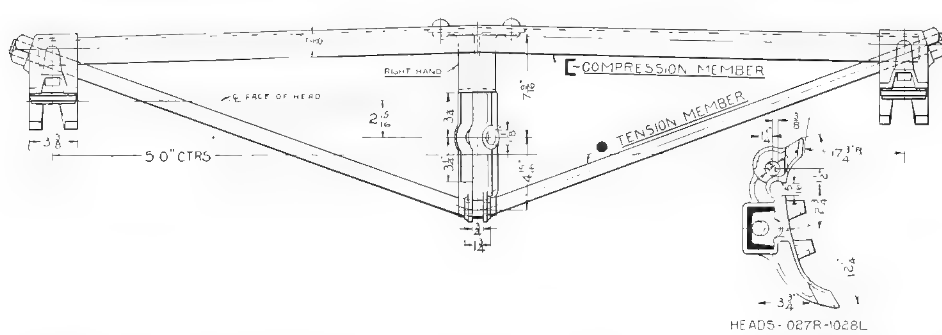


Fig. 1271—Drexel Freight Brake Beam with Riveted Strut for M. C. B. No. 1 Capacity.

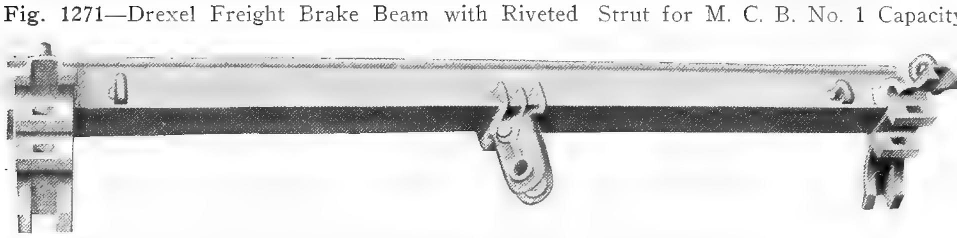


Fig. 1272—Sterlingworth Freight Brake Beam.

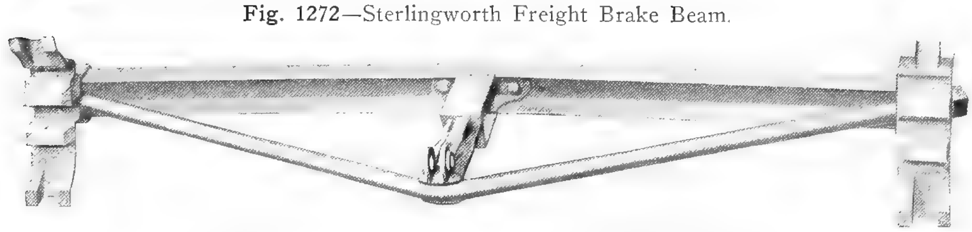


Fig. 1273—Drexel Brake Beam for Freight Service.

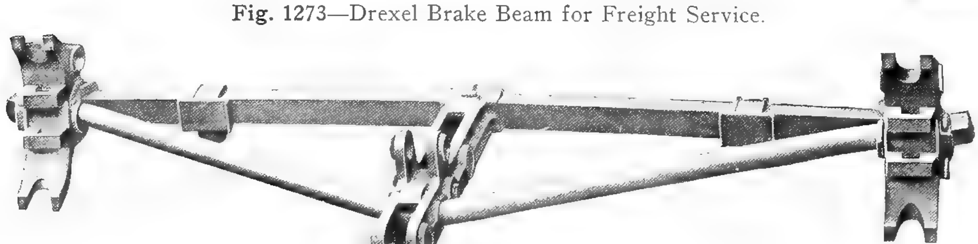
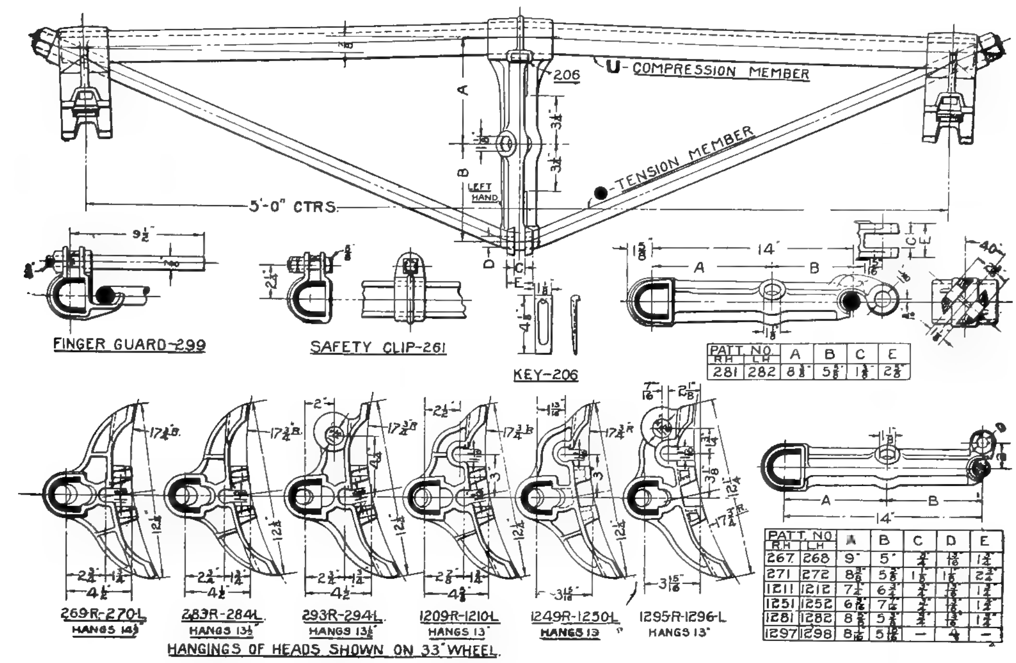


Fig. 1274—Diamond Special Brake Beam for High Speed Six-Wheel Trucks. Chicago Railway Equipment Company.



PATT. NO. RH	PATT. NO. LH	A	B	C	E
281	282	8⅜"	5⅝"	1⅜"	2⅝"

PATT. NO. RH	PATT. NO. LH	A	B	C	D	E
267	268	9"	5"	¾	13/16	1¼
271	272	8⅝"	5⅜"	1⅛	1⅛	2¼"
1211	1212	7¼"	6¾"	¾	13/16	1¼
1251	1252	6 7/16"	7 9/16"	¾	13/16	1¼
1281	1282	8⅝	5⅜	¾	13/16	1¼"
1297	1298	8 [illegible]	5 [illegible]	—	[illegible]	—

Fig. 1275—Creco Brake Beam for Heavy Freight Service.

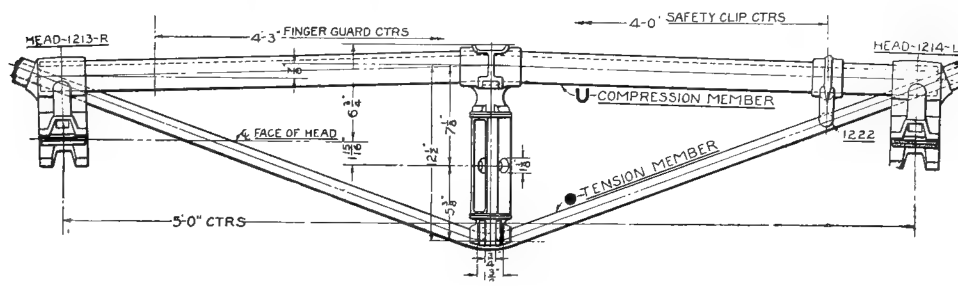


Fig. 1275A—Creco Brake Beam with Reversible Strut for General Freight Service.

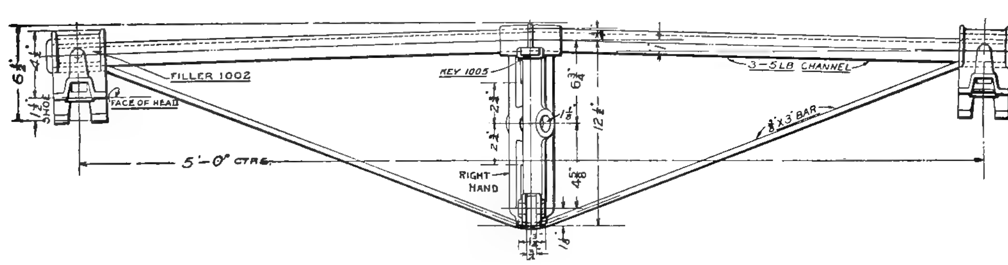


Fig. 1276—Reliance Freight Brake Beam.

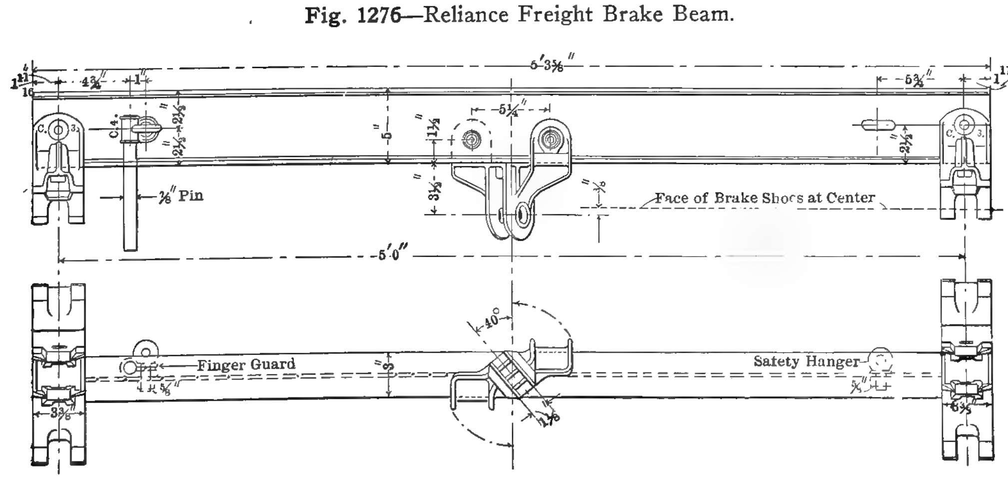
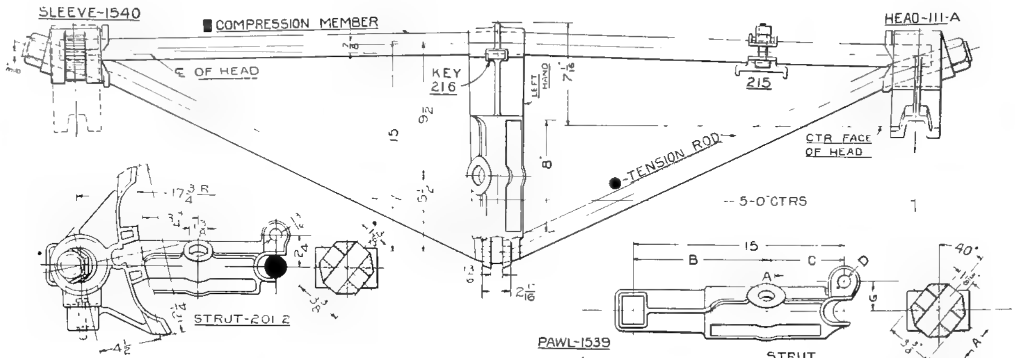
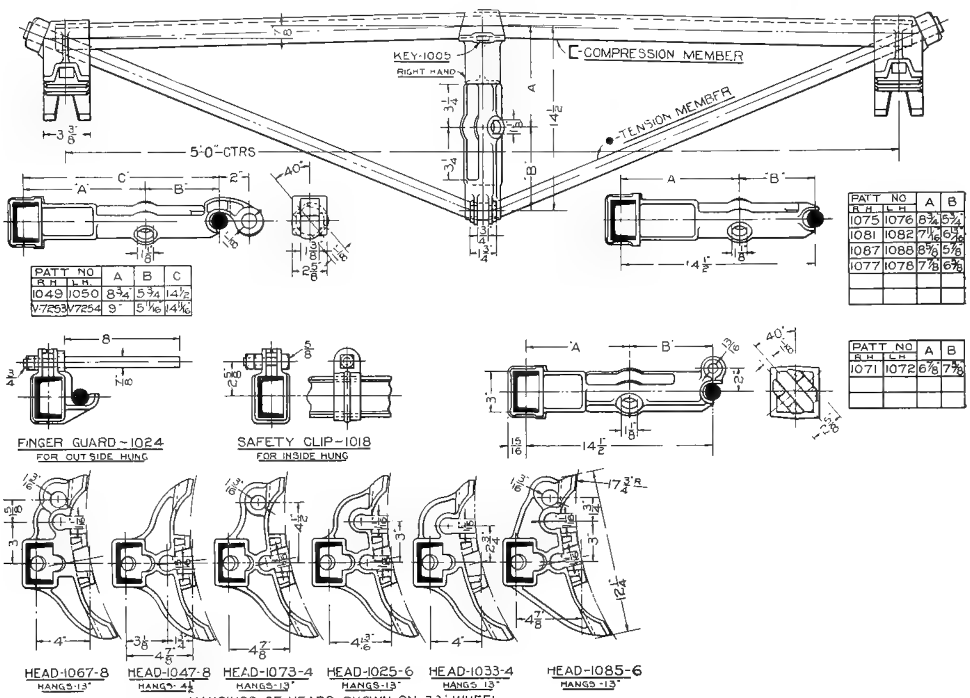


Fig. 1277—Ninety-Six Freight Brake Beam.
Chicago Railway Equipment Company.



PATT. NO	A	B	C	D	E	F	G
201-R 202L	$1\frac{3}{8}$"	$9\frac{1}{2}$"	$5\frac{1}{2}$"	$\frac{13}{16}$"	$\frac{13}{16}$"	$2\frac{1}{16}$"	$2\frac{1}{4}$
211 R 212 L	$1\frac{1}{4}$"	$9\frac{1}{2}$"	$5\frac{1}{2}$"	$\frac{13}{16}$"	$\frac{13}{16}$	$2\frac{1}{16}$	$2\frac{1}{4}$
235R 236-L	$1\frac{1}{4}$"	$8\frac{1}{4}$"	$6\frac{3}{4}$"	$1\frac{1}{8}$"	$1\frac{1}{8}$	$2\frac{5}{8}$	$2\frac{3}{8}$

Fig. 1278—Diamond Special Double Brake Beam for High Speed Four-Wheel Trucks.



PATT NO R H	PATT NO L H	A	B	C
1049	1050	$8\frac{3}{4}$"	$5\frac{3}{4}$	$14\frac{1}{2}$
V-7253	V7254	9"	$5\frac{11}{16}$	$14\frac{11}{16}$

PATT NO R H	PATT NO L H	A	B
1075	1076	$8\frac{3}{4}$	$5\frac{3}{4}$
1081	1082	$7\frac{11}{16}$	$6\frac{5}{16}$
1087	1088	$8\frac{5}{8}$	$5\frac{5}{8}$
1077	1078	$7\frac{7}{8}$	$6\frac{7}{8}$

PATT NO R H	PATT NO L H	A	B
1071	1072	$6\frac{7}{8}$	$7\frac{7}{8}$

Fig. 1279—Drexel M. C. B. No. 2 Brake Beam with Keyed Strut.

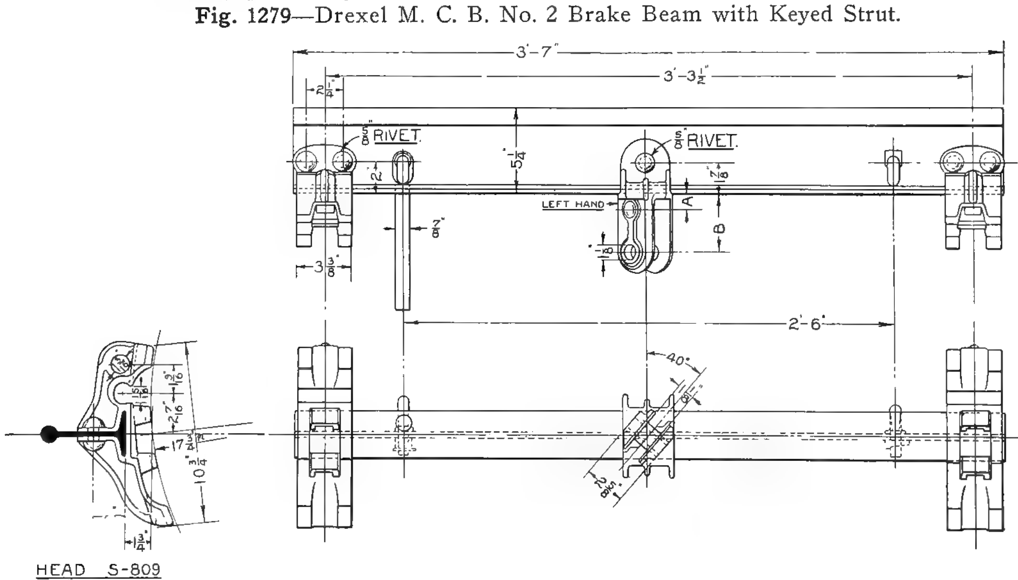


Fig. 1280—Sterlingworth Brake Beam for Narrow Gage Cars.

Chicago Railway Equipment Company.

Fig. 1281—National Hollow Brake Beam for Six-Wheel Trucks.

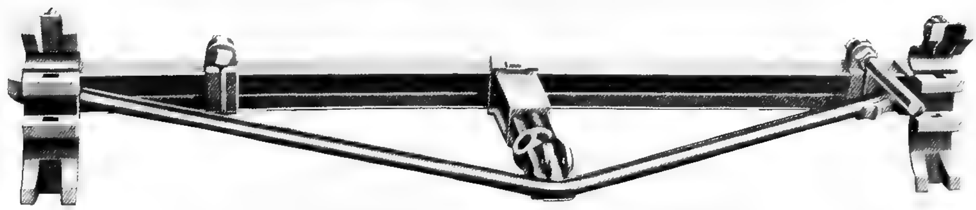


Fig. 1282 Drexel Brake Beam with Keyed Strut.

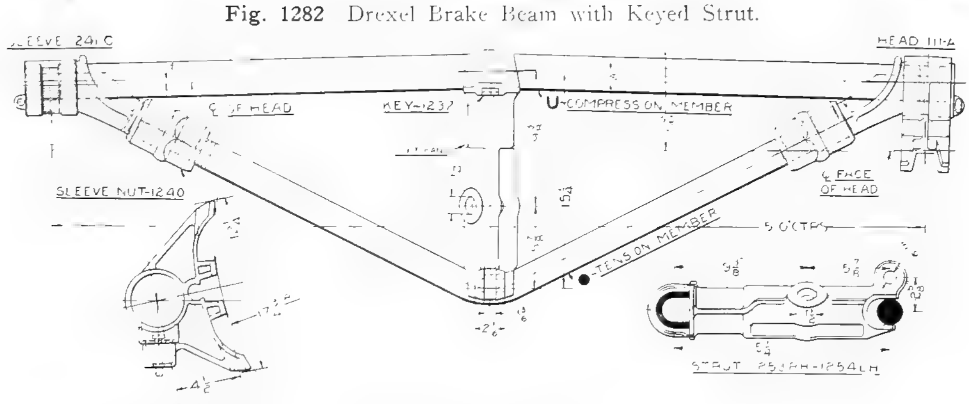


Fig. 1283—P C Creco Brake Beam for Heavy Service with Four-Wheel Trucks.

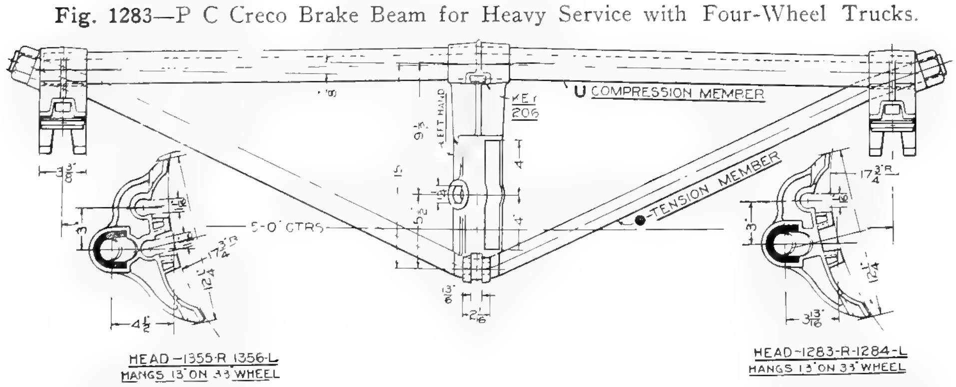
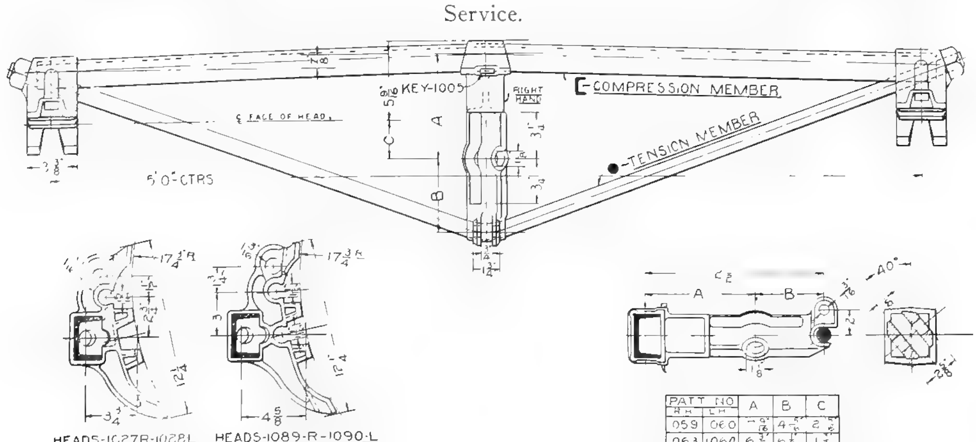


Fig. 1284—E L Creco Brake Beam for Use with Westinghouse Empty and Load Brake for Heavy Freight Service.



PATT NO RH	PATT NO LH	A	B	C
059	060	7 9/16	4 [illegible]	2 [illegible]
063	1064	6 [illegible]	6 [illegible]	1 [illegible]

Fig. 1285—No. 1 M. C. B. Drexel Brake Beam with Keyed Strut.
Chicago Railway Equipment Company.

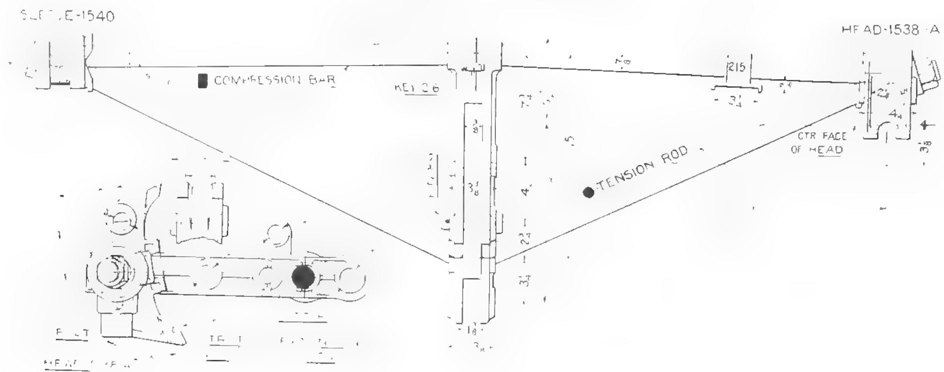


Fig. 1286—Diamond Special Triple Brake Beam for High Speed Six-Wheel Trucks.

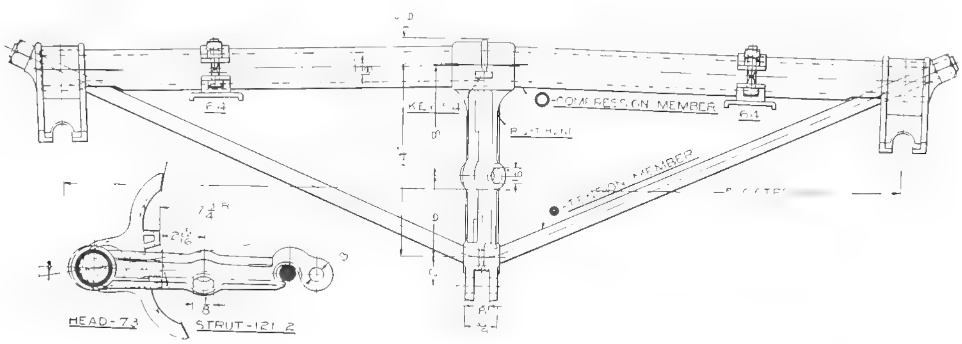


Fig. 1287—National Hollow 2½-in. Brake Beam with Rigid Heads for Heavy Freight Service.

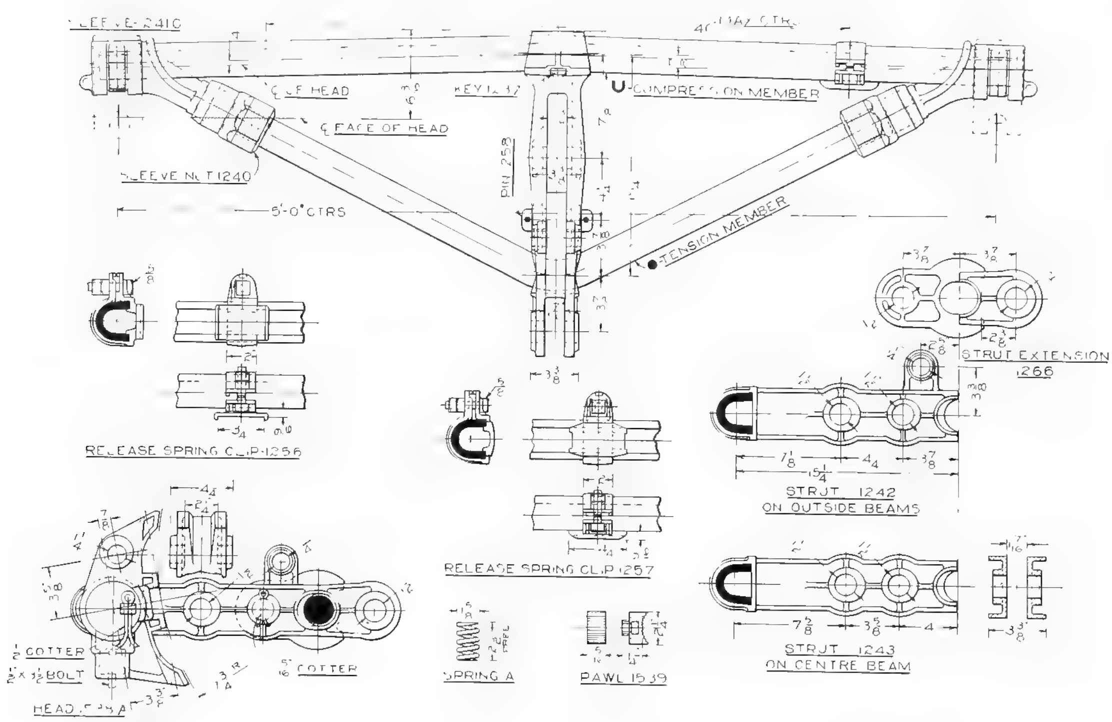


Fig. 1288—P C Creco Brake Beam for Heavy Service with Six-Wheel Trucks.

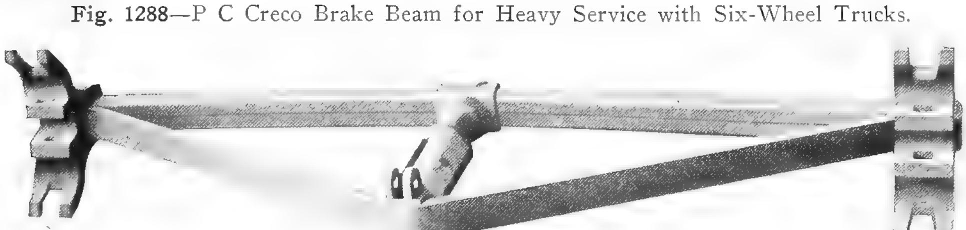


Fig. 1289—Kewanee Brake Beam.
Chicago Railway Equipment Company.

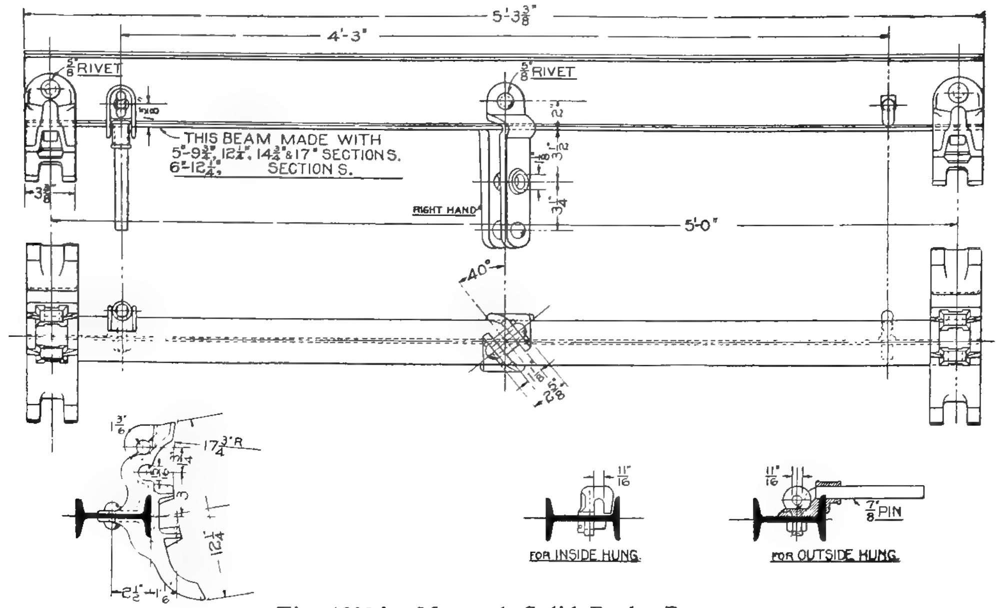


Fig. 1290A—Monarch Solid Brake Beam.

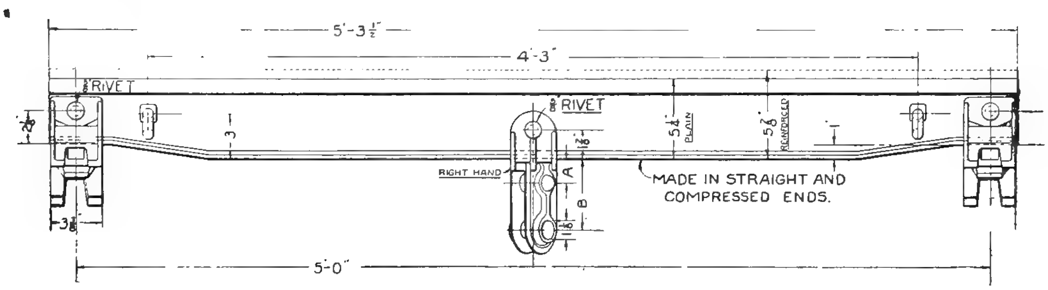


Fig. 1290B—Sterlingworth Compressed End Freight Brake Beam.

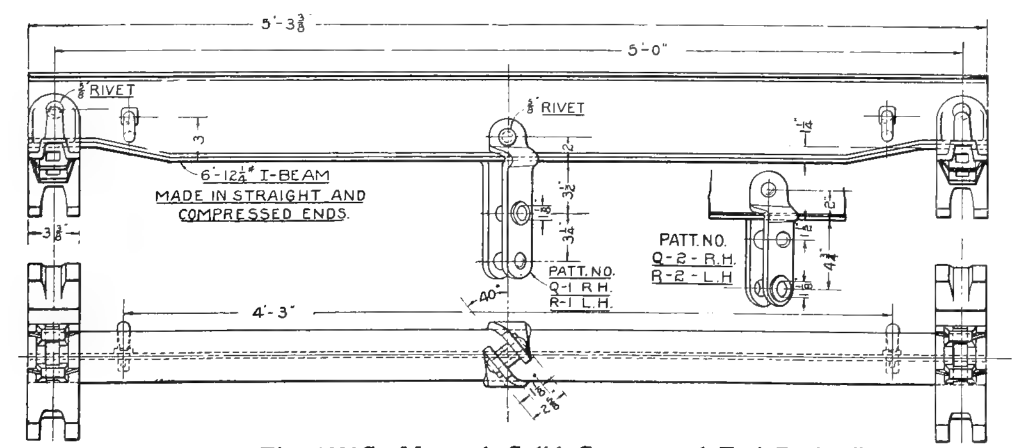


Fig. 1290C—Monarch Solid Compressed End Brake Beam.
Chicago Railway Equipment Company.

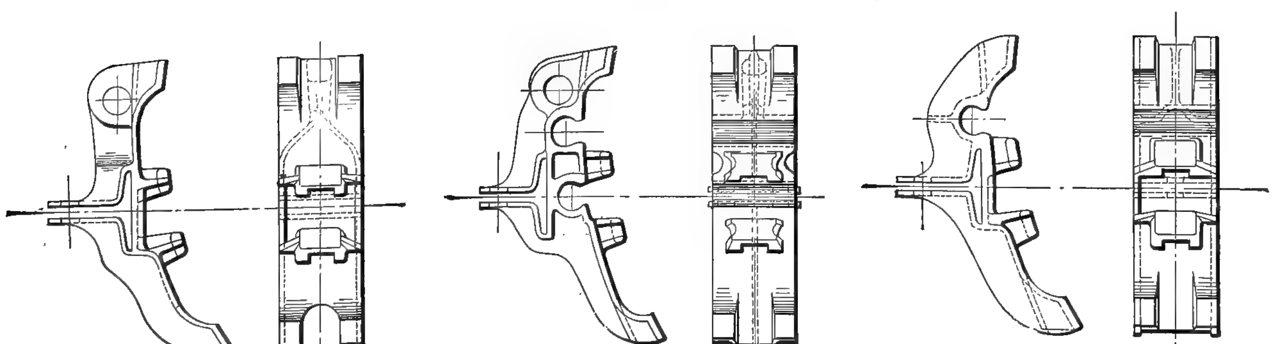


Fig. 1290D—Brake Heads for Acme Brake Beams. American Steel Foundries.

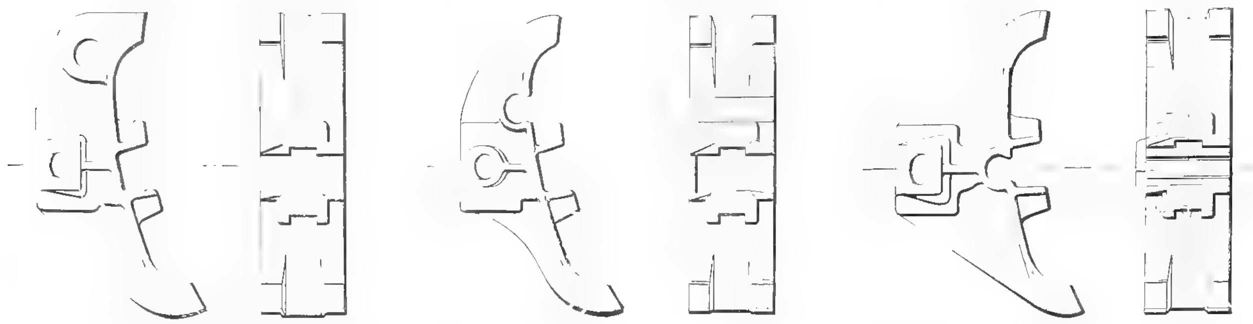


Fig. 1290 Brake Heads for Ajax Brake Beams. American Steel Foundries.

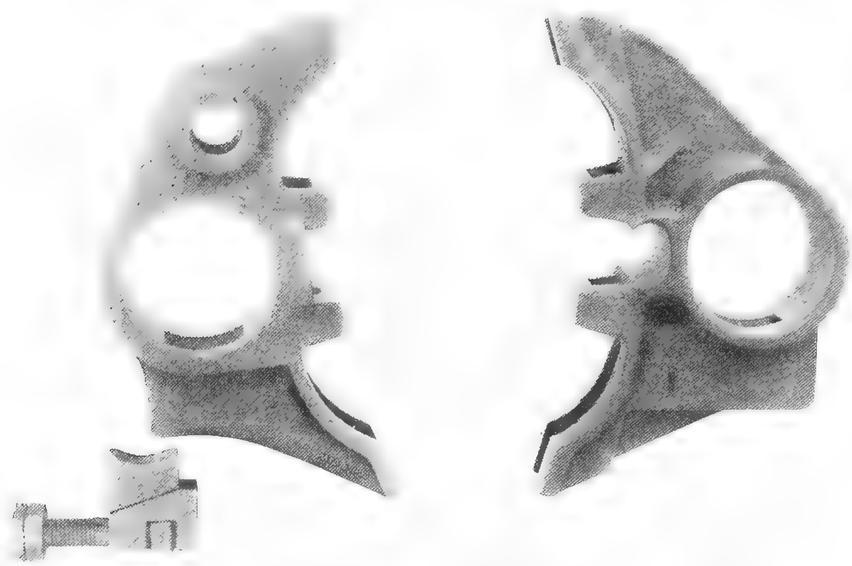
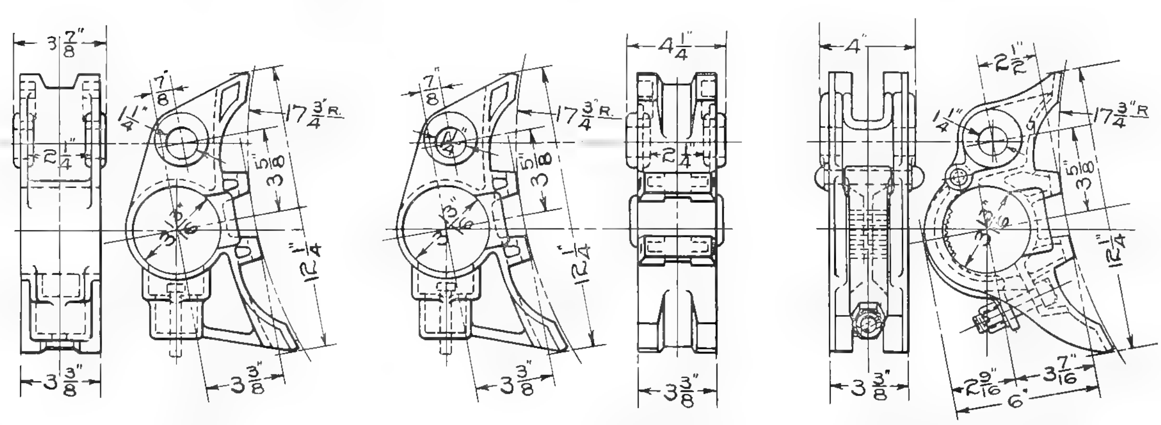


Fig. 1291—Adjustable Brake Heads for Vulcan, Hercules and Ajax Passenger Brake Beams American Steel Foundries.



HEAD~138-A HEAD~1538-B HEAD~1318

Fig. 1292—Creco Standard Adjustable Brake Heads. Chicago Railway Equipment Company.

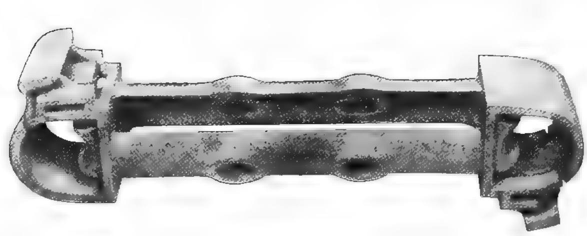


Fig. 1293—Creco Duplex Strut for Brake Beams. Chicago Railway Equipment Company.

Fig. 1294—Truck Brake Lever Connecting Rods. Shaefer Equipment Company.

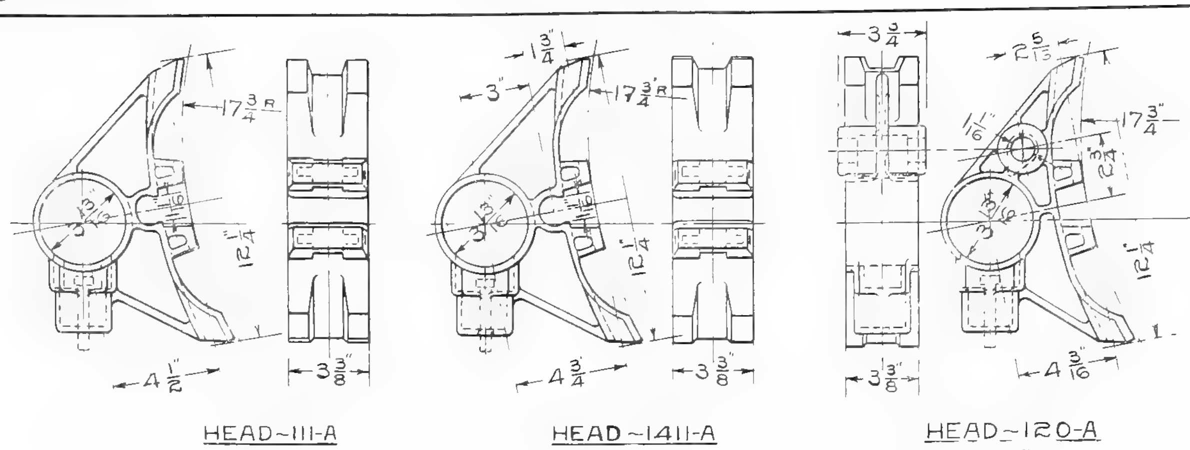


Fig. 1295—Creco Standard Adjustable Brake Heads. Chicago Railway Equipment Company.

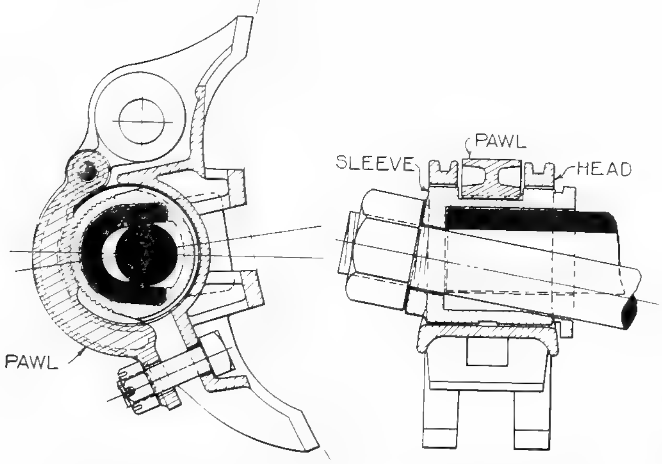


Fig. 1296—Semi-Adjustable Head for Creco Brake Beam. Chicago Railway Equipment Company.

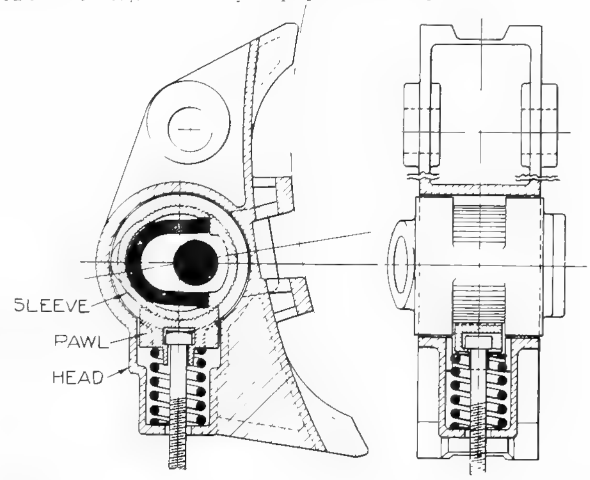


Fig. 1297—Automatic Adjustable Head and Sleeve for Creco Brake Beams. Chicago Railway Equipment Company.

Fig. 1298—Sliding Chair for Creco Third Point Support. Chicago Railway Equipment Company

Fig. 1299—Channel Brake Beam Forged Steel Fulcrum. Damascus Brake Beam Company.

Fig. 1300—Channel Brake Beam Forged Steel Strut for Outside Application. Damascus Brake Beam Company

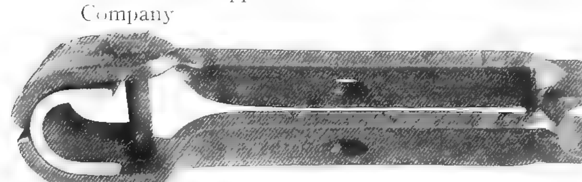


Fig. 1301—U-Section Forged Steel Fulcrum. Damascus Brake Beam Company.

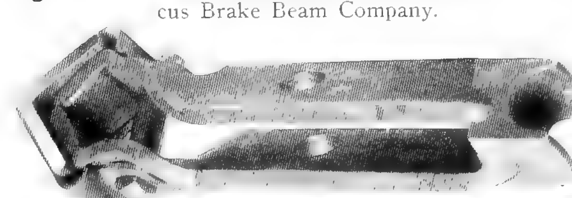


Fig. 1302—Anglrod Forged Steel Fulcrum. Damascus Brake Beam Company.

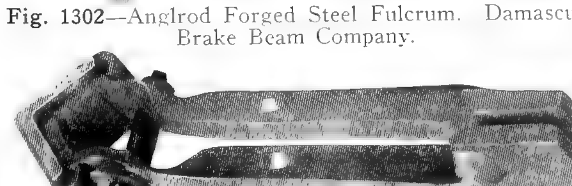


Fig. 1303—Waycott Brake Beam Forged Steel Fulcrum. Damascus Brake Beam Company.

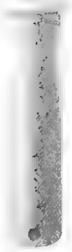


Fig. 1304—Brake Lever Pin.

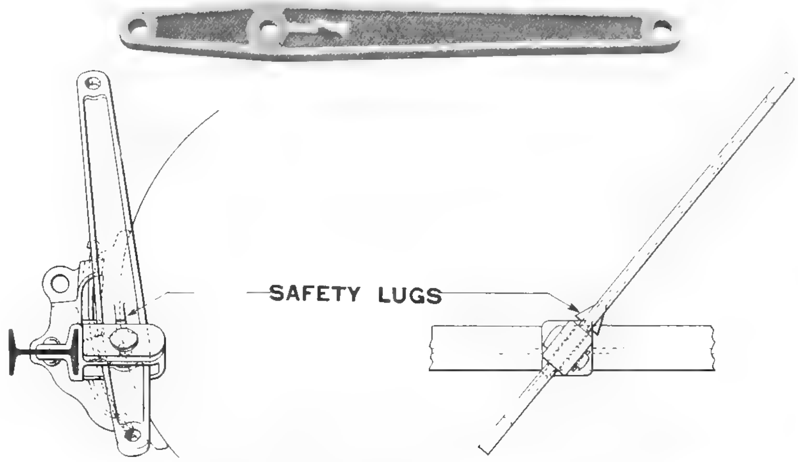


Fig. 1305—National Safety Brake Lever. (Patented.)

Fig. 1306—Brake Lever Pin.

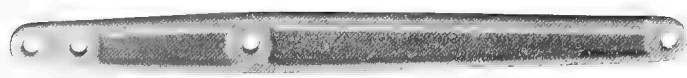


Fig. 1307—Cylinder Lever.

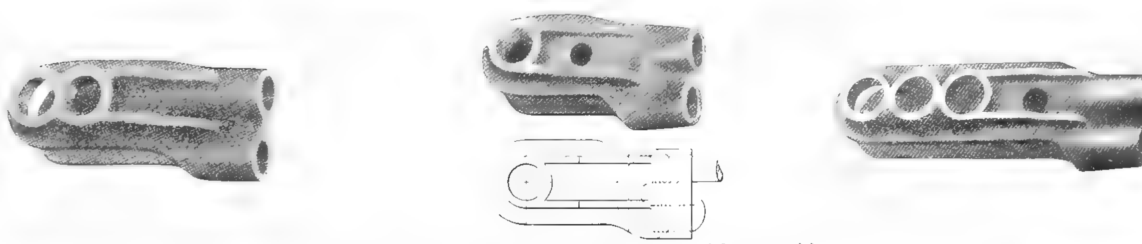


Fig. 1308—National Brake Jaws. (Patented.)

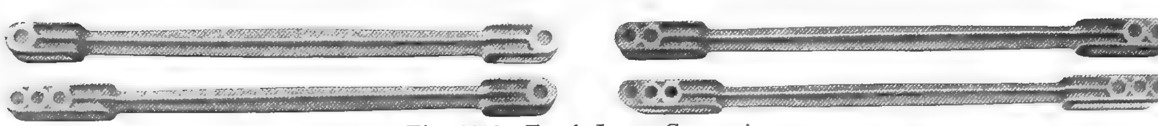


Fig. 1309—Truck Lever Connections.

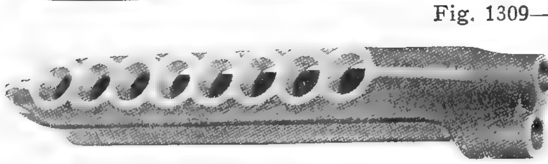


Fig. 1310—The "National" Dead Lever Guide. (Patented.)

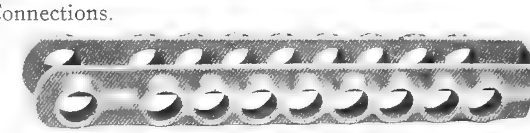


Fig. 1311—Dead Lever Guide or Brake Lever Stop.

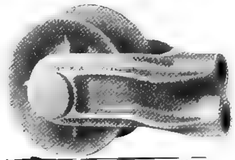


Fig. 1312—"National" Sheave Jaw. (Patented.)

Fig. 1313—Floating Lever Bracket.

Fig. 1314—Two-Piece Adjustable Brake Beam Fulcrum. (Patented.)

Fig. 1315—Brake Shoe Key, M. C. B. Standard.

Fig. 1316—Finger Guard.

National Malleable Castings Company.

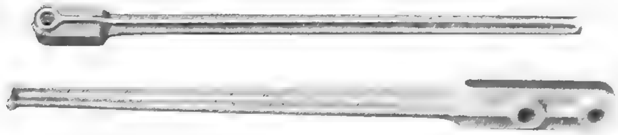


Fig. 1317—Cylinder Push Rods. National Malleable Castings Company.

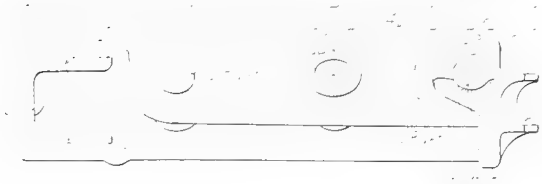


Fig. 1318—Forged Steel Strut. Buffalo Brake Beam Company.

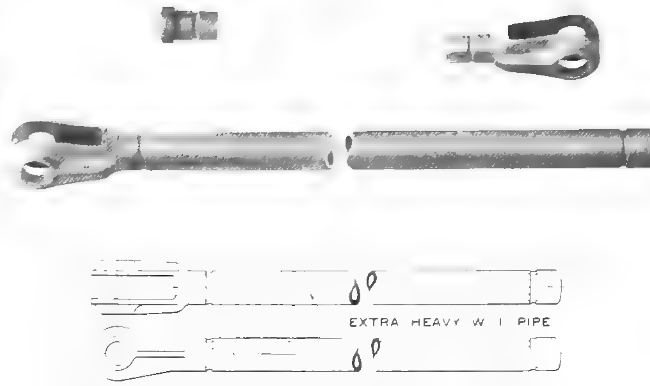


Fig. 1319—National Cylinder Push Rod Jaw and Tip. (Patented.) National Malleable Castings Company.

Fig. 1320—Western One-Hole Brake Jaw.

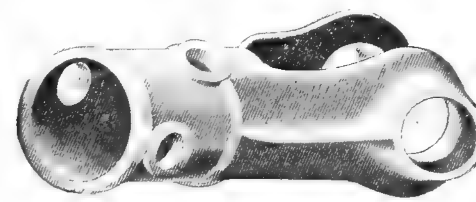


Fig. 1321—One-Hole Malleable Iron Brake Jaw.

Fig. 1322—Western Three-Hole Brake Jaw.

Fig. 1323—Two-Hole Malleable Iron Brake Jaw.

Fig. 1324—Western Dead Lever Guide.

Fig. 1325—Western Bottom Connecting Rod with Center of Extra Heavy Pipe.

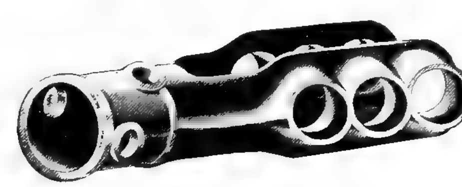


Fig. 1326—Three-Hole Malleable Iron Brake Jaw.

Western Railway Equipment Company.

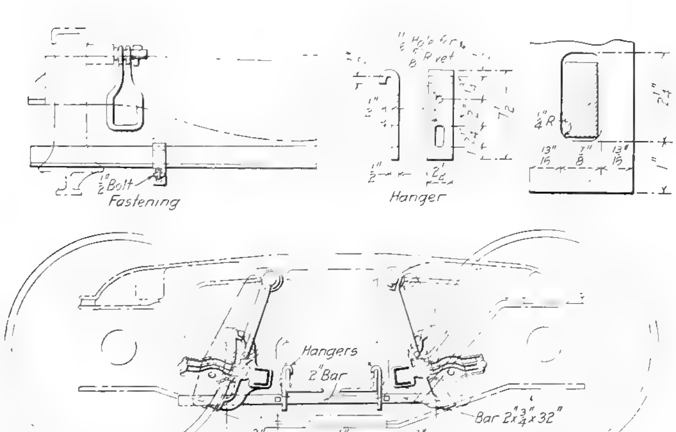


Fig. 1327—Brake Beam Safety Hanger. American Steel Foundries.

Fig. 1328—Adjustable Brake Head. Joliet Railway Supply Company.

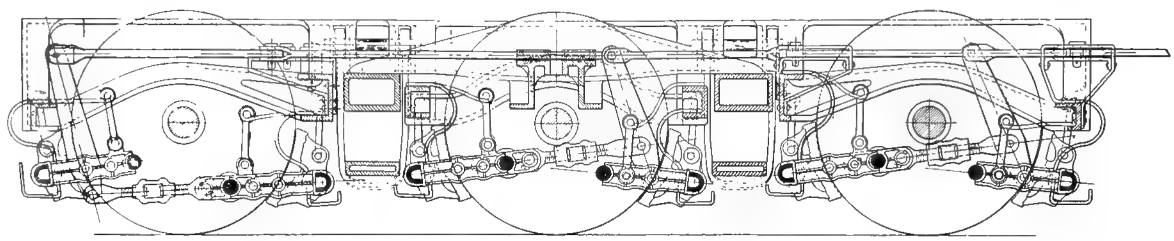


Fig. 1329—Creco Brake Beam Clasp Brake Arrangement for Triple Trucks. Chicago Railway Equipment Company.

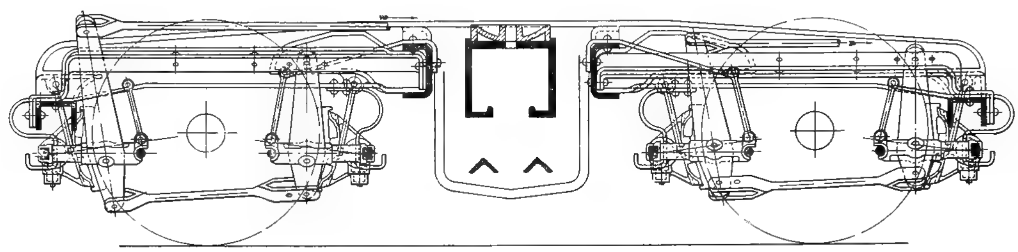


Fig. 1330—Diamond Special Brake Beam Clasp Brake Arrangement for Four-Wheel Trucks. Chicago Railway Equipment Company.

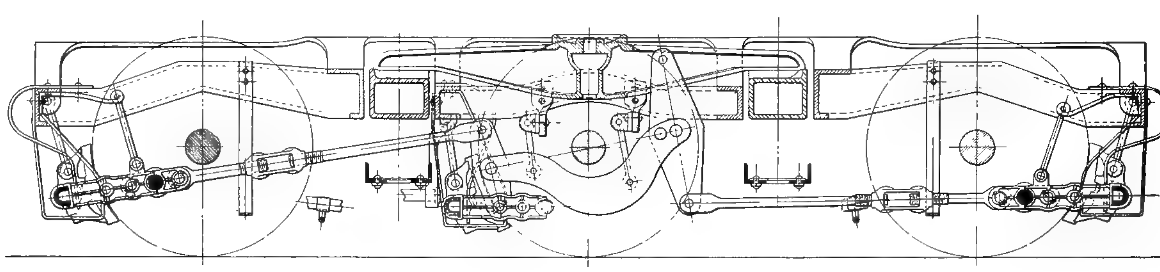


Fig. 1331—Arrangement of Brake Rigging for Triple Brakes on Six-Wheel Passenger Train Car Trucks. Chicago Railway Equipment Company.

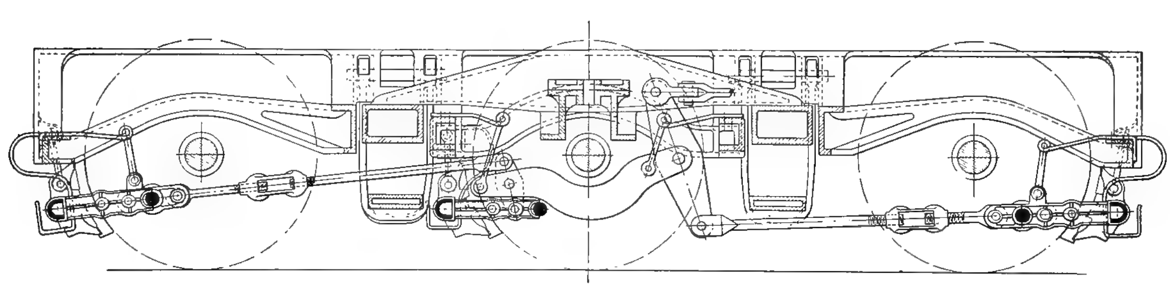


Fig. 1332—Pullman Standard Arrangement of Brake Rigging for All-Steel Six-Wheel Passenger Train Car Trucks. Chicago Railway Equipment Company.

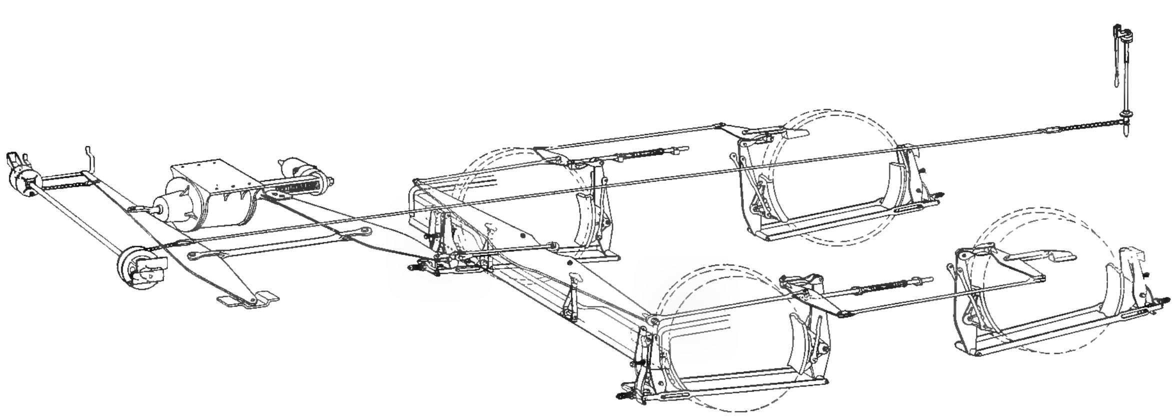


Fig. 1333—Arrangement of Brake Rigging for Clasp Brakes of New York, Westchester & Boston Suburban Cars.

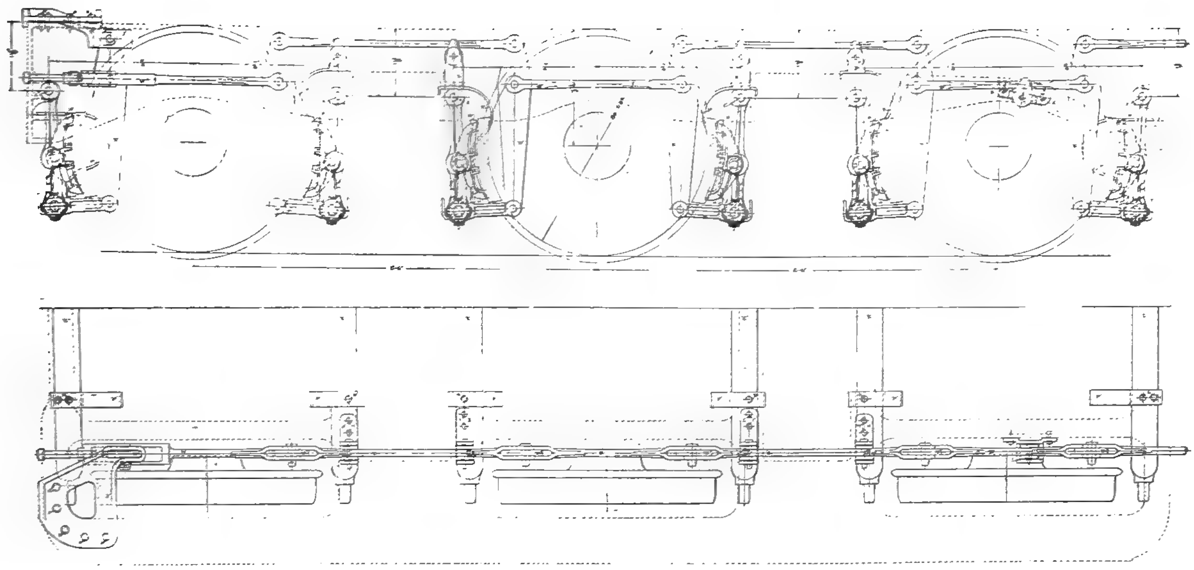


Fig. 1334—Clasp Brake Arrangement for Six-Wheel Passenger Train Car Trucks.
American Brake Company.

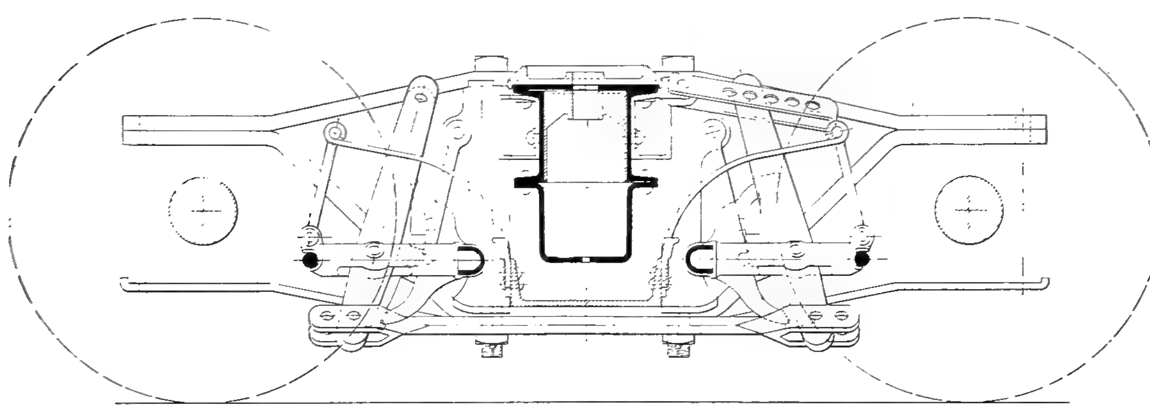


Fig. 1335—Inside Hung Creco Brake Beams Applied to Rigid Diamond Freight Car Truck.
Chicago Railway Equipment Company.

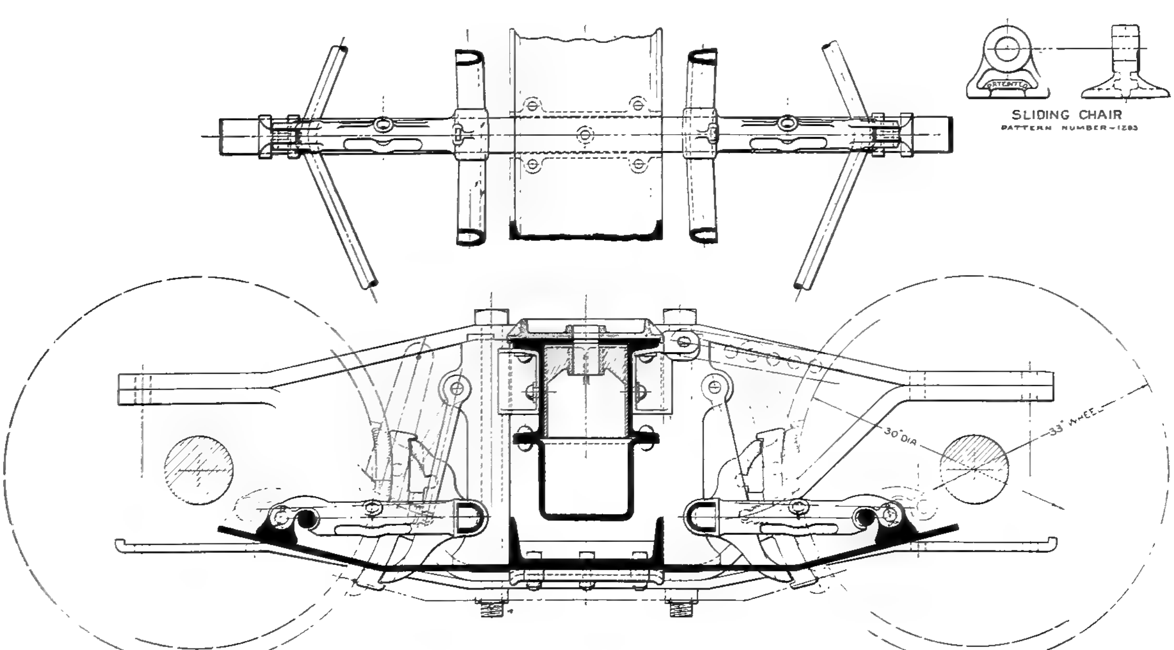


Fig. 1336—Creco Sliding Third Point Support and Safety Device Applied to Rigid Diamond Freight Car Truck.
Chicago Railway Equipment Company.

Note: See Trucks for Other Arrangements of Clasp Brakes.

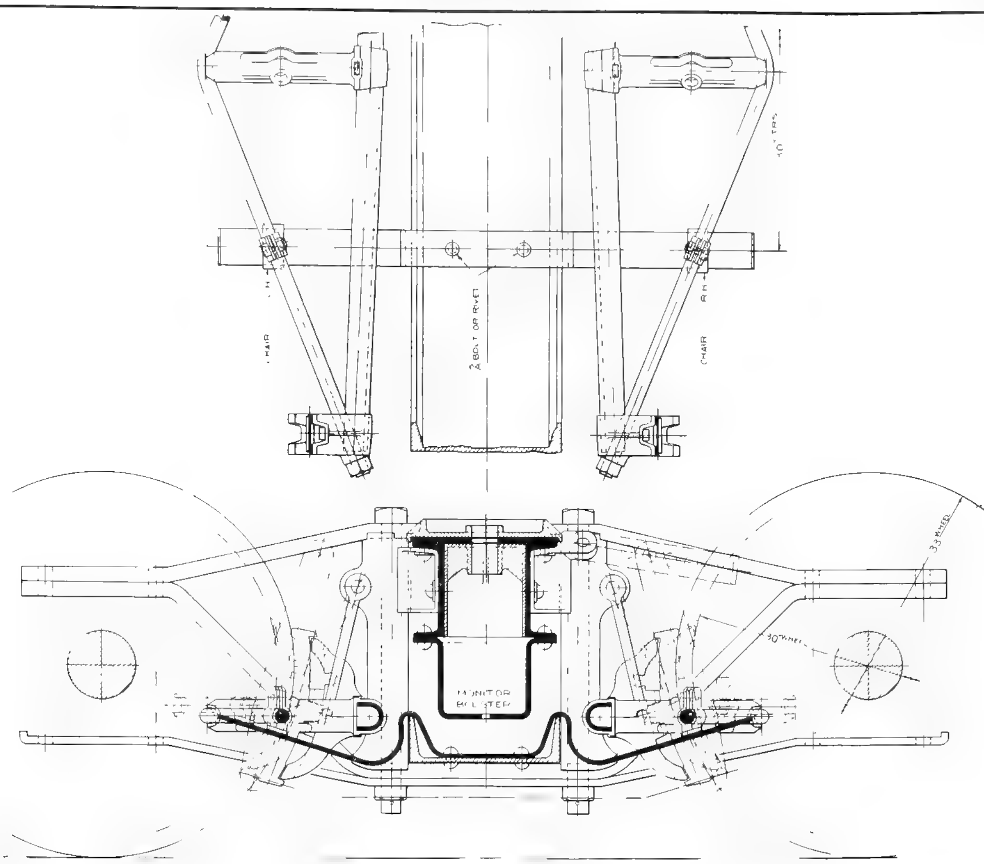


Fig. 1337—Creco Four-Point Support and Safety Device as Applied to Rigid Diamond Freight Car Truck. Chicago Railway Equipment Company.

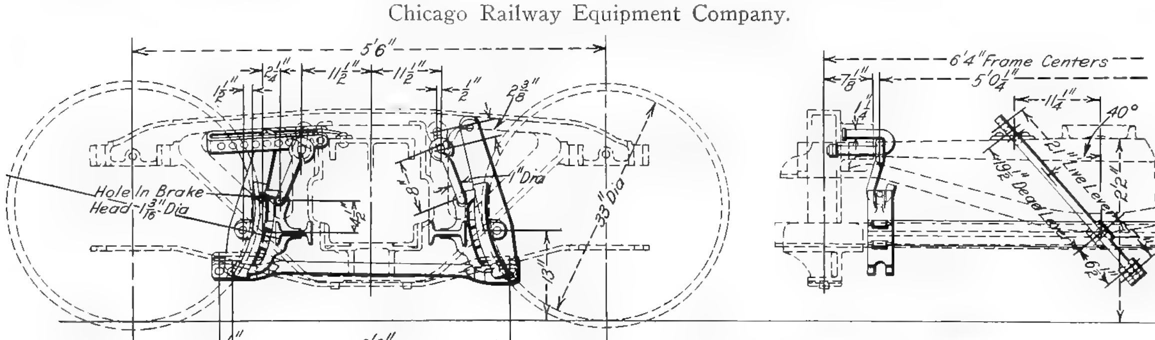


Fig. 1338—Brake Arrangement for New York Central Freight Car Truck.

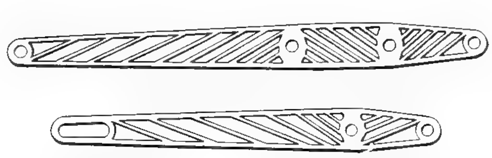


Fig. 1339—Malleable Iron Brake Levers. Dayton Malleable Iron Company.

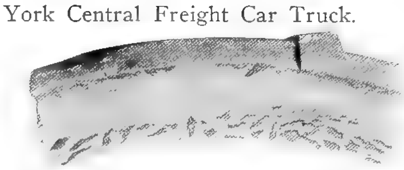


Fig. 1340—Wheel Truing Brake Shoe. American Abrasive Metals Company.

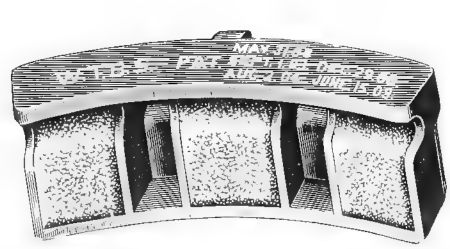


Fig. 1341—Wheel Truing Brake Shoe. Wheel Truing Brake Shoe Company.

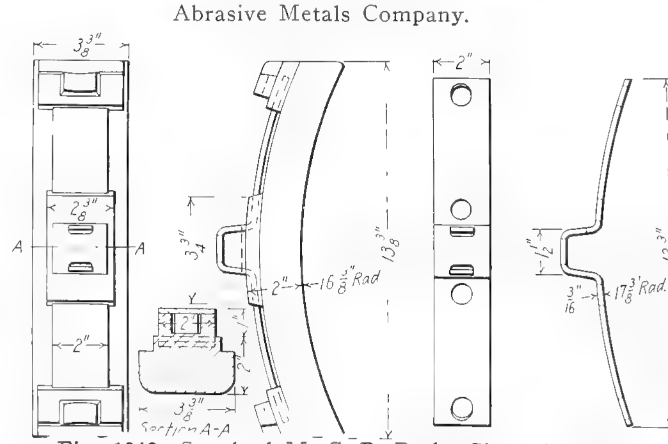
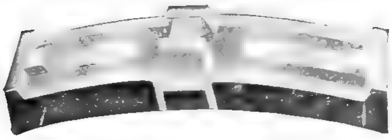
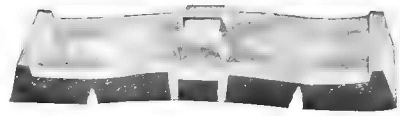


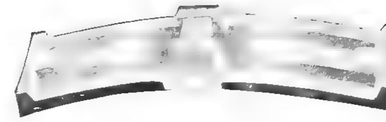
Fig. 1342—Standard M. C. B. Brake Shoe, Armbrust Type. General Brake Shoe & Supply Company.



Showing Reinforcing Steel Back and Lug.

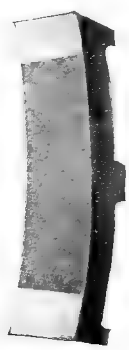


Broken Brake Shoe Held by Steel Back.

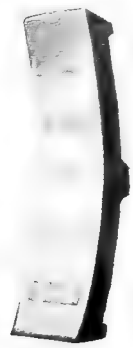


Brake Shoe Worn to Steel Back.

Plain Type.



Special Chilled Type.

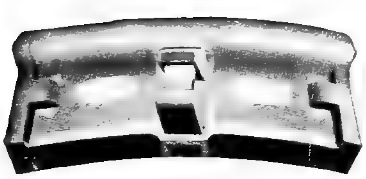


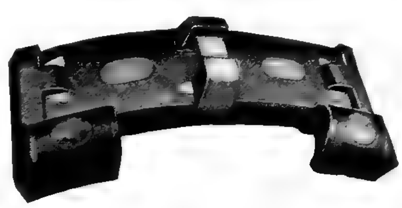
Congdon Type.

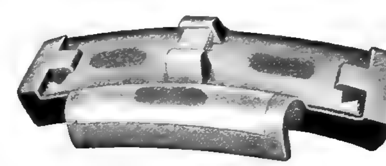
Streeter Type.

Diamond S Type.

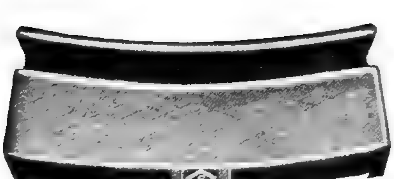
Fig. 1343—Special Reinforced Unflanged Brake Shoes. American Brake Shoe & Foundry Company.





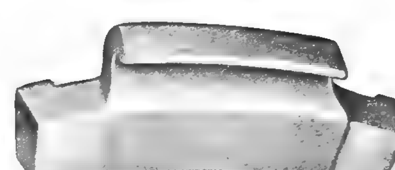


Reinforcing Steel Back and Steel Lug for Full, Open and Center Flange Brake Shoes.



Diamond S Type with Full Flange.

Diamond S Type with Open Flange.



Special Chilled Type with Center Flange.

Special Chilled Type.

Streeter Type.

Fig. 1344—Special Reinforced Flanged Brake Shoes. American Brake Shoe & Foundry Company.

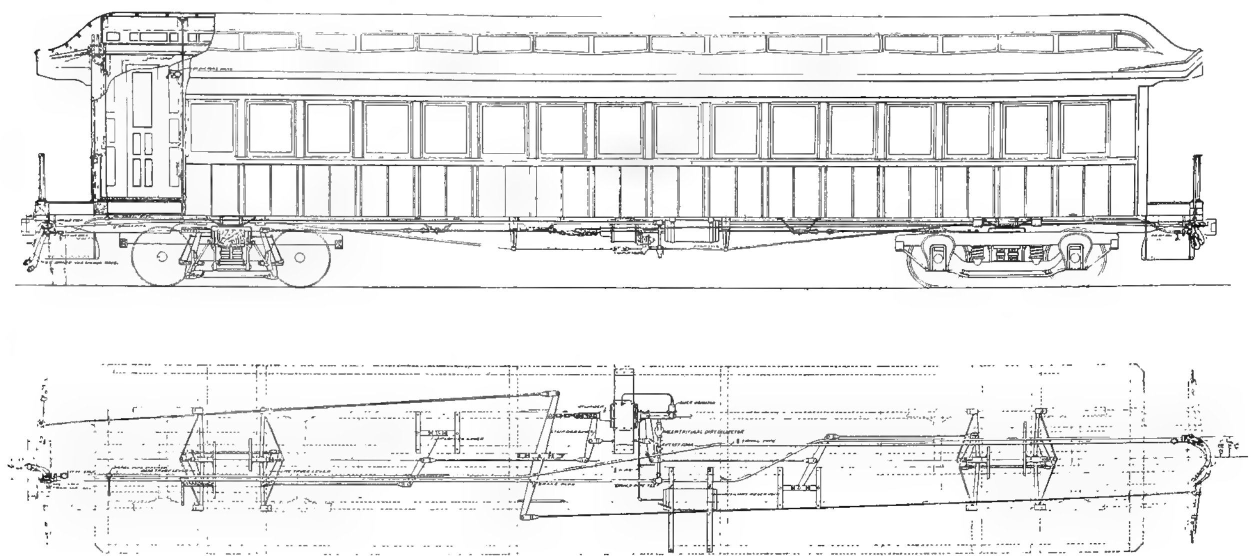


Fig. 1345—Westinghouse Air Brake and Train Air Signal Apparatus Applied to a Passenger Train Car.

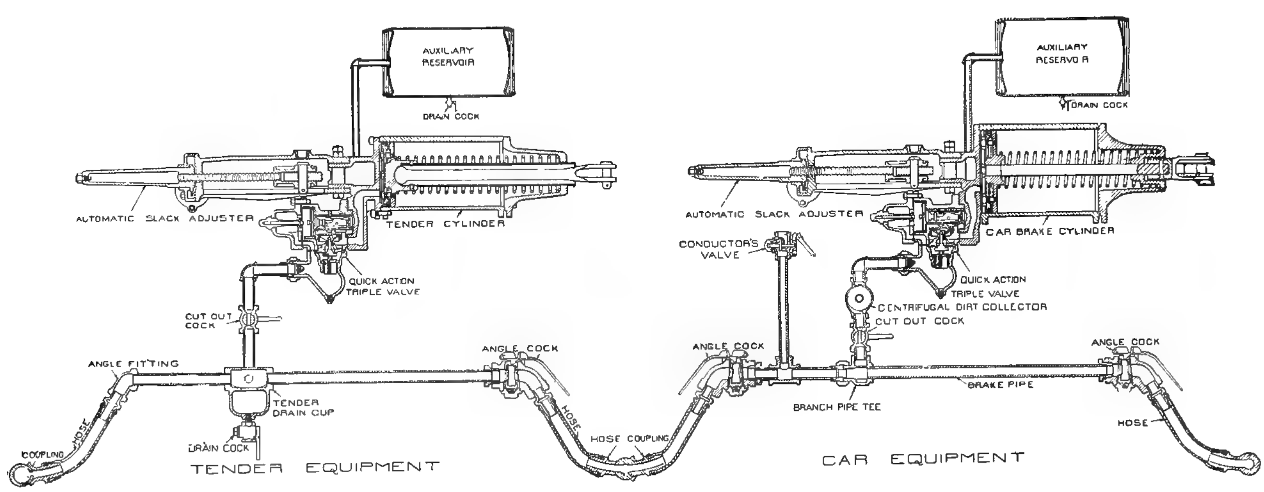


Fig. 1346—Diagram of Westinghouse Old Standard Quick Action Air Brake Apparatus for Passenger Train Cars.

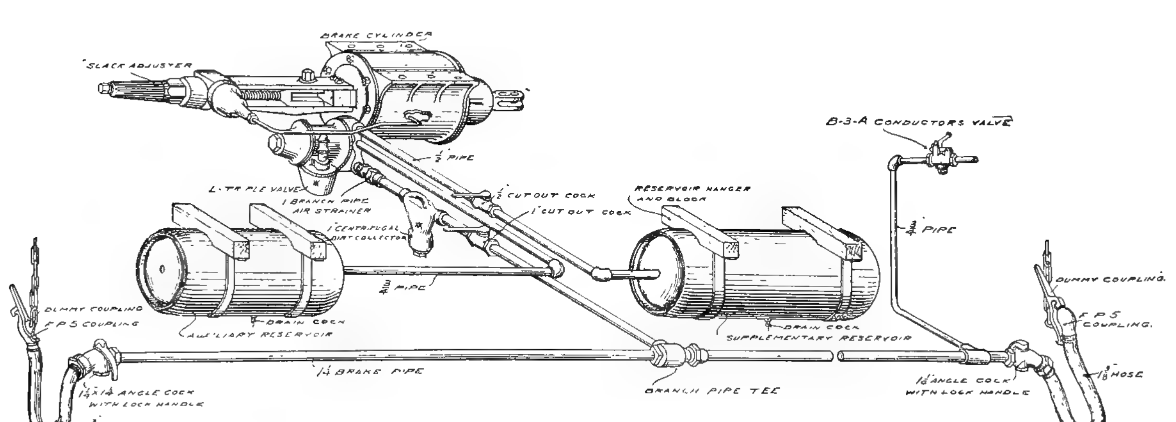


Fig. 1347—L N Passenger Brake Equipment.

Westinghouse Air Brake Company.

NOTE.—The Westinghouse Air Brake Equipment Shown in Figs. 1345-1396 is for Use on Trains Where Steam is the Motive Power. That Shown in Figs. 1397-1444 is for Use on Electrically-Propelled Trains.

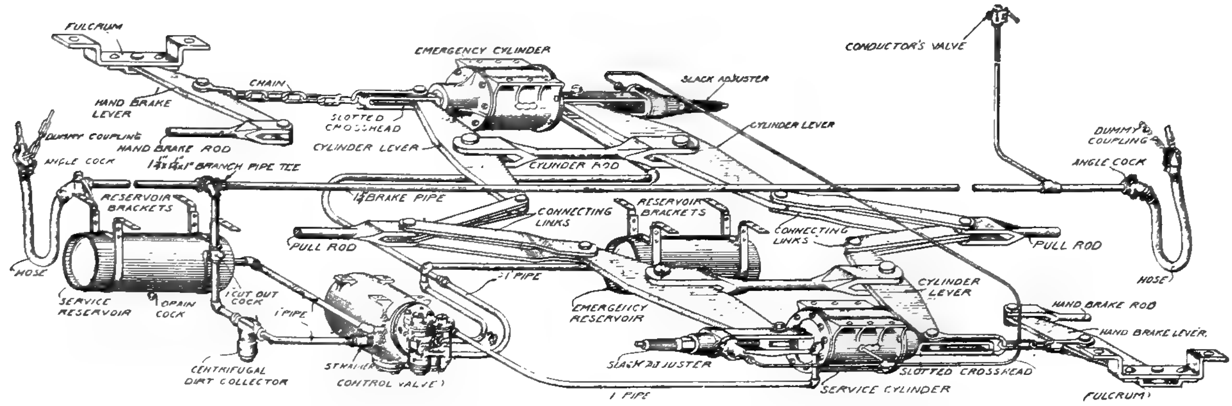


Fig. 1348—P C Passenger Brake Equipment with Cylinders Pointing in Opposite Directions.

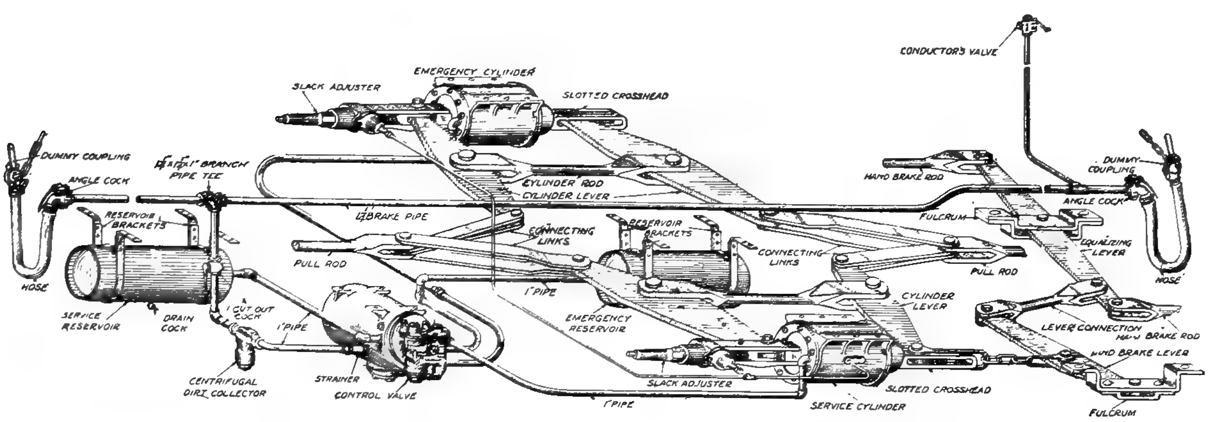


Fig. 1349—P C Passenger Brake Equipment with Cylinders Pointing in the Same Direction.

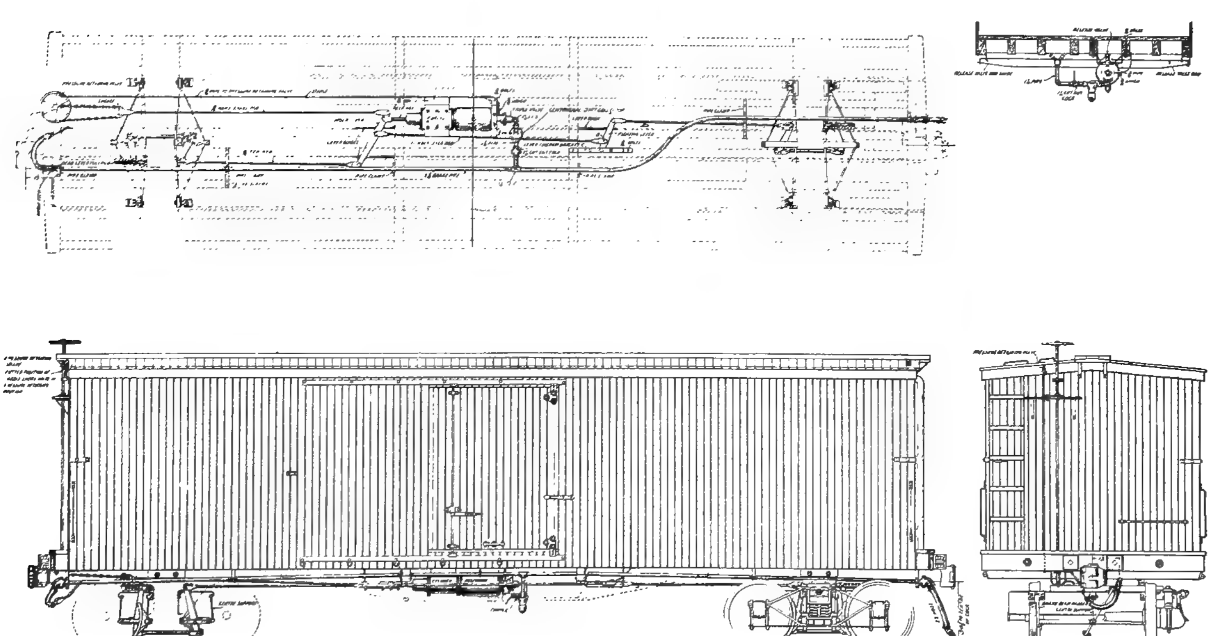


Fig. 1350—Westinghouse Single Cylinder Air Brake Equipment Applied to a Freight Car.

Westinghouse Air Brake Company.

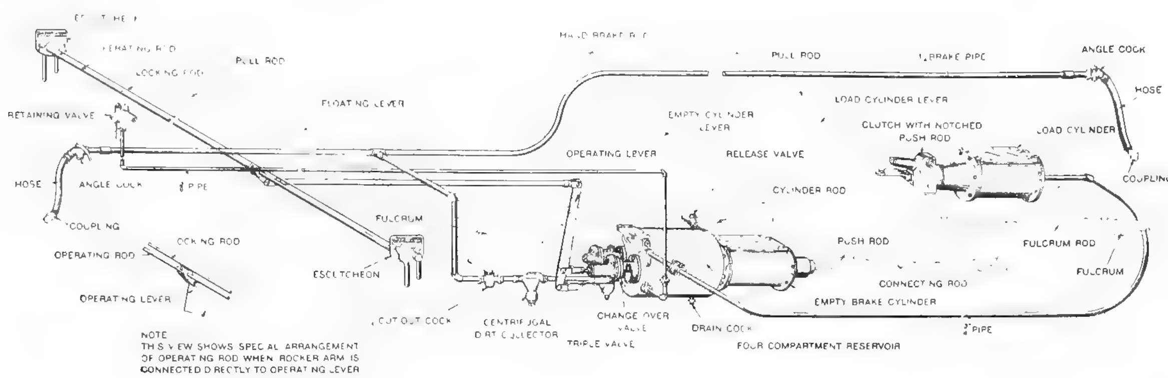


Fig. 1351—Empty and Load Freight Brake Equipment.

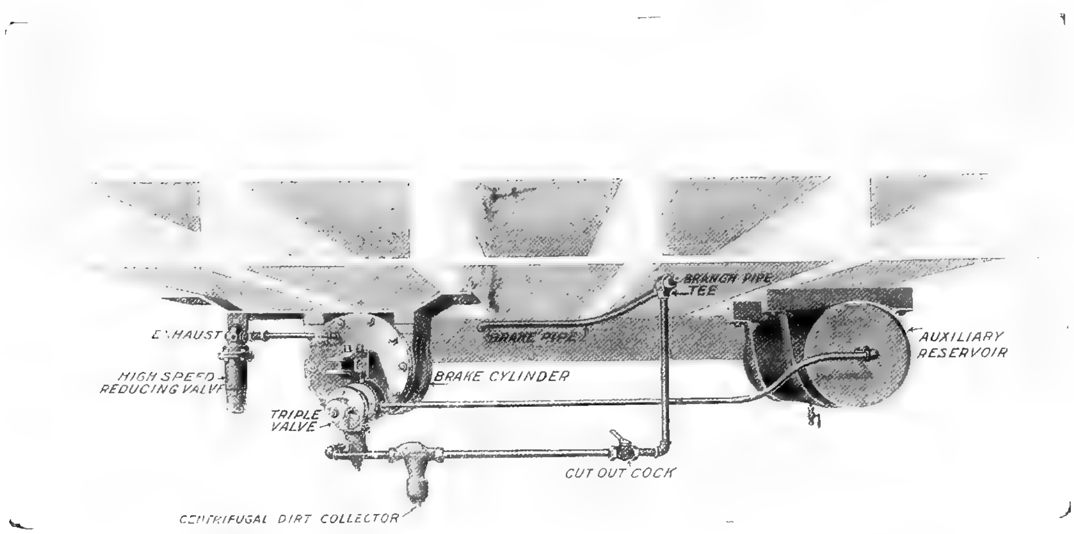


Fig. 1352—Arrangement of High Speed Brake Under Passenger Train Car.

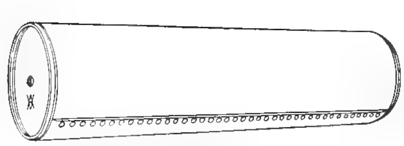


Fig. 1353—Main Reservoir.

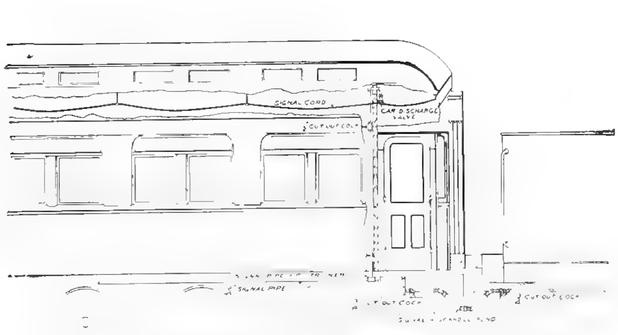


Fig. 1354—Arrangement of Train Air Signal on Passenger Train Car.

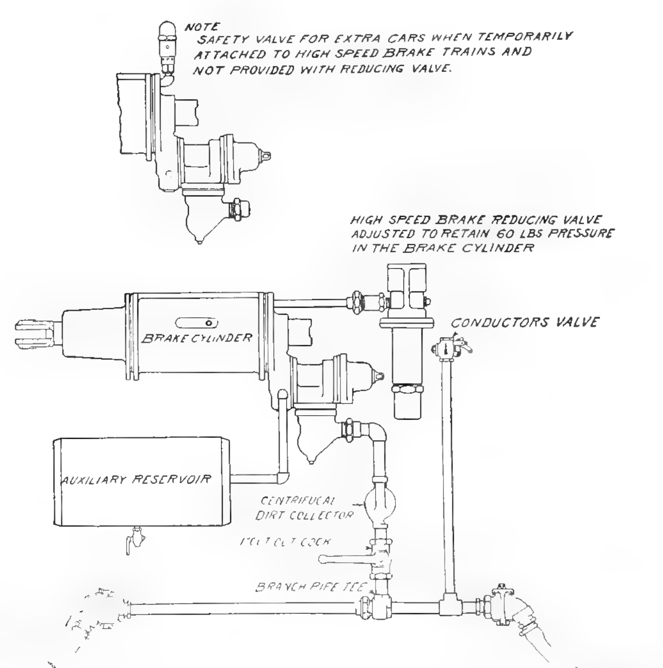


Fig. 1355—Diagram of Apparatus for High Speed Brake on Passenger Train Car.

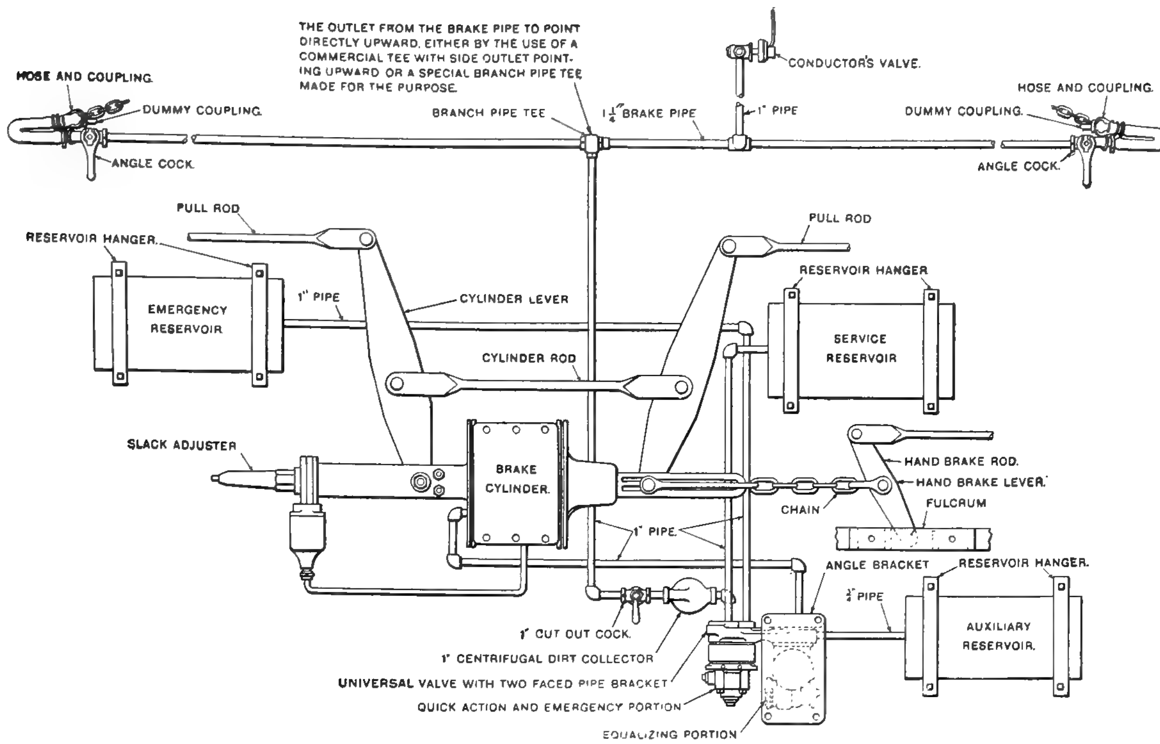


Fig. 1356—Piping Diagram of Universal Common Standard Brake Equipment, Schedule **UC.**

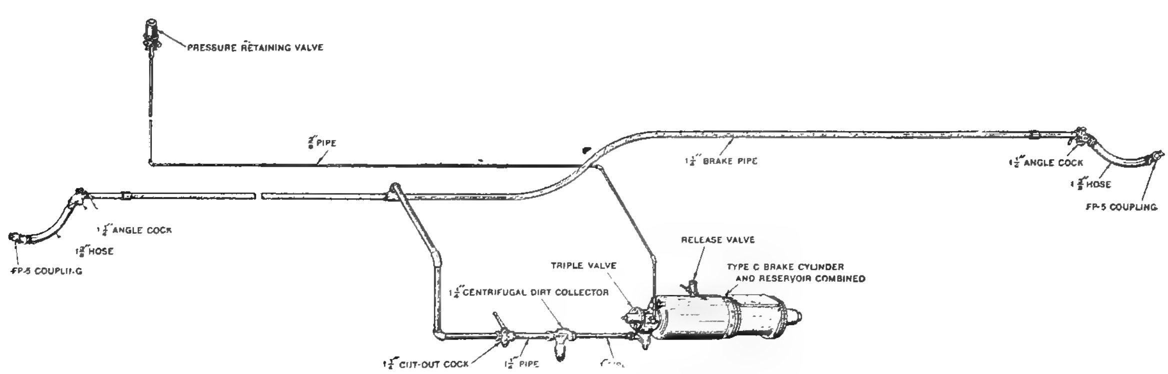


Fig. 1357—Piping Diagram **of Standard** Single **Cylinder** Freight Brake Equipment, Schedule KC.

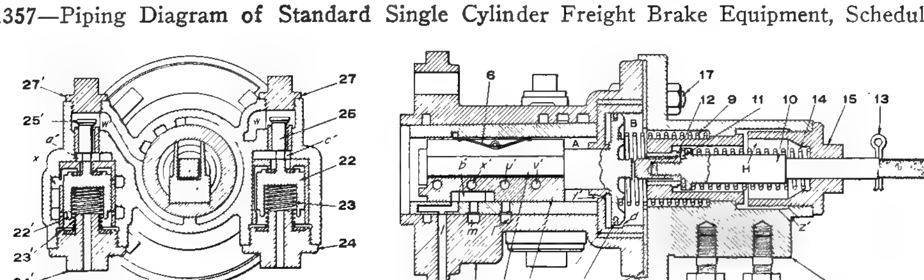


Fig. 1358—Actual Assembly, H-3 Change-Over Valve for Empty and Load Freight Brake **Equipment.**

Parts of Change-Over Valve, Fig. 1358.

2 *Body*
3 *Slide·Valve*
4 *Cut-Out Piston.*
5 *Piston Ring*
6 *Slide Valve Spring*
7 *Cut-out Piston Bush*
8 *Cylinder Cap.*
9 *Cut-out Piston Spring*
10 *Vent Valve Stem.*
11 *Vent Valve Seat*
12 *Vent Valve Stem Nut*
13 *Cotter*
14 *Vent Valve Spring*
15 *Vent Valve Cap Nut*
16 *Cylinder Cap Gasket*
17 *Cylinder Cap Bolt and Nut*
18 *Stud and Nut for Securing Fulcrum.*
22 *Weighted Valve*
23 *Weighted Valve Spring*
24 *Weighted Valve Cap Nut*
25 *Check Valve*
27 *Check Valve Nut*

Westinghouse Air Brake Company.

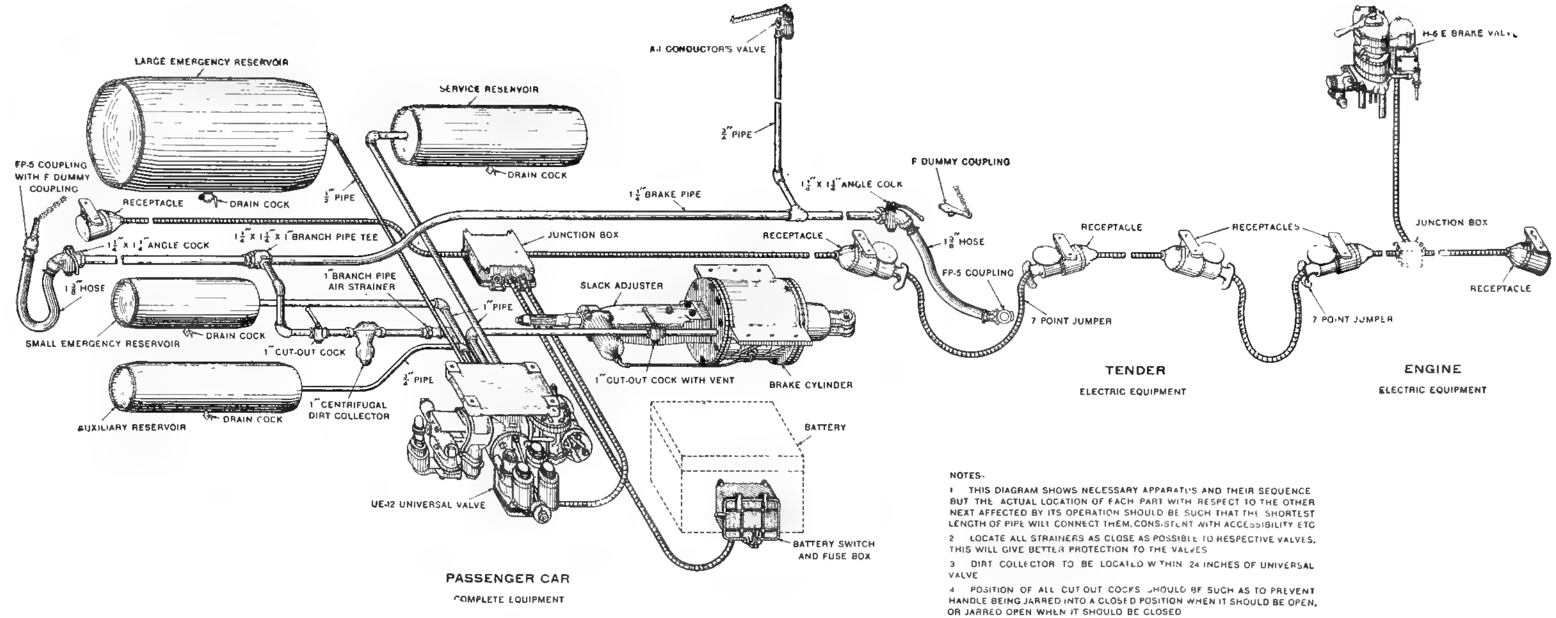


Fig. 1359—Piping Diagram of Westinghouse Universal Common Standard Electro-Pneumatic Brake Equipment, Schedule UCE, Complete for Engine, Tender and Car.

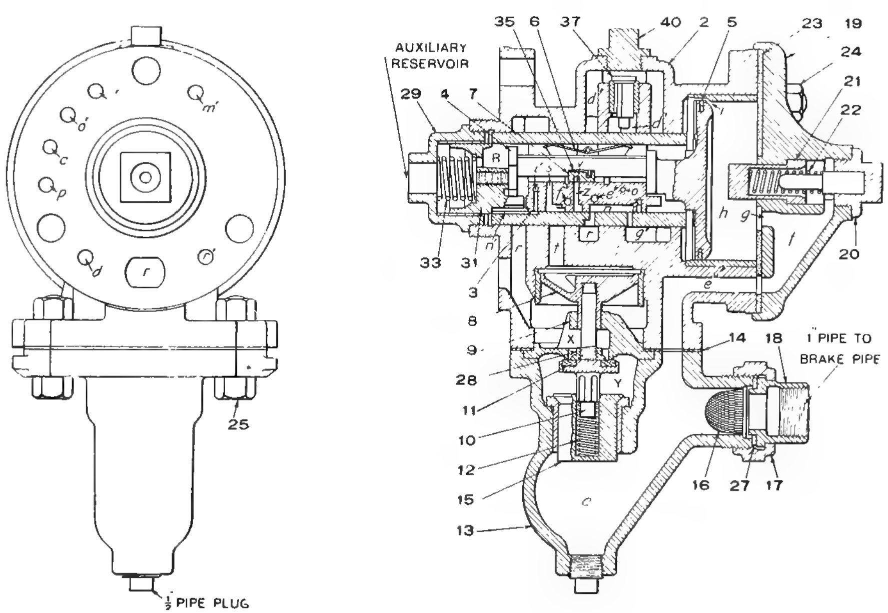


Fig. 1360—Standard Quick-Action, Quick-Service, Uniform Release, Uniform Recharge, Empty and Load Freight Triple Valve, Type K-2-L.

Parts of Triple Valve, Fig. 1360.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Main Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 *Union Nut*
18 *Union Swivel*
19 *Cylinder Cap*
20 *Graduating Nut*
21 *Graduating Sleeve*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Tee Head Bolt and Nut*
25 *Hexagon Head Bolt and Nut for Check Valve Case*
27 *Union Gasket*
28 *Emergency Valve Nut*
29 *Cap*
31 *Stop*
33 *Spring*
35 *Graduating Valve Spring*
37 *Take-up Reservoir Check Valve*
40 *Take-up Reservoir Check Valve Cap Nut*

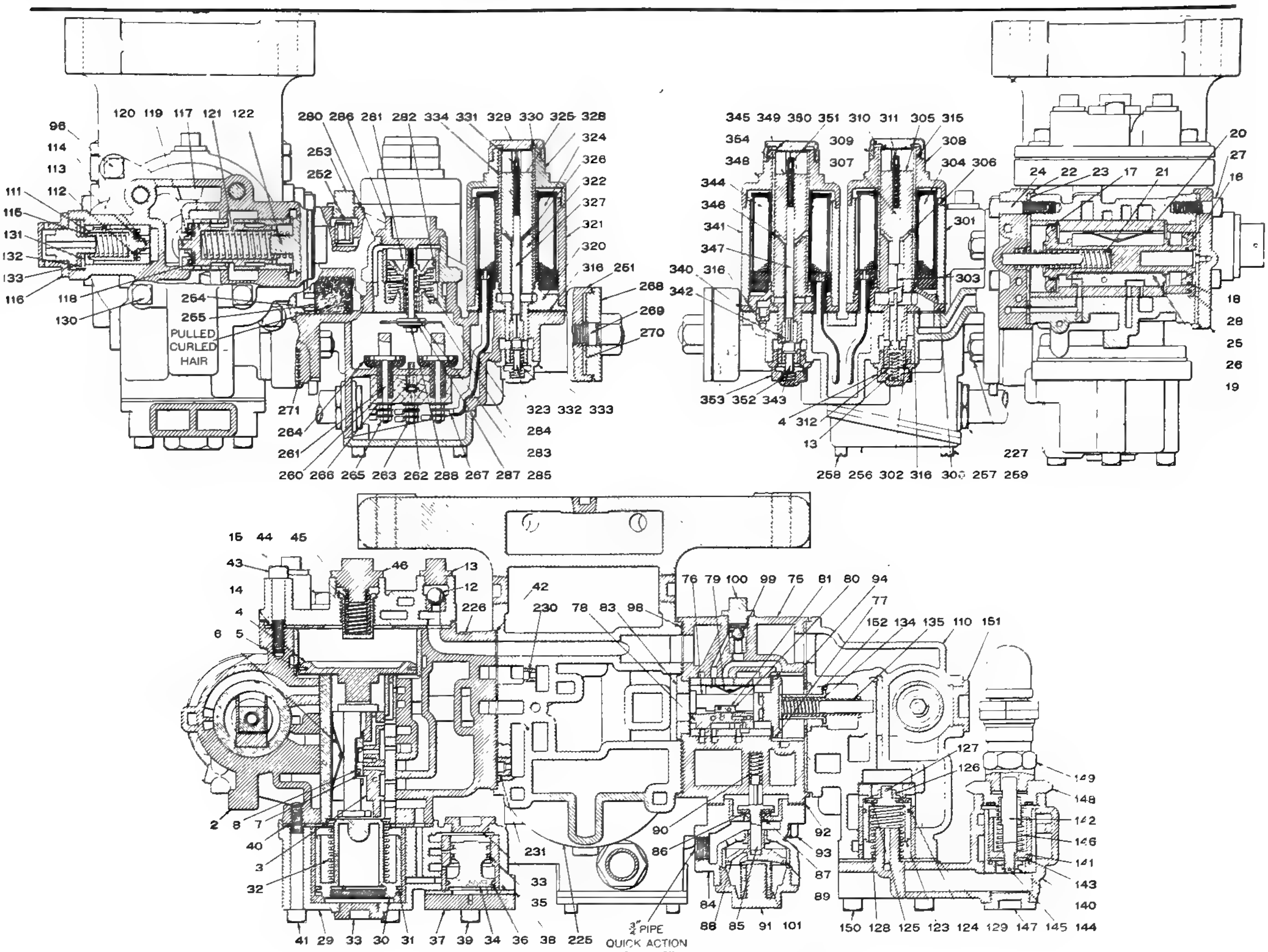


Fig. 1361—Universal Valve, Type UE-12.

List of Parts of Universal Valve, Fig. 1361.

Equalizing Portion.

2 *Equalizing Body*
3 *Equalizing Slide Valve*
4 *Equalizing Piston*
5 *Equalizing Piston Ring*
6 *Equalizing Slide Valve Spring*
7 *Equalizing Graduating Valve*
8 *Graduating Valve Spring*
11 *Equalizing Cylinder Cap*
12 *⅝-in. Ball Check*
13 *Check Valve Cap Nut*
14 *Cylinder Cap Gasket*
15 *Square Head Cap Screw*
16 *Release Piston*
17 *Release Piston Ring*
18 *Release Piston Ring*
19 *Release Slide Valve*
20 *Release Slide Valve Spring*
21 *Release Piston Spring*
22 *Application Piston Cover*
23 *Application Piston Cover Gasket*
24 *Square Head Cap Screw*
25 *Release Piston Cover*
26 *Release Piston Cover Gasket*
27 *Square Head Cap Screw*
28 *Release Piston Bush*
29 *Charging Valve Body*
30 *Graduated Release Piston*
31 *Graduated Release Piston Ring*
32 *Graduated Release Piston Spring*
33 *Flush Nut*
34 *Charging Valve*
35 *Charging Valve Piston Ring*
36 *Charging Valve Piston Ring*
37 *Charging Valve Cover*
38 *Charging Valve Cover Gasket*
39 *Square Head Cap Screw*
40 *Charging Valve Body Gasket*
41 *Square Head Cap Screw*
42 *Gasket (between Equal. Portion and Pipe Bracket)*
43 *Square Head Cap Screw*
44 *Graduating Sleeve*
45 *Graduating Spring*
46 *Graduating Nut*

Quick Action Portion With High Pressure Cap Having Protection Valve and Safety Valve.

75 *Emergency Body Complete*
76 *Emergency Piston*
77 *Emergency Piston Ring*
78 *Emergency Slide Valve*
79 *Emergency Slide Valve Spring*
80 *Emergency Graduating Valve*
81 *Emergency Graduating Valve Spring*
83 *Flush Nut*
84 *Quick Action Valve Case*
85 *Quick Action Valve*
86 *Quick Action Valve Seat*
87 *Quick Action Valve Nut*
88 *Quick Action Piston*
89 *Quick Action Piston Ring*
90 *Quick Action Valve Spring*
91 *Cap Nut for Quick Action Valve Case*
92 *Quick Action Valve Case Gasket*
93 *Stud and Nut*
94 *High Pressure Cap Gasket*
96 *Cap Screw*
98 *Gasket (between Quick Action Portion and Pipe Bracket)*
99 *½-in. Ball Check*
100 *Ball Check Cap Nut*
101 *Spring to hold Quick Action Piston against Quick Action Valve Stem*

High Pressure Cap having Protection Valve and Safety Valve Cap

110 *High Pressure Cap Body*
111 *Protection Valve*
112 *Protection Valve Seat*
113 *Protection Valve Nut*
114 *Cotter*
115 *Protection Valve Spring*
116 *Protection Valve Cap Nut*
117 *Intercepting Valve*
118 *Intercepting Valve Seat*
119 *Intercepting Valve Nut*
120 *Cotter*
121 *Intercepting Valve Spring*
122 *Intercepting Valve Cap Nut*
123 *High Pressure Valve*
124 *Piston Ring*
125 *High Pressure Valve Seat*
126 *High Pressure Valve Seat Nut*
127 *Cotter*
128 *High Pressure Valve Spring*
129 *Safety Valve Bracket Gasket*
130 *Cap Screw*
131 *Protection Valve Seat*
132 *Protection Valve Washer*
133 *Protection Valve Seat Nut*
134 *Emergency Piston Stop*
135 *Emergency Piston Stop Spring*
140 *Safety Valve Bracket Body*
141 *Cut-off Valve*

Westinghouse Air Brake Company.

142 *Cut-off Valve Stem*
143 *Cut-off Valve Seat*
144 *Cut-off Valve Nut*
145 *Cotter*
146 *Cut-off Valve Spring*
147 *Flush Nut*
148 *Cut-off Valve Cap Nut*
149 *E-7 Safety Valve*
150 *Cap Screw*
151 *Flush Nut*
152 *Emergency Piston Stop Nut*

Type C—Pipe Bracket.

225 *Type C Pipe Bracket*
226 *Stud Nut*
227 *Stud Nut*
230 *Service Choke Plug*
231 *Exhaust Choke Plug*

Electric Portion—Magnet Bracket Portion.

251 *Magnet Bracket*
252 *Check Valve*
253 *Check Valve Cap Nut*
254 *Cap Nut for Strainer*
255 *Perforated Plates for Strainer*
256 *Junction Box Cover*
257 *Cap Screw*
258 *Cap Screw*
259 *Lock Nut for Conduit*
260 *Terminal Block*
261 *Switch Terminal*
262 *Terminal Block Screw*
263 *Copper Coated Machine Bolt*
264 *Switch Terminal Insulator*
265 *Copper Coated Hex. Nut*
266 *Copper Coated Washer*
267 *Terminal Clips*
268 *Magnet Cutout Cap*
269 *Stud and Nut for Magnet Cut-out Cap*
270 *Magnet Cut-out Gap Gasket*
271 *Gasket between Magnet Bracket and Pipe Bracket*

Emergency Switch Portion.

280 *Switch Cylinder (Bushed)*
281 *Switch Piston*
282 *Switch Piston Ring*
283 *Contact*
284 *Piston Spring*
285 *Contact Spring*
286 *Switch Cap Nut*
287 *Contact Washer*
288 *Cotter*

Release Magnet.

300 *Back Strap*
301 *Cover*
302 *Magnet Core (Bushed)*
303 *Valve*
304 *Magnet Coil*
305 *Plunger*
306 *Special Washer*
307 *Armature Stem*
308 *Top Cover*
309 *Magnet Cap*
310 *Gasket for Magnet Cap*
311 *Cotter*
312 *Spring Guide*
313 *Spring*
314 *Magnet Valve Cap*
315 *Sleeve*
316 *Magnet Gasket*

Emergency Magnet.

320 *Back Strap*
321 *Cover*
322 *Magnet Core (Bushed)*
323 *Valve*
324 *Magnet Coil*
325 *Plunger*
326 *Special Washer*
327 *Armature Stem*
328 *Top Cover*
329 *Magnet Cap*
330 *Gasket for Magnet Cap*
331 *Cotter*
332 *Spring*
333 *Magnet Valve Cap*
334 *Sleeve*

Service Magnet.

340 *Back Strap*
341 *Cover*
342 *Magnet Core (Bushed)*
343 *Valve*
344 *Magnet Coil*
345 *Plunger*
346 *Special Washer*
347 *Armature Stem*
348 *Top Cover*
349 *Magnet Cap*
350 *Gasket for Magnet Cap*
351 *Cotter*
352 *Spring*
353 *Magnet Valve Cap*
354 *Sleeve*

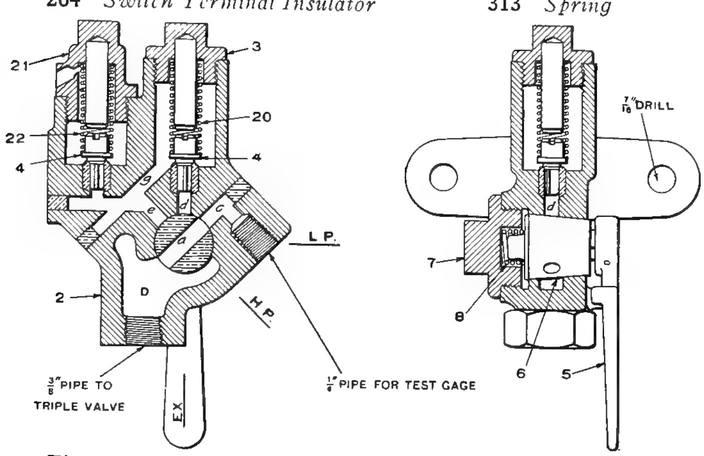


Fig. 1362—Spring Type Double Pressure Retaining Valve.

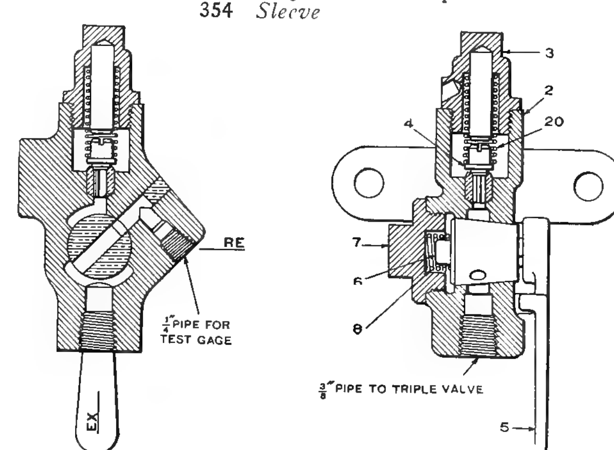
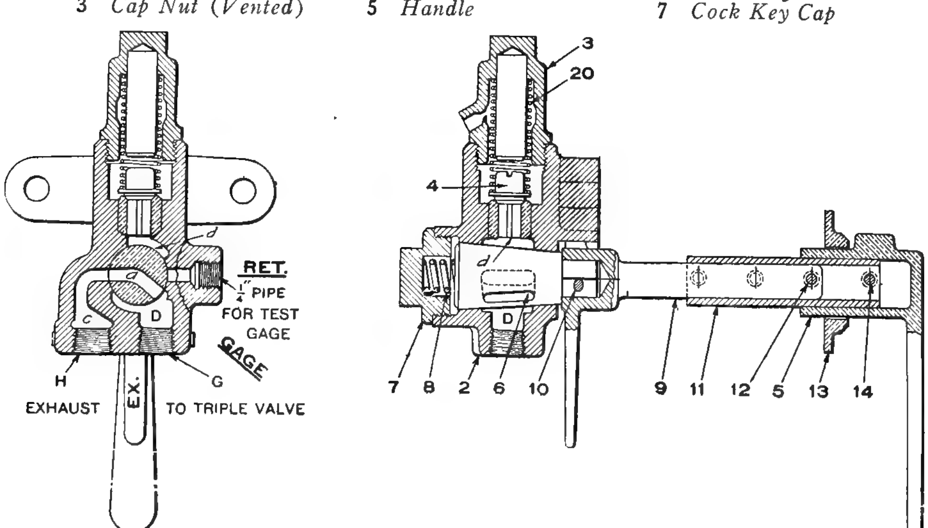


Fig. 1363—Spring Type Single Pressure Retaining Valve.

Parts of Retaining Valve, Figs. 1362 and 1363.

2 *Body*
3 *Cap Nut (Vented)*
4 *Valve*
5 *Handle*
6 *Cock Key*
7 *Cock Key Cap*
20 *Spring*
8 *Cock Key Spring*



Parts of Retaining Valve, Fig. 1364.

2 *Body*
3 *Cap Nut*
4 *Valve*
5 *Handle*
6 *Cock Key*
7 *Cock Key Cap*
8 *Cock Key Spring*
9 *Extension Socket*
10 *Cotter*
11 *Extension Sleeve*
12 *Socket and Sleeve Pin*
13 *Escutcheon*
14 *Handle Pin*
20 *Valve Spring*

Fig. 1364—Spring Type Double Pressure Retaining Valve for Vestibule Cars. Westinghouse Air Brake Company.

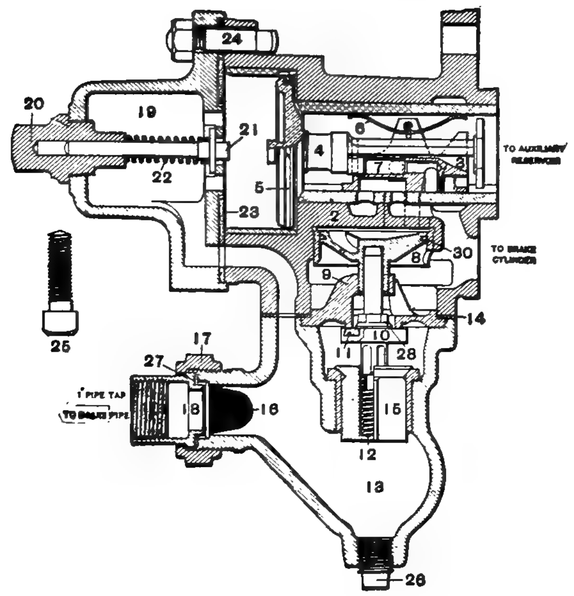


Fig. 1365—Quick Action Triple Valve, Type P-2.

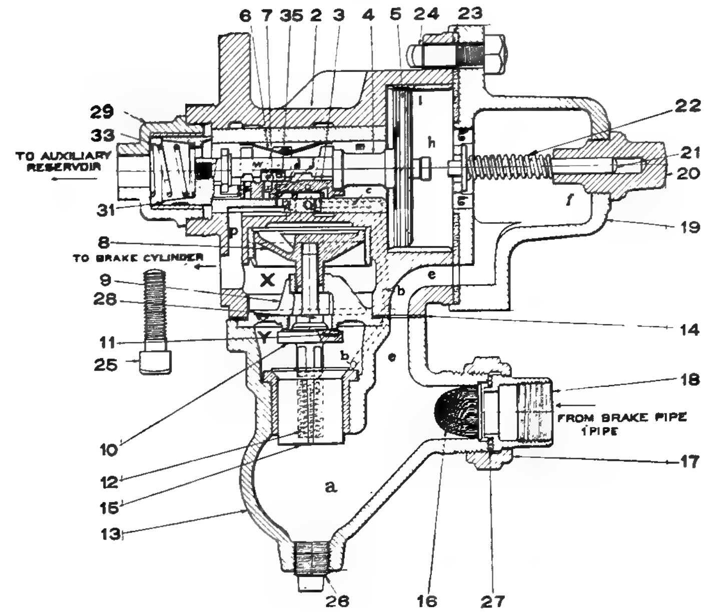


Fig. 1366—Standard Quick Action, Quick Service, Uniform Release, Uniform Recharge Freight Triple Valve, Type K-1.

Parts of Type P-2 Triple Valve, Fig. 1365.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case, Complete*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 1 *in. Union Nut*
18 1 *in. Union Swivel*
19 *Cylinder Cap*
20 *Graduating Stem Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Cylinder Cap Bolt and Nut*
25 *Cap Screw*
27 1 *in. Union Gasket*
28 *Emergency Valve Nut*
30 *Emergency Piston Ring*

Parts of Type K-1 Triple Valve, Fig. 1366.

2 *Body, Complete*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case, Complete*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 1 *in. Union Nut*
18 1 *in. Union Swivel*
19 *Cylinder Cap*
20 *Graduating Stem Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Cylinder Cap Bolt and Nut*
25 *Cap Screw*
27 1 *in. Union Gasket*
28 *Emergency Valve Nut*
29 *Retarding Device Body*
31 *Retarding Stem*
33 *Retarding Spring*
35 *Graduating Valve Spring*

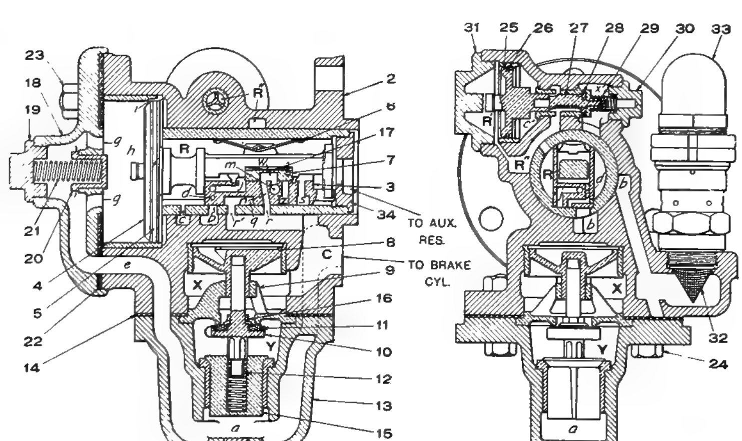


Fig. 1367—Passenger Triple Valve, Type L.

Parts of Type L Triple Valve, Fig. 1367.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat for Emergency Valve*
12 *Check Valve Spring*
13 *Check Valve Case, Complete*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Emergency Valve Nut*
17 *Graduating Valve Spring*
18 *Cylinder Cap*
19 *Graduating Spring Nut*
20 *Graduating Sleeve*
21 *Graduating Spring*
22 *Cylinder Cap Gasket*
23 *Cylinder Cap Bolt and Nut*
24 *Check Valve Case Bolt and Nut*
25 *By-Pass Piston*
26 *By-Pass Piston Ring*
27 *By-Pass Valve*
28 *Rubber Seat*
29 *By-Pass Valve Spring*
30 *By-Pass Valve Cap*
31 *By-Pass Piston Cap*
32 *Strainer*
33 *E-7 Safety Valve*
34 *End Cap*

Westinghouse Air Brake Company.

Parts of No. 3-E Control Valve, Fig. 1368.

2 *Equalizing Body, Complete*
3 *Release Piston*
4 *Release Slide Valve*
5 *Release Slide Valve Spring*
6 *Release Graduating Valve*
7 *Release Graduating Valve Spring*
8 *Release Piston Cap Nut for Equalizing Portion*
9 *Release Piston Ring*
10 *Release Cylinder Cap*
11 *Release Cylinder Cap Gasket*
12 *Cap Screw*
13 *Release Piston Graduating Sleeve*
14 *Release Piston Graduating Spring*
15 *Release Piston Graduating Nut*
16 *Check Valve*
17 *Check Valve Cap Nut*
18 *Release Regulating Cap*
19 *Stud and Nut for Release Regulating Cap*
20 *Equalizing Piston*
21 *Equalizing Piston Ring (Large)*
22 *Equalizing Slide Valve*
23 *Equalizing Slide Valve Spring*
24 *Equalizing Graduating Valve*
25 *Equalizing Graduating Valve Spring*
26 *Large Equalizing Cylinder Cap*
27 *Large Equalizing Cylinder Cap Gasket*
28 *Cap Screw*
29 *Equalizing Piston Stop Sleeve*
30 *Lower Equalizing Piston Stop Spring*
31 *Equalizing Graduating Nut*
32 *Equalizing Piston Ring (Small)*
33 *Small Equalizing Cylinder Cap*
34 *Gasket for Small Equalizing Cylinder Cap*
35 *Cap Screw*
36 *Cap Nut for Small Equalizing Cylinder Cap*
37 *Small Equalizing Piston Bush*
38 *Service Reservoir Charging Valve*
39 1 *in. Charging Valve Piston Ring*
40 1¼ *in. Charging Valve Piston Ring*
41 *Charging Valve Seat*
42 *Charging Valve Washer*
43 *Internal Charging Valve Nut*
44 *External Charging Valve Nut*
45 *Gasket for Release Regulating Cap*
46 *Upper Equalizing Piston Stop Spring*
75 *Application Body*
76 *Piston Stem*
77 *Piston Ring (Small)*
78 *Piston Head*
79 *Piston Seal*

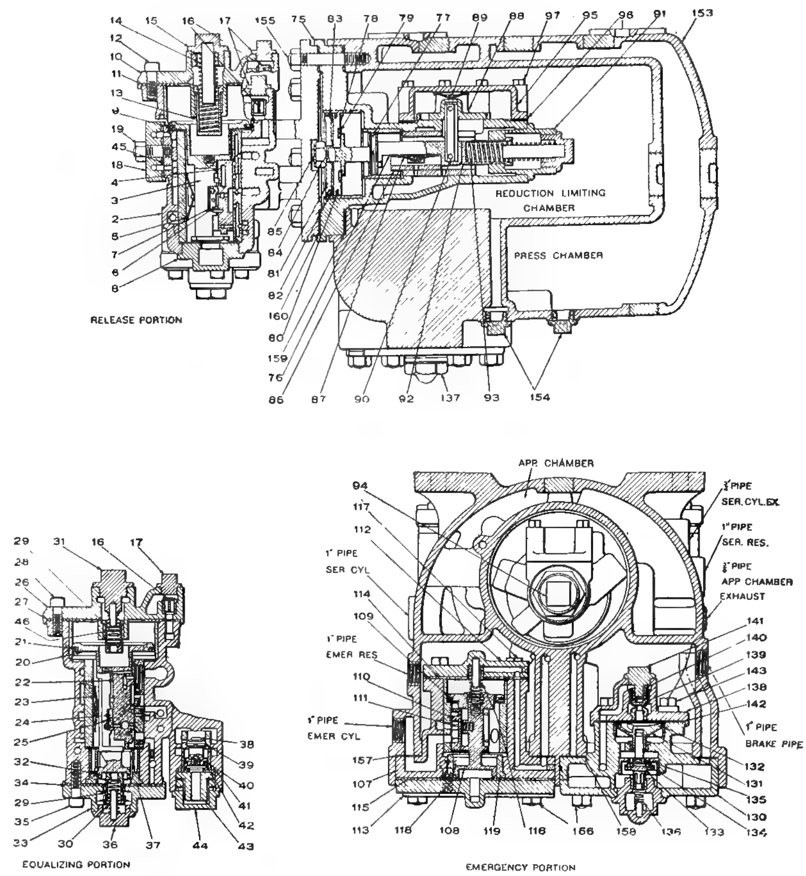


Fig. 1368—No. 3-E Control Valve.

80 *Piston Ring (Large)*
81 *Piston Follower*
82 *Piston Packing Leather*
83 *Piston Packing Leather Expander*
84 *Piston Nut*
85 *Piston Cotter*
86 *Exhaust Valve*
87 *Exhaust Valve Spring*
88 *Application Valve*
89 *Application Valve Spring*
90 *Application Piston Bolt*
91 *Spring Box*
92 *Piston Spring Sleeve*
93 *Piston Spring*
94 *Graduating Nut*
95 *Application Valve Cover*
96 *Application Valve Cover Gasket*
97 *Cap Screw for Application Valve Cover*
107 *Emergency Body*
108 *Piston*
109 *Piston Ring*
110 *Slide Valve*
111 *Slide Valve Spring*
112 *Small Cylinder Cap*
113 *Large Cylinder Cap*
114 *Small Cylinder Cap Gasket*
115 *Large Cylinder Cap Gasket*
116 *Piston Spring*
117 *Cap Screw*
118 *Oval Fillister Head Cap Screw*
119 *Emergency Piston Bush*
130 *Quick Action Body*
131 *Piston*
132 *Piston Ring*
133 *Quick Action Valve*
134 *Quick Action Valve Seat*
135 *Quick Action Valve Nut*
136 *Quick Action Valve Spring*
137 *Quick Action Valve Cap Nut*
138 *Quick Action Valve Cover*
139 *Quick Action Closing Valve*
140 *Quick Action Closing Valve Spring*
141 *Cover Cap Nut*
142 *Cover Gasket*
143 *Cap Screw for Cover*
153 *Reservoir*
154 *Cap Nut*
155 *Stud with Hexagon Nut*
156 *Stud with Hexagon Nut*
157 *Emergency Cylinder Gasket*
158 *Quick Action Cylinder Gasket*
159 *Large Reservoir Gasket*
160 *Equalizing Cylinder Gasket*

Westinghouse Air Brake Company.

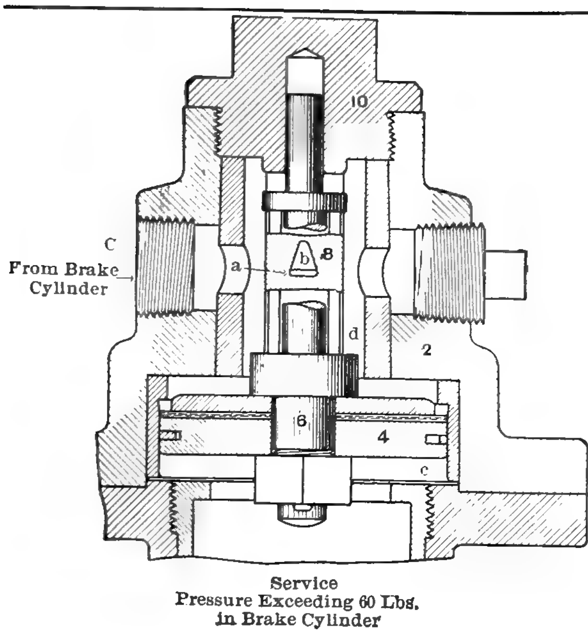


Fig. 1369—High Speed Reducing Valve, Service Position.

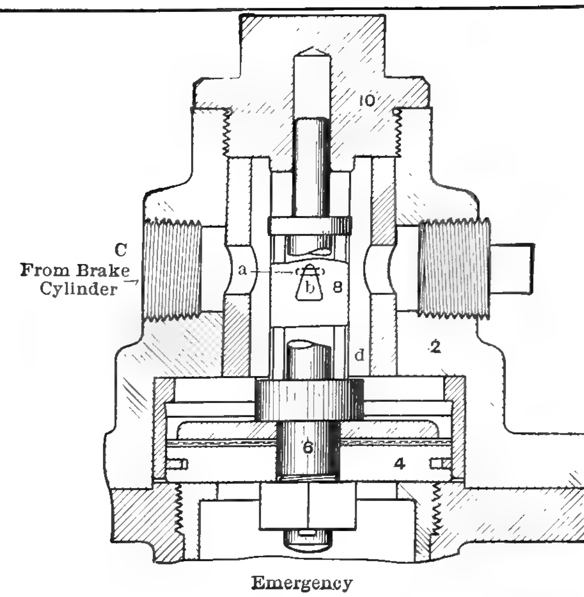


Fig. 1370—High Speed Reducing Valve, Emergency Position.

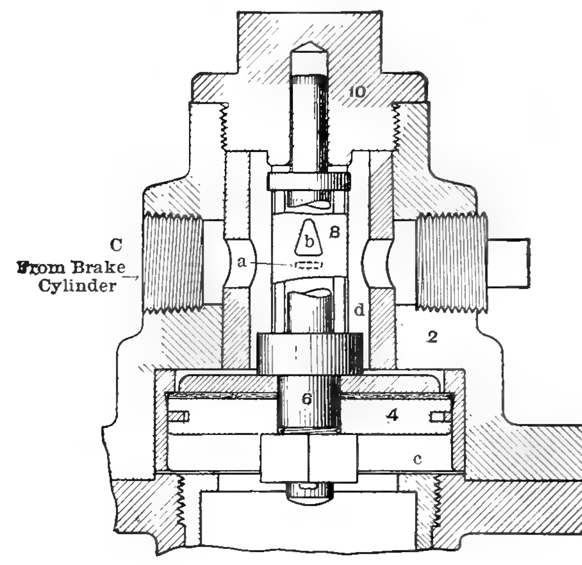


Fig. 1372—High Speed Reducing Valve, Release Position.

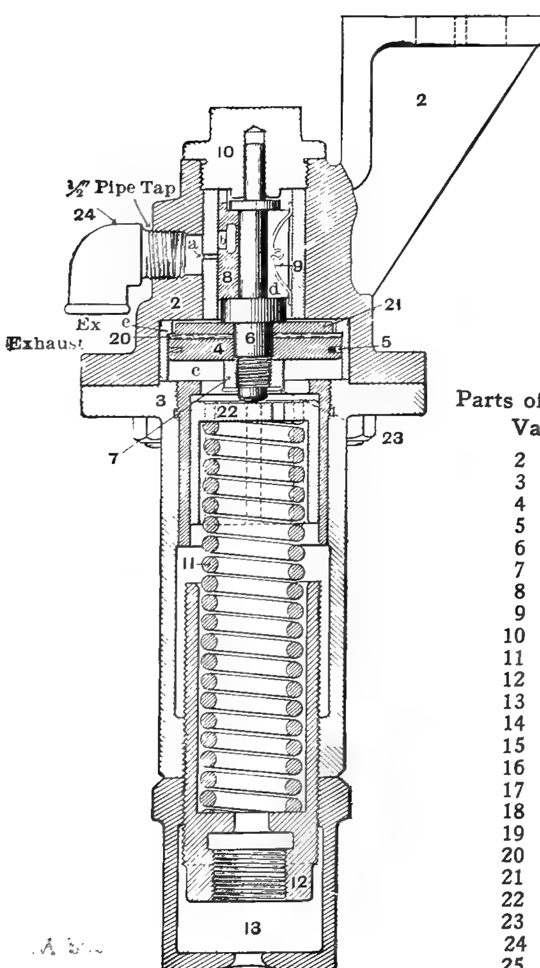


Fig. 1371—Vertical Section Through High Speed Reducing Valve.

Parts of High Speed Reducing Valve, Figs. 1369-1373.

2 *Body*
3 *Spring Box*
4 *Piston*
5 *Piston Ring*
6 *Piston Stem*
7 *Piston Stem Nut*
8 *Slide Valve*
9 *Slide Valve Spring*
10 *Cap Nut*
11 *Regulating Spring*
12 *Regulating Nut*
13 *Check Nut*
14 *Union Stud*
15 *Union Swivel*
16 *Union Nut*
17 *Air Strainer*
18 *Union Gasket*
19 *Bolt and Nut*
20 *Piston Seat*
21 *Piston Disc*
22 *Spring Abutment*
23 *Cotter*
24 *½ in. Street Elbow*
25 *¾ in. Pipe Plug*

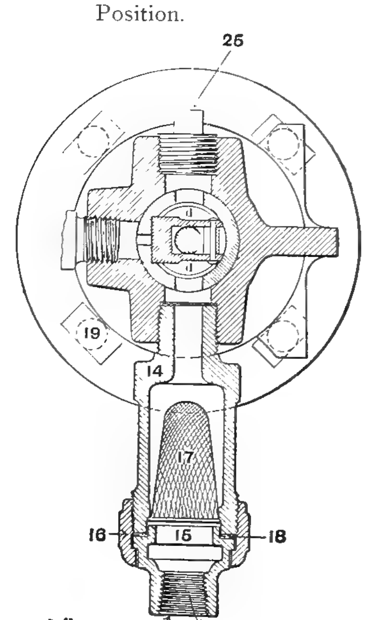


Fig. 1373—Horizontal Section Through High Speed Reducing Valve.

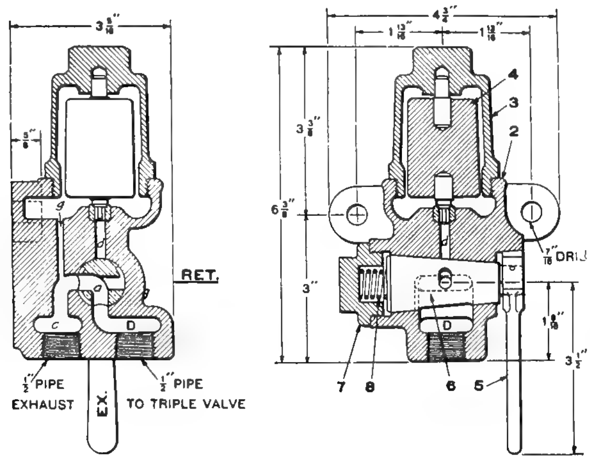


Fig. 1374—Weight Type Pressure Retaining Valve for 12 in., 14 in. and 16 in. Brake Cylinders.

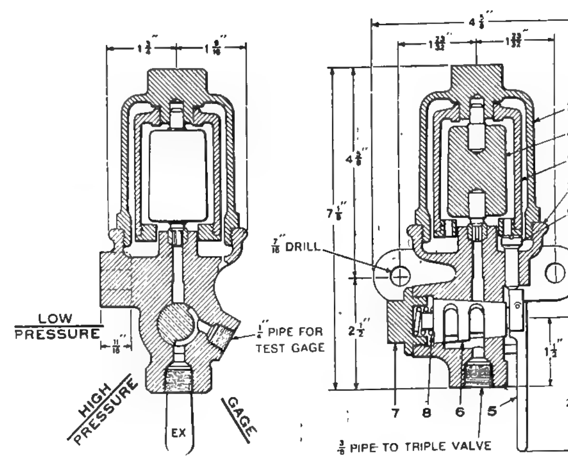


Fig. 1375—Weight Type High and Low Pressure Retaining Valve.

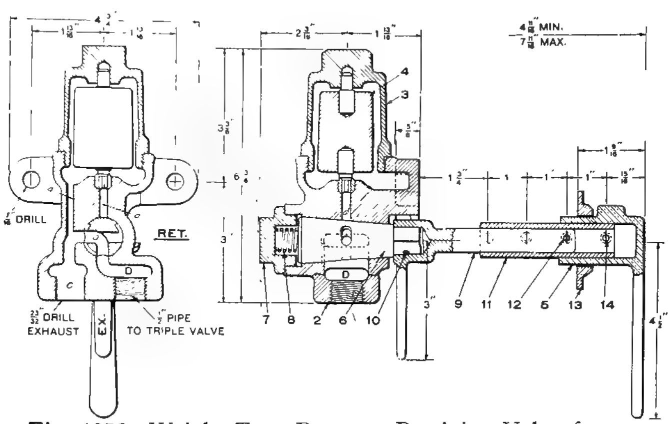


Fig. 1376—Weight Type Pressure Retaining Valve for Vestibule Cars with 12 in., 14 in. and 16 in. Cylinders.

Parts of Retaining Valve, Fig. 1376.

2	*Body*	9	*Extension Socket*
3	*Case*	10	*Extension Socket Cotter*
4	*Weight*	11	*Extension Socket Sleeve*
5	*Handle*	12	*Extension Socket Sleeve Pin*
6	*Cock Key*	13	*Handle Plate*
7	*Cock Cap*	14	*Handle Pin*
8	*Key Spring*		

Parts of Retaining Valve, Fig. 1375.

2 *Body*
3 *Case*
4 *Inside Weight*
5 *Handle*
6 *Cock Key*
7 *Cock Cap*
8 *Key Spring*
9 *Weight Lifting Rod*
10 *Outside Weight*

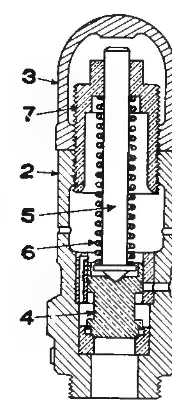


Fig. 1377—Type E-6 Safety Valve.

Parts of Retaining Valve, Fig. 1374.

2	*Body*	6	*Cock Key*
3	*Case*	7	*Cock Cap*
4	*Weight*	8	*Key Spring*
5	*Handle*		

Parts of Type E-6 Safety Valve, Fig. 1377.

2	*Body*	5	*Valve Stem*
3	*Cap Nut*	6	*Spring (50 lbs. to 90 lbs.)*
4	*Valve*	7	*Regulating Nut*

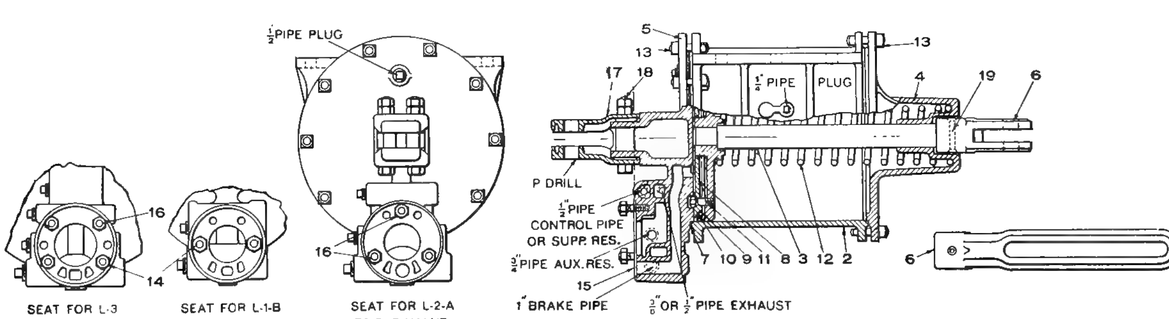


Fig. 1378—Type N Passenger Brake Cylinder.

Parts of Type N Brake Cylinder, Fig. 1378.

2	*Cylinder Body*	8	*Follower*	14	*Triple Valve Bolt and Nut*
3	*Piston and Rod*	9	*Packing Leather*	15	*Triple Valve Gasket*
4	*Non-Pressure Head*	10	*Packing Expander*	16	*Triple Valve Stud and Nut*
5	*Pressure Head*	11	*Follower Stud and Nut*	17	*Lever Bracket*
6	*Crosshead*	12	*Release Spring*	18	*Lever Bracket Bolt and Nuts*
7	*Cylinder Gasket*	13	*Cylinder Head Bolt and Nut*	19	*Crosshead Rivet*

Westinghouse Air Brake Company.

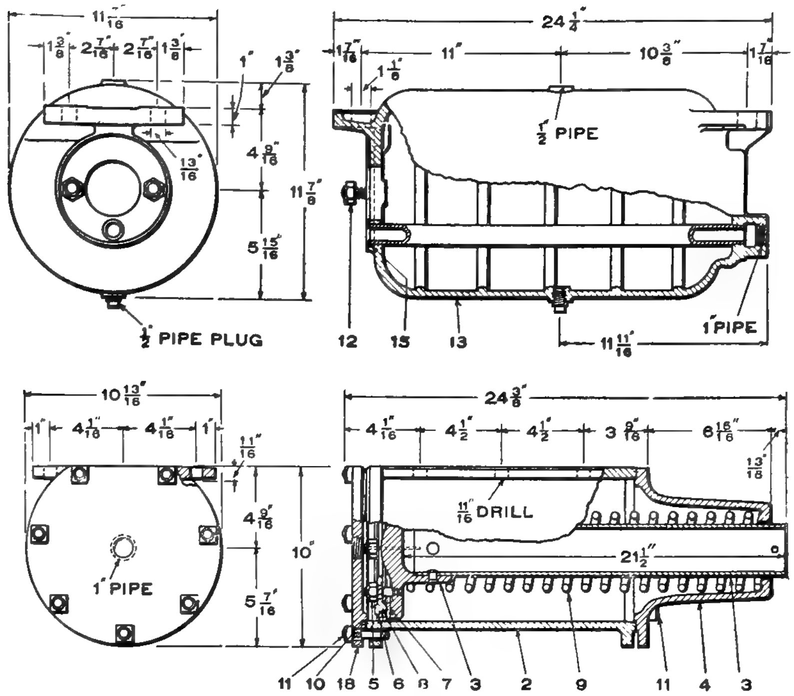


Fig. 1379—Freight Brake Cylinder and Reservoir, Detached.

Parts of Brake Cylinder, Fig. 1379.

2 *Cylinder Body, 8 in. by 12 in.*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Follower Stud and Nut*
6 *Follower*
7 *Packing Leather*
8 *Packing Expander*
9 *Release Spring*
10 *Cylinder Gasket*
11 *Cylinder Head Bolt and Nut*
12 *Reservoir Stud and Nut*
13 *Detached Reservoir Drain Plug*
15 *Triple Valve Gasket*
18 *Pressure Head*

Parts of Load Brake Cylinder, Fig. 1381.

2 *Cylinder Body*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Follower-Stud and Nut*
6 *Follower*
7 *Packing Leather*
8 *Packing Expander*
9 *Release Spring*
10 *Cylinder Gasket*
11 *Cylinder-Head Bolt and Nut*
18 *Pressure Head*
25 *Push Rod*
26 *Push Rod Pin*
27 *Push Rod Pin Cotter*
28 *Latch Box*
29 *Stud and Nut*
30 *Latch Box Cover*
31 *Latch Box Cap Nut*
32 *Latch*
33 *Latch Pin*
34 *Latch Pin Cotter*
35 *Release Pin*
36 *Spring Guide*
37 *Latch Spring*
40 *¾ in. by ½ in. Reducing Bush*

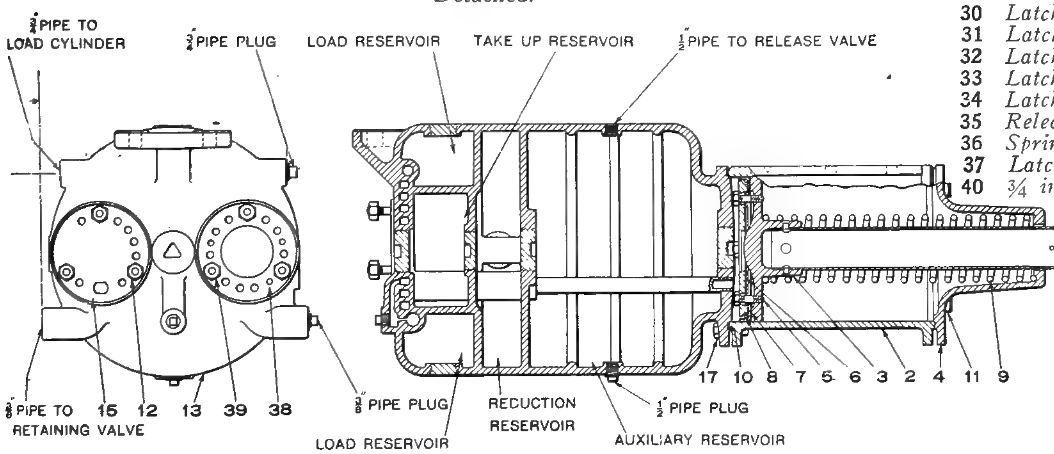


Fig. 1380—Empty Brake Cylinder, 10 in. by 12 in. and Four Compartment Reservoir Combined.

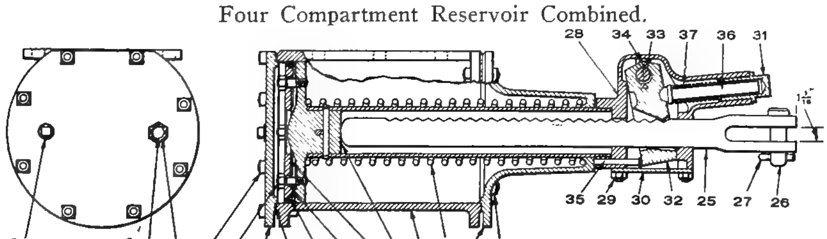


Fig. 1381—Load Brake Cylinder, 10 in. by 12 in., with Notched Push Rod and Enclosed Locking Mechanism, for Empty and Load Freight Brake Equipment.

Parts of Brake Cylinder, Fig. 1382.

2 *Cylinder Body*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Follower-Stud and Nut*
6 *Follower*
7 *Packing Leather*
8 *Packing Expander*
9 *Release Spring*
10 *Cylinder Gasket*
11 *Cylinder-Head Bolt and Nut*
12 *Reservoir Stud and Nut*
13 *Reservoir*
15 *Triple Valve Gasket*
17 *Reservoir Cylinder Bolt and Nut*

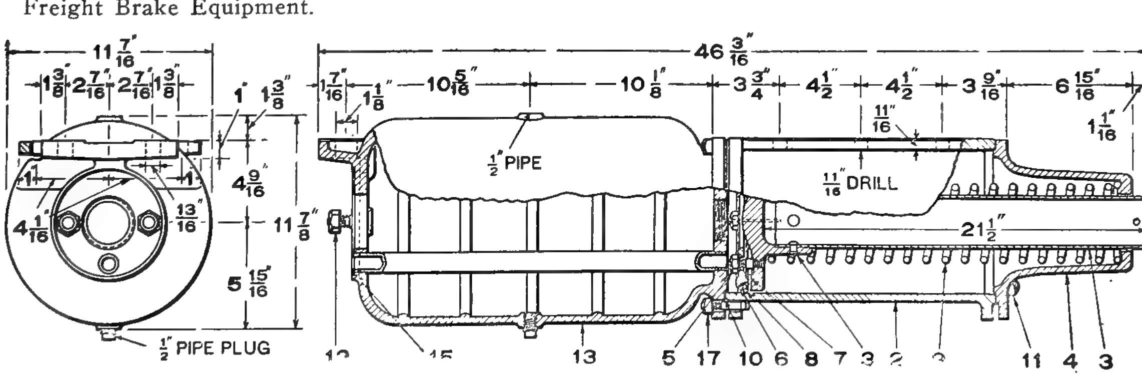


Fig. 1382—8 in. by 12 in. Freight Brake Cylinder and Auxiliary Reservoir Combined.

Westinghouse Air Brake Company.

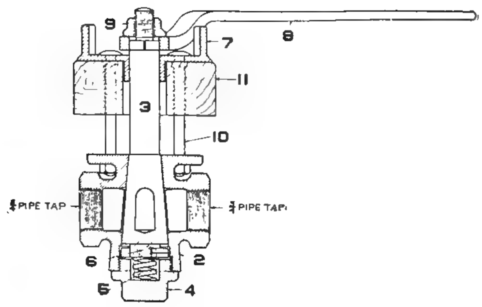


Fig. 1383—Type C-3 Conductor's Valve.

Parts of Conductor's Valve, Fig. 1383.

2 *Body*
3 *Key*
4 *Cap*
5 *Key Spring*
6 *Key Stop*
7 *Key Escutcheon*
8 *Handle*
9 *Key Nut*
10 *Bolt and Nut*
11 *Filler Block*

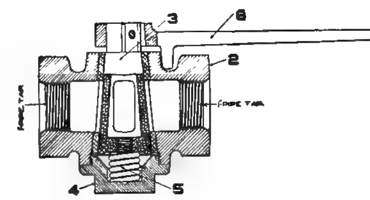


Fig. 1384—One-Inch Cut-Out Cock.

Parts of Cut-Out Cock, Fig. 1384.

2 *Body*
3 *Key*
4 *Cap*
5 *Spring*
6 *Handle*

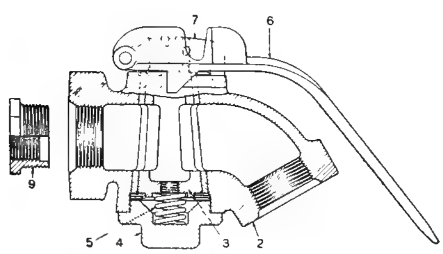


Fig. 1385—Self-Locking Angle Cock.

Parts of Angle Cock, Fig. 1385.

2 *Body*
3 *Key*
4 *Cap*
5 *Spring*
6 *Handle*
7 *Handle Socket*
9 1¼ *in. by* 1 *in. Bushing*

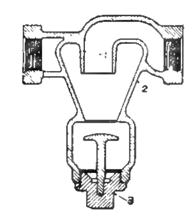


Fig. 1386—Centrifugal Dirt Collector.

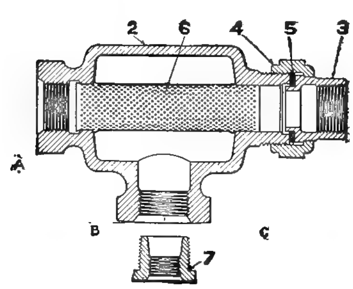


Fig. 1387—One-Inch Brake Pipe Air Strainer.

Parts of Strainer, Fig. 1387.

2 *Strainer Body*
3 1 *in. Union Swivel*
4 1 *in. Union Nut*
5 1 *in. Union Gasket*
6 *Strainer*
7 *Bushing*

Parts of Centrifugal Dirt Collector, Fig. 1386.

2 *Body*
3 *Deflector and Special Plug*

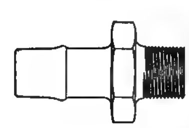


Fig. 1389—Threaded Hose Nipple.

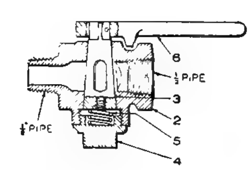


Fig. 1391—Reservoir Drain Cock, ½ in.

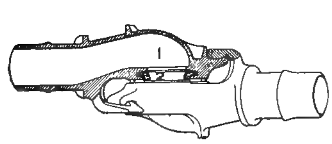


Fig. 1388—Freight Hose Coupling.

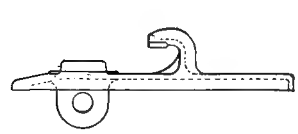


Fig. 1393—Dummy Hose Coupling.

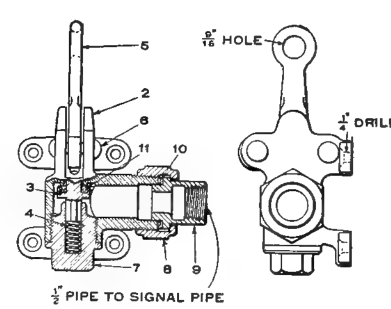


Fig. 1394—Car Discharge Valve.

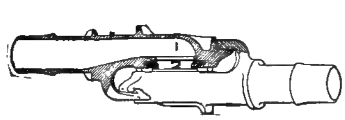


Fig. 1392—Passenger Hose Coupling.

Parts of Car Discharge Valve, Fig. 1394.

3 *Body*
4 *Stem*
4 *Spring*
5 *Handle*
6 *Stop Pin*
7 *Cap*
8 *Union Nut*
9 *Union Swivel*
10 *Union Gasket*
11 *Rubber Seat*

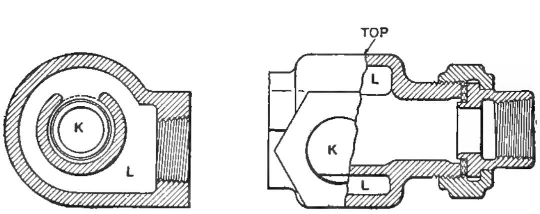


Fig. 1395—Branch Pipe Tee.

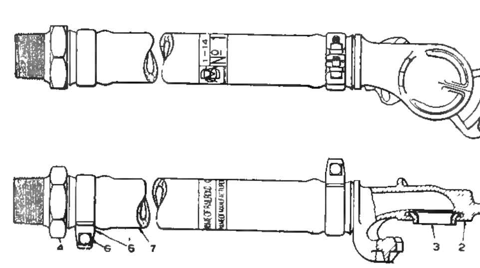
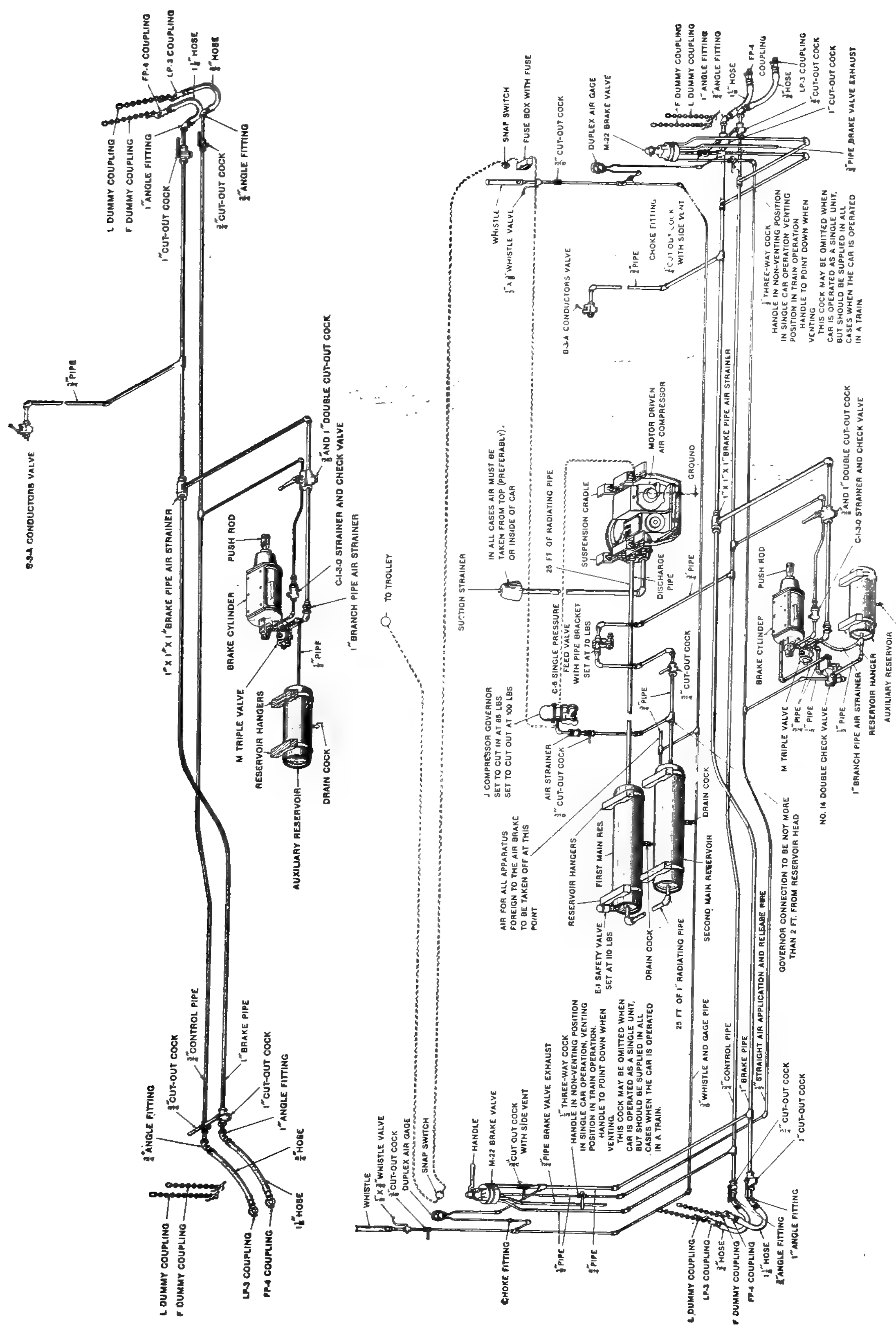


Fig. 1396—Brake Hose and Coupling.

Westinghouse Air Brake Company.



Westinghouse Air Brake Company.

Fig. 1397—Diagram of Westinghouse Air Brake Equipment, Schedule Combined Automatic A M M and Straight Air, for Electric Trains. Plain Automatic Brake with Graduated Release on Each Car, with Provision for Straight Air Application and Release in Single Car Service. The Length of the Train Should Not Exceed Three Cars with the M-22 Brake Valve. Any Length of Train May Be Used with the M-22-A Brake Valve.

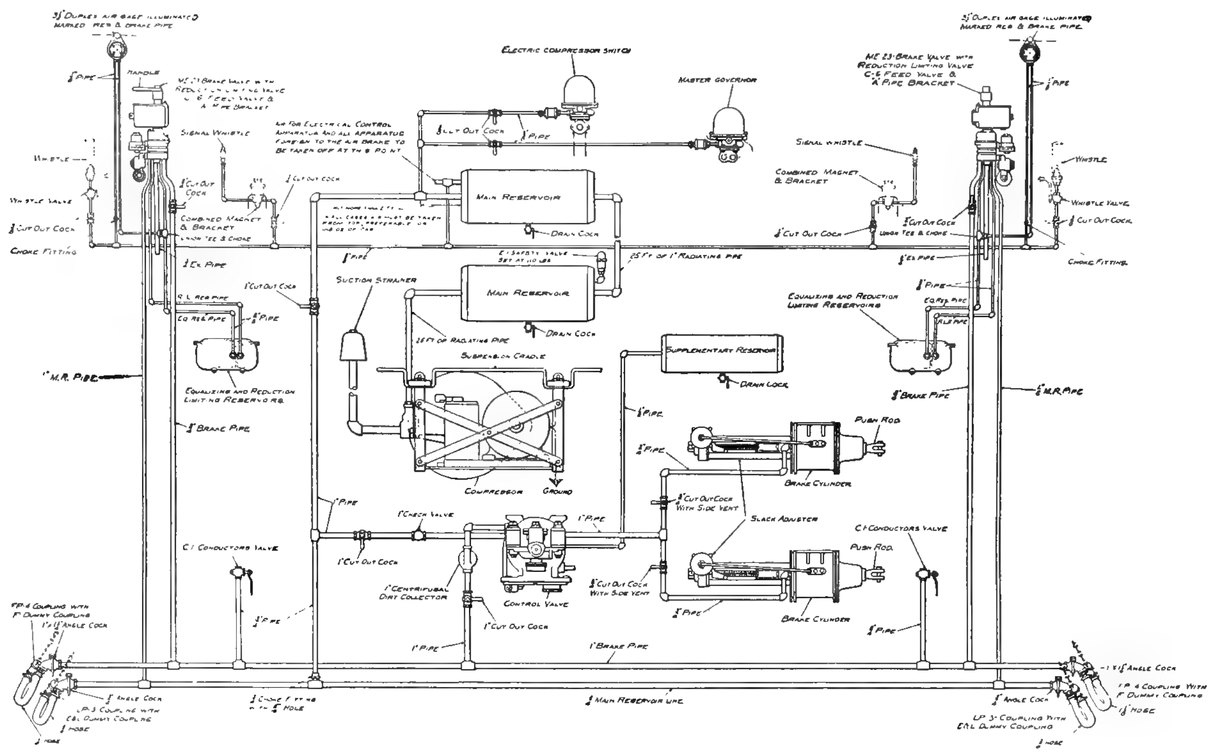


Fig. 1398—Diagram of Westinghouse Air Brake Equipment, Schedule AMCE, for Electric Trains. Consists of a Combination of a Pneumatic Service and Emergency Brake with an Electric Control of Both Service and Emergency Operations of the Brakes. For Trains of Any Length.

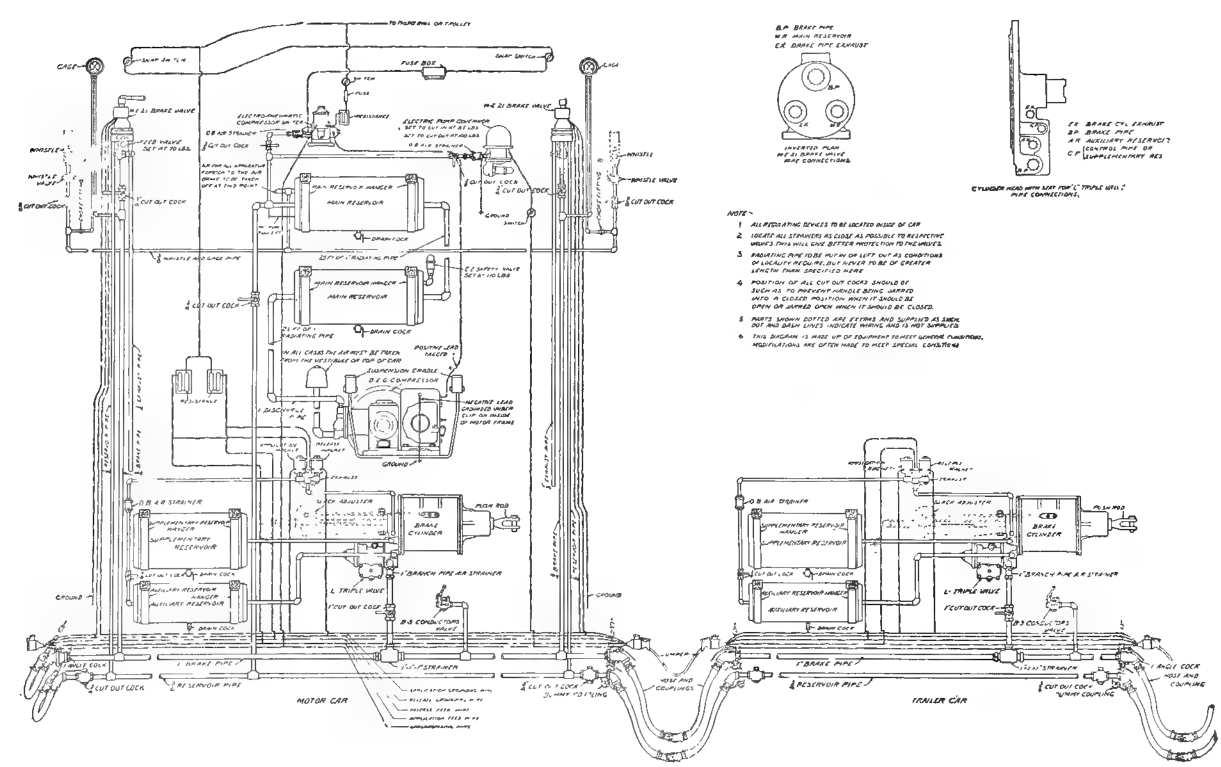


Fig. 1399—Diagram of Westinghouse Air Brake Equipment, Schedule AMLE, for Electric Trains. Consists of a Combination of a Pneumatic Service and Emergency Brake with an Electric Control of Both Service and Emergency Operations of the Brakes. For Trains of Any Length.

Westinghouse Air Brake Company.

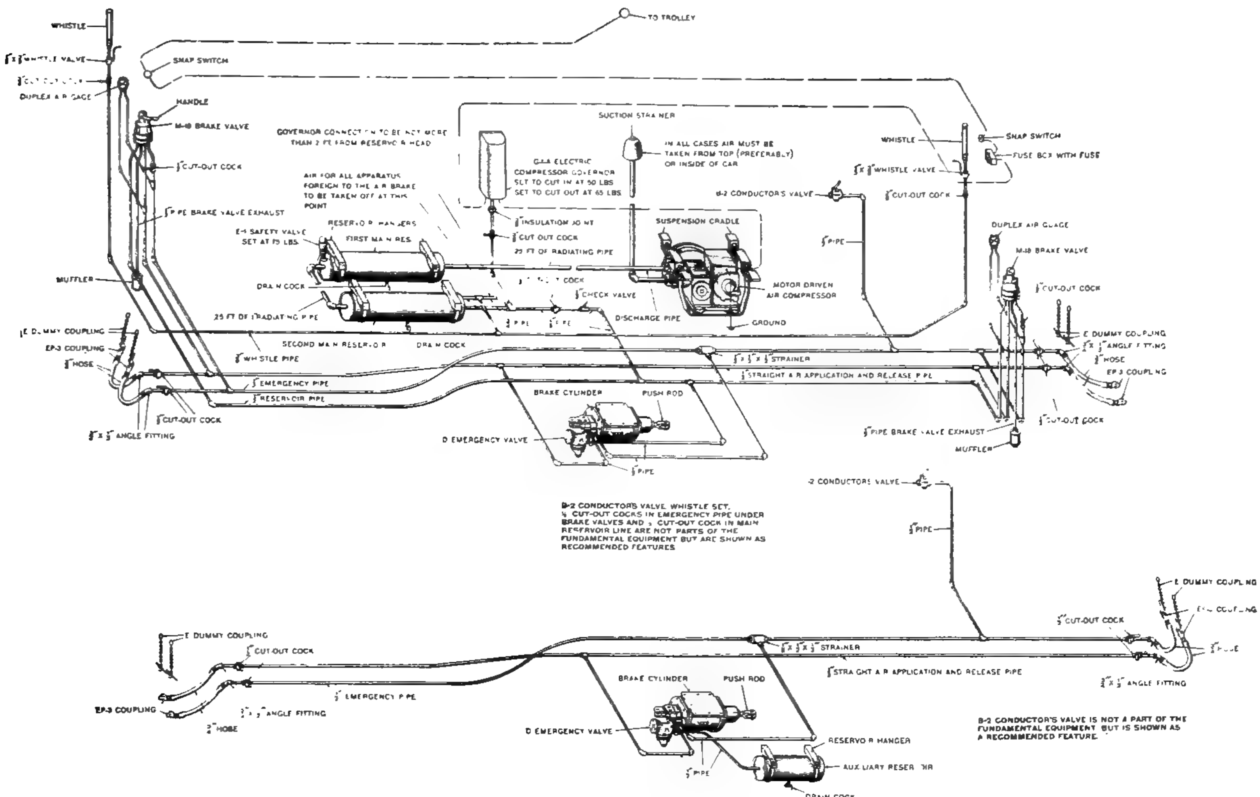


Fig. 1400—Diagram of Westinghouse Air Brake Equipment, Schedule SME. Straight Air Brake with an Automatic Emergency Feature for Single Car Service. Under Some Conditions it May be Used for Two-Car Trains, Consisting of Motor Car and Trailer, Where the Motor Car Operates Singly Most of the Time.

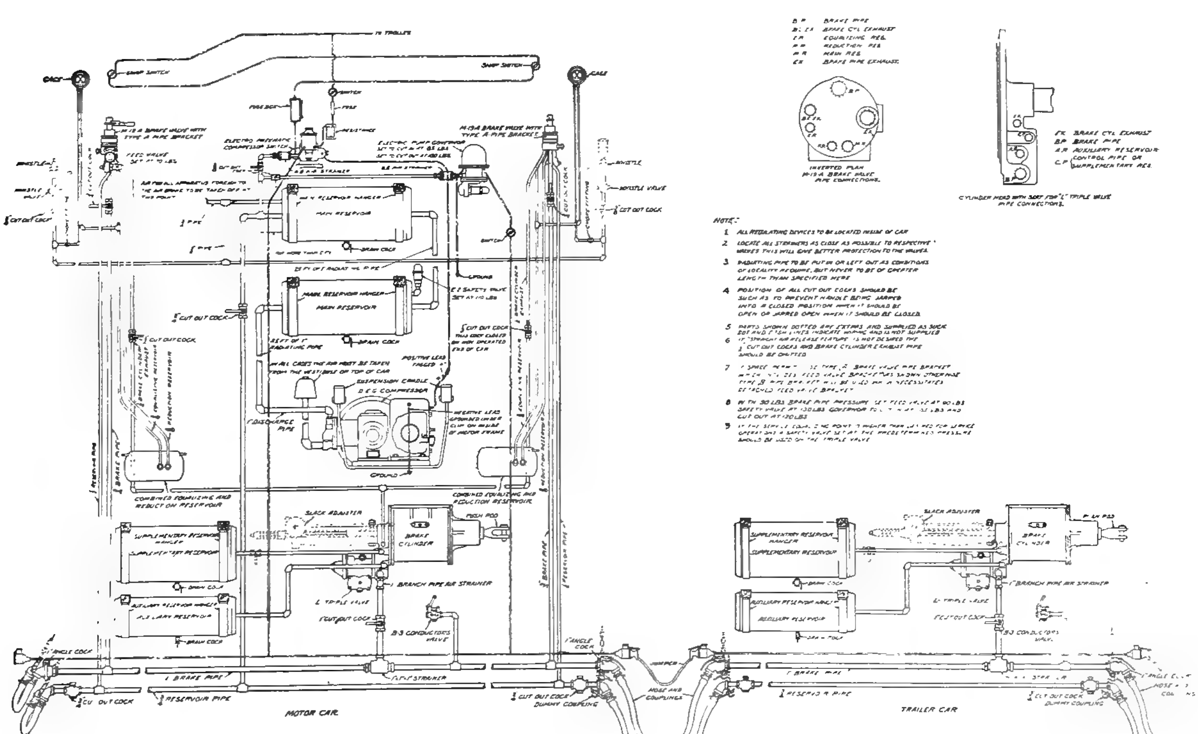


Fig. 1401—Diagram of Westinghouse Air Brake Equipment, Schedule AML, for Electric Trains. Quick Action, Automatic Brake with Graduated Release, Quick Service and Quick Recharge Features on Every Car with the Addition of Straight Air Release on Head Car; Also Reduction Limiting Features. For Trains of Any Length.

Westinghouse Air Brake Company.

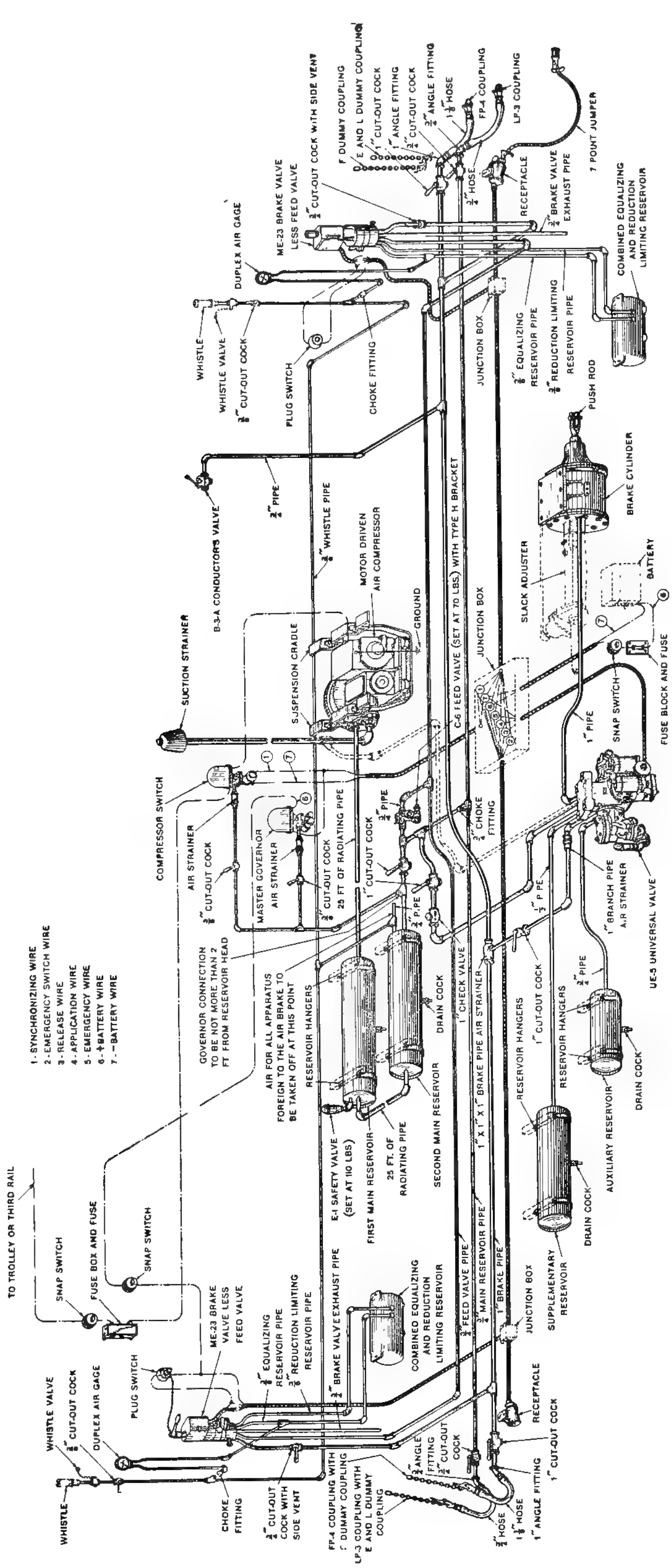


Fig. 1402—Westinghouse Universal Common Standard Brake Equipment, Schedule AMUE, for Electric Trains. Consists of a Combination of a Pneumatic Service and Emergency Brake with Electric Control of both Service and Emergency Operations of the Brakes, for Trains of Any Length.

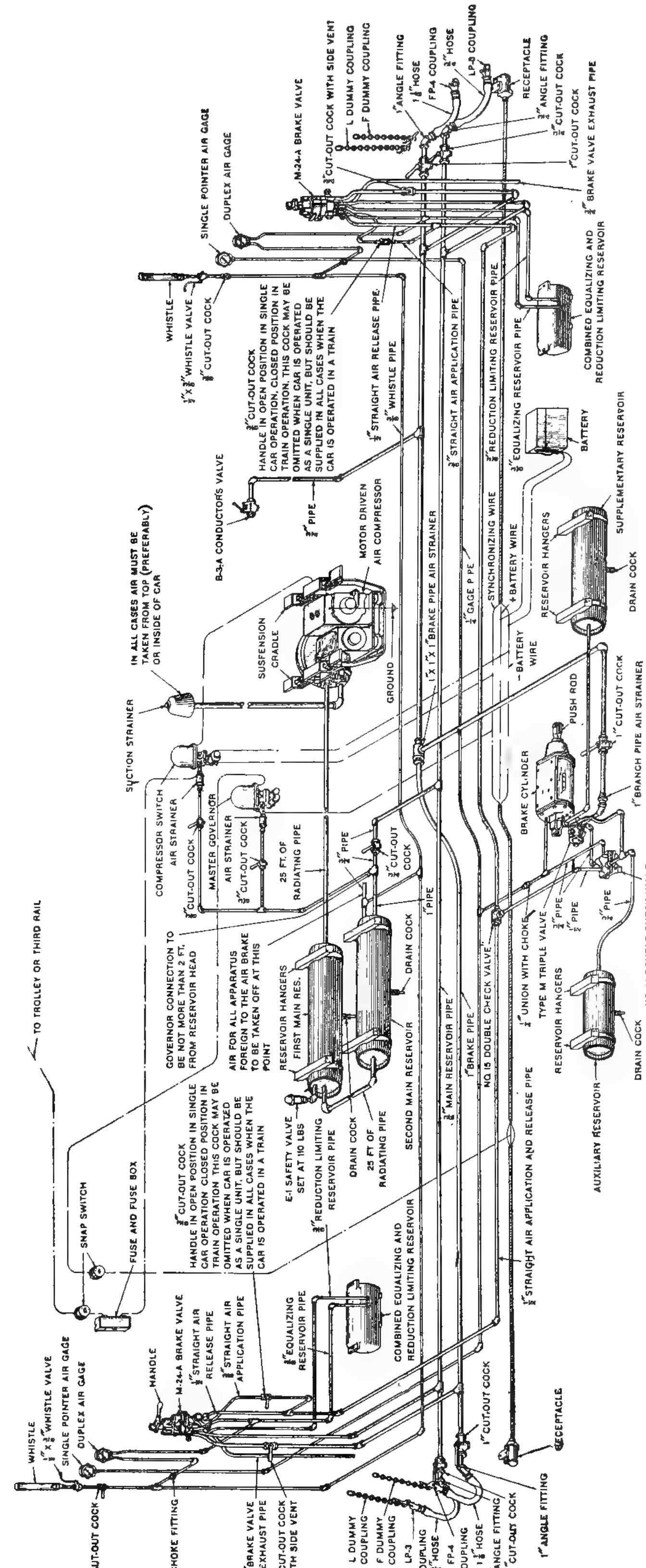


Fig. 1403—Piping diagram of Westinghouse Air Brake Equipment, Schedule Combined Automatic A M M and Straight Air, for Electric Trains. Plain Automatic Brake with Graduate Release on Each Car, with Provision for Straight Air Application and Release in Single Car Service. For Trains of Any Length.

Westinghouse Air Brake Company.

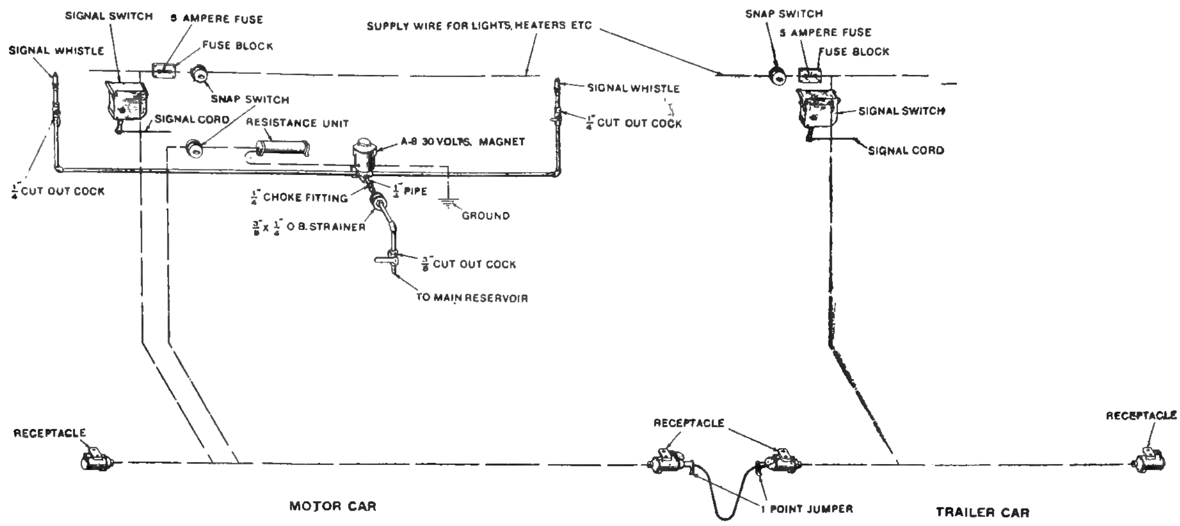


Fig. 1404—Electro-Pneumatic Train Signal for Electric Car Trains.

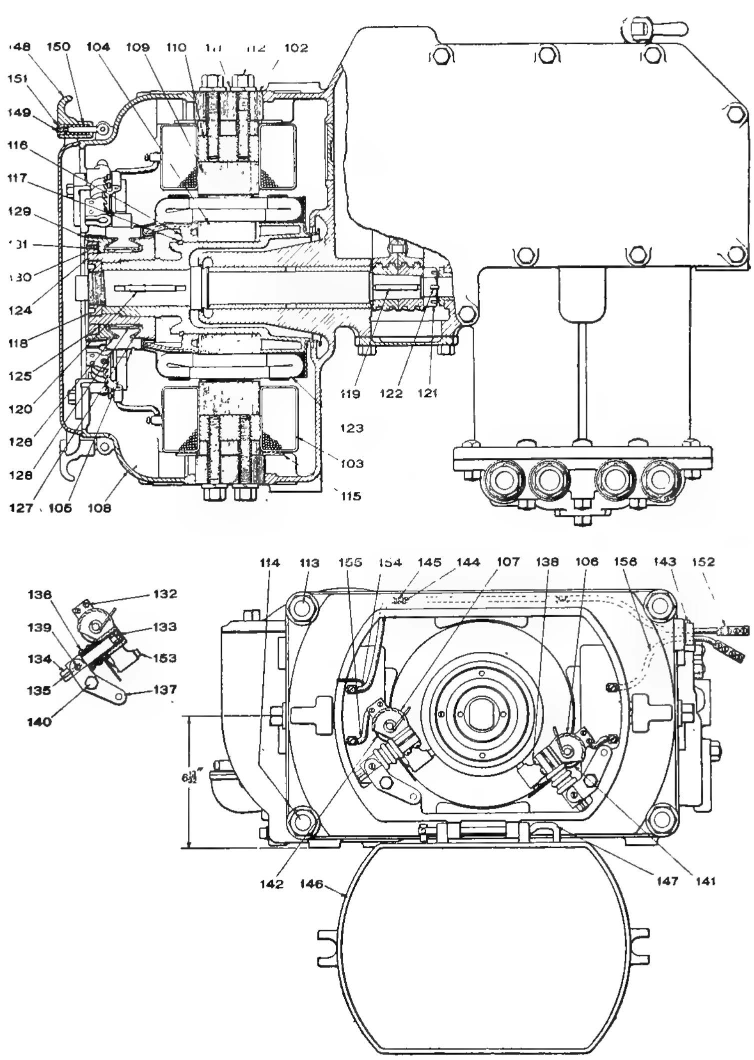


Fig. 1405—Low Height, Light Weight Motor-Driven Air Compressor, Type D-1-H. See also Fig. 1406.

Parts of Air Compressor, Fig. 1405.

Compressor Portion

2 *Cylinder and Crank Case*
3 *Cylinder Cover*
4 *Inlet Valve*
5 *Inlet Valve Chamber Cap*
6 *Discharge Valve*
7 *Discharge Valve Chamber Cap*
8 *Piston*
9 *Piston Ring*
10 *Crank Shaft*
11 *Connecting Rod*
12 *Wrist Pin*
13 *Gear*
14 *Pinion*
15 *Cylinder Cover Gasket*
16 *Rear Crank Shaft Bearing*
17 *Front Crank Shaft Bearing*
18 *Small Motor Bearing*
19 *Inside Motor Bearing*
20 *Outside Motor Bearing*
21 *Oil Filling Elbow*
22 *Oil Filling Plug*
23 *Outside Bearing Set Screw*
24 *Inside Bearing Set Screw*
25 *Cotter*
26 *Hand Hole Cover*
27 *Hand Hole Cover Gasket*
28 *Hand Hole Cover Cap Screw*
29 *Crank Case Top Cover*
30 *Crank Case Top Cover Gasket*
31 *Crank Case Top Cover Cap Screw*
32 *Cylinder Cover Bolt and Nut*
33 *Cylinder Cover Bolt and Nut*
34 *Cylinder Cover Bolt and Nut*
35 *Crank Shaft Key*
36 *Crank Shaft Castle Nut*
37 *Cotter*
38 *Bearing Cap (Rear End)*
39 *Bearing Cap (Front End)*
40 *Bearing Cap Bolt*
41 *Castle Nut*
42 *Cotter*
43 *Connecting Rod Bush*
44 *Connecting Rod Cap*
45 *Connecting Rod Cap Bush*
46 *Wrist Pin Bush*
47 *Eye Bolt*
48 *Castle Nut*
49 *Alignment Washer*
50 *Cotter*
51 *Wrist Pin Set Screw*
52 *Cotter*

Motor Portion

102 *Field Yoke*

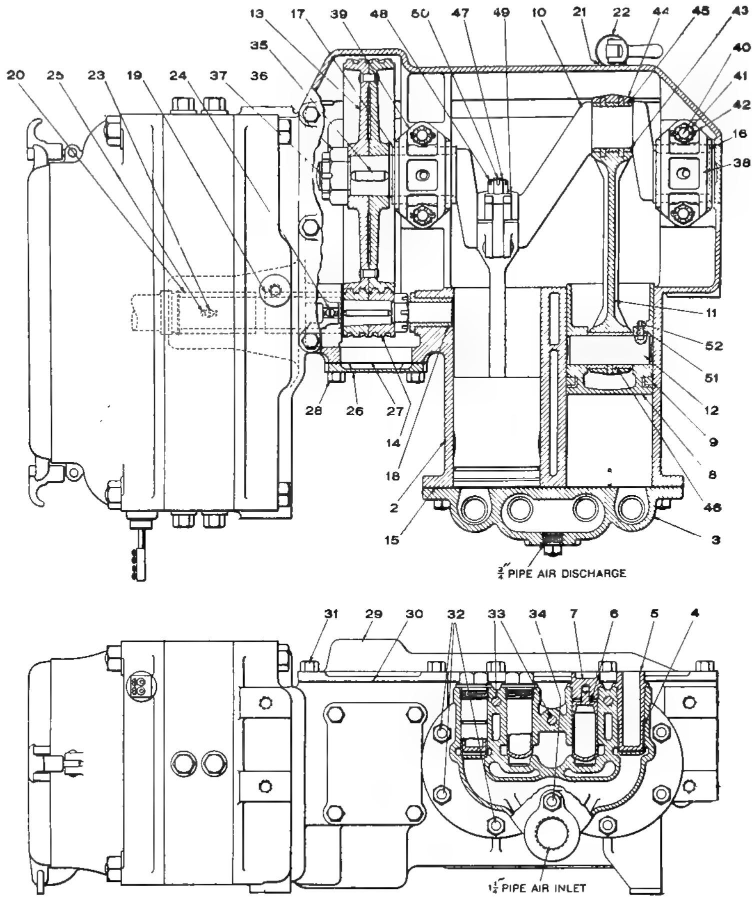


Fig. 1406—Type D-1-H Motor Driven Air Compressor. See also Fig. 1405.

103 *Field Coils*
104 *Armature*
105 *Commutator*
106 *Right Carbon Holder*
107 *Left Carbon Holder*
108 *Front End Bell*
109 *Salient Pole*
110 *Salient Pole Nut*
111 *Lock Washer*
112 *Salient Pole Cap Screw*
113 *Hexagonal Head Bolt and Nut*
114 *Stud and Nut*
115 *Field Coil Spring*
116 *Armature Collar*
117 *Ring for Armature Collar*
118 *Armature Shaft Nut*
119 *Key for Pinion*
120 *Key for Commutator*
121 *Castle Nut*
122 *Cotter*
123 *Armature Coil*
124 *Commutator Bushing*
125 *Commutator Washer*
126 *Front "V" Ring*
127 *Rear "V" Ring*
128 *Insulating Sleeve*
129 *Taper Ring*
130 *Commutator Nut*
131 *Commutator Nut Set Screw*
132 *Lead Screw*
133 *Carbon Holder Stud Insulation*
134 *Carbon Holder Stud*
135 *Carbon Holder Stud Key*
136 *Carbon Holder Stud Sleeve*
137 *Carbon Holder Clamp*
138 *Screw*
139 *Set Screw*
140 *Cap Screw*
141 *Right Carbon Holder Spring*
142 *Left Carbon Holder Spring*
143 *Insulating Plug*
144 *Cleat for Lead*
145 *Cleat Screw*
146 *Commutator Door*
147 *Hinge Pin*
148 *Latch*
149 *Latch Eye Bolt*
150 *Latch Spring*
151 *Latch Nut*
152 *Connector for Lead*
153 *Carbon*
154 *Field Coil Lead*
155 *Lead*
156 *Field Coil Lead*

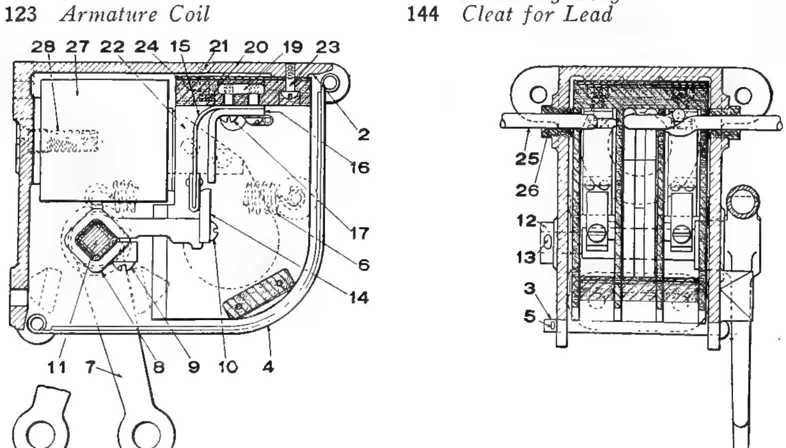
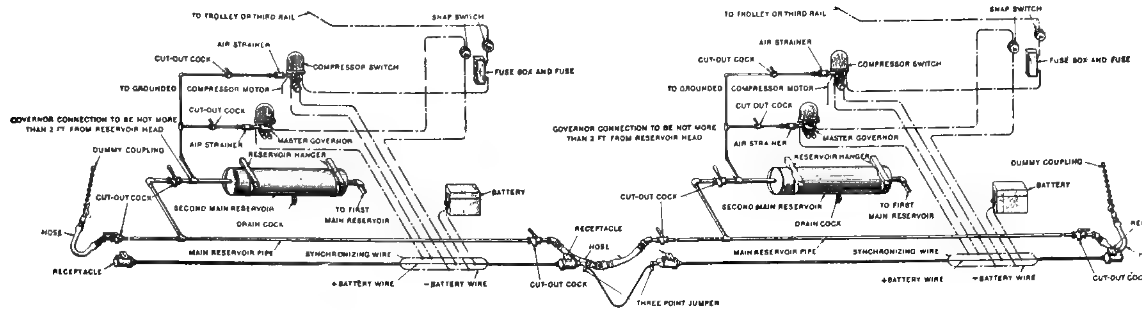


Fig. 1407—Conductor's Switch.

Parts of Conductor's Switch, Fig. 1407.

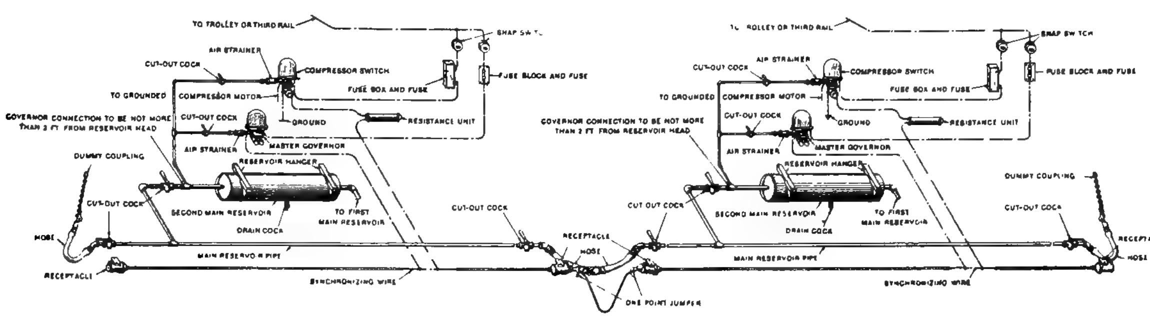
2 *Frame*
3 *Pin*
4 *Cover*
5 *Cotter*
6 *Extension Spring*
7 *Handle*
8 *Spider*
9 *Screw*
10 *Screw*
11 *Shaft*
12 *Collar*
13 *Cotter*
14 *Contact*
15 *Contact Finger*
16 *Finger Stop*
17 *Screw*
19 *Double Nut*
20 *Special Nut*
21 *Fillister Head Screw*
22 *Arc Shield*
22 *Arc Shield for Conductor's Switch*
23 *Round Head Screw*
24 *Back Insulation*
25 *Lead*
26 *Insulating Bushing*
27 *Blowout Coil*
28 *Cap Screw*

Westinghouse Air Brake Company.



SYNCHRONIZING SYSTEM BATTERY CIRCUIT

Fig. 1408—Wiring Diagram of Westinghouse Governor Synchronizing System; Battery Circuit.



SYNCHRONIZING SYSTEM TROLLEY OR THIRD RAIL CIRCUIT

Fig. 1409—Wiring Diagram of Westinghouse Governor Synchronizing System; Trolley Circuit.

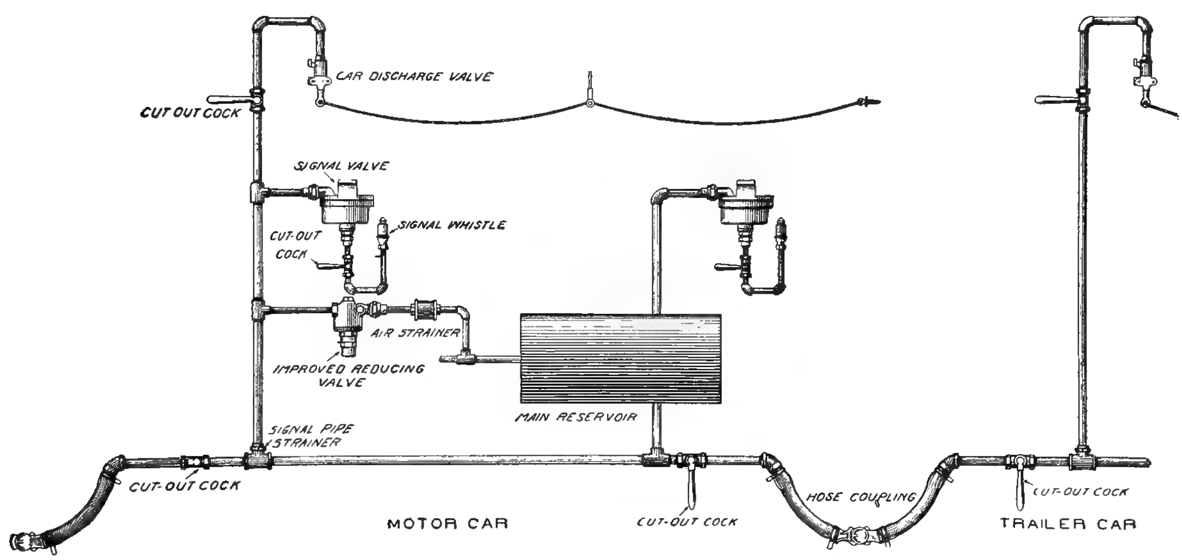


Fig. 1410—Diagram of Train Air Signal for Electric Trains.

Parts of Air Compressor, Fig. 1411.

2 *Cylinder and Crank Case*
3 *Cylinder Cover*
4 *Bolt and Nut*
5 *Bolt and Nut*
6 *Bolt and Nut*
7 *Front Crank Case Cover*
8 *Cap Screw*
9 *Gear Case*
10 *Stud and Nut*
11 *Gear Case Cover*
12 *Gear Case Cover Bolt and Nut*
13 *Cap Screw*
14 *Cap Screw*
15 *Bolt*
16 *Gear Case Cover Cap*
17 *Cap Screw*
19 *Tapped Crank Case Top Cover*
19 *Solid Crank Case Top Cover*
20 *Cap Screw*
21 *Cap Screw*
22 *Crank Case Oil Fitting*
23 *Cap Screw*
24 *Crank Shaft*
25 *Crank Shaft Key*
26 *Crank Shaft Nut*
27 *Crank Shaft Jam Nut*
28 *Gear*
29 *Connecting Rod*
30 *Connecting Rod Cap*
31 *Connecting Rod Eye Bolt*
32 *Nut*
33 *Jam Nut*
34 *Cotter*
35 *Connecting Rod Bush*
36 *Wrist Pin with Special Dowel*
37 *Wrist Pin Set Screw*
38 *Piston*
39 *Piston Packing Ring*
40 *Inlet Valve*
41 *Inlet Valve Chamber Cap*
42 *Discharge Valve*
43 *Discharge Valve Chamber Cap*
49 *Cylinder Cover Gasket*
50 *Front Crank Case Cover Gasket*

Westinghouse Air Brake Company.

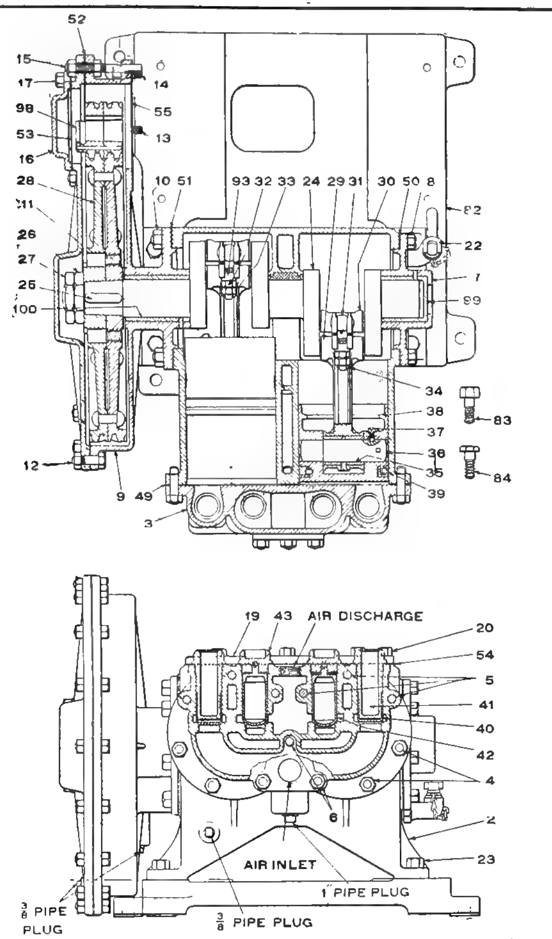


Fig. 1411—Compressor Portion of Motor Driven Air Compressor for Electric Cars.

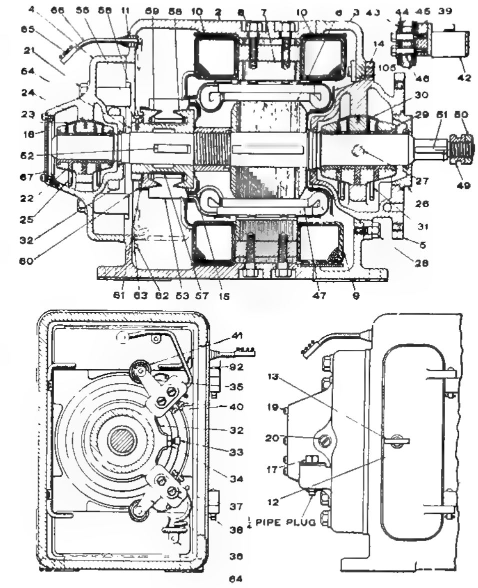


Fig. 1412—Motor Portion of Motor Driven Air Compressor for Electric Cars.

Parts of Air Compressor, Fig. 1411 (Continued).

- **51** *Gear Case and Crank Case Gasket*
- **52** *Gear Case Cover Gasket*
- **53** *Gear Case Cover Cap Gasket*
- **54** *Crank Case Top Cover Gasket*
- **55** *Motor Gasket*
- **82** *Bed Plate*
- **83** *Cap Screw*
- **84** *Special Cap Screw*
- **85** *Suction Plate*
- **86** *Suction Plate Gasket*
- **87** *Bolt and Nut*
- **93** *Washer*
- **97** *Pipe*
- **98** *Pinion for Motor Shaft*
- **99** *Shaft Bearing Bush (Front End)*
- **100** *Shaft Bearing Bush (Rear End)*

Parts of Motor, Fig. 1412

- 2 *Field Yoke*
- 3 *End Bell*
- 4 *Front Bearing Housing*
- 5 *Rear Bearing Housing*
- 6 *Armature*
- 7 *Field Pole*
- 8 *Field Pole Screw*
- 9 *Field Coil*
- 10 *Field Coil Washer*
- 11 *Short Insulating Bushing for Leads*
- 11 *Long Insulating Bushing for Leads*
- 12 *Commutator Door*
- 13 *Commutator Door Latch*
- 14 *Stud and Nut*
- 15 *Armature Coil Support*
- 17 *Oil Filling Elbow Cap Nut*
- 18 *Front Bearing Housing Dust Plate*
- 19 *Screw for Dust Plate*
- 20 *Front Bearing Housing Headless Screw*
- 21 *Cap Screw*
- 22 *Front Bearing*
- 23 *Cleat for Front Bearing*
- 24 *Cleat Screw*
- 25 *Front Bearing Oil Ring*
- 26 *Nut*
- 27 *Rear Bearing Housing Headless Screw*
- 28 *Cap Screw*
- 29 *Rear Bearing*
- 30 *Cleat for Rear Bearing*
- 31 *Rear Bearing Oil Ring*
- 32 *Rocker Arm*
- 33 *Set Screw*
- 34 *Jam Nut*
- 35 *Upper Carbon Holder*
- 36 *Lower Carbon Holder*
- 37 *Cap Screw*
- 38 *Washer*
- 39 *Double Nut*
- 40 *Screw*
- 41 *Carbon Holder Spring*
- 42 *Carbon*
- 43 *Insulating Washer Fibre*
- 44 *Insulating Washer Fullerboard*
- 45 *Insulating Washer Mica*
- 46 *Insulating Tube for Rocker Arm*
- 47 *Armature Coil*
- 49 *Nut for Removing Pinion*
- 50 *Motor Shaft Jam Nut*
- 51 *Key for Pinion*
- 52 *Key for Commutator*
- 53 *Commutator*
- 54 *Commutator Bushing*
- 55 *Commutator Nut*
- 56 *Set Screw*
- 57 *Insulating Bush*
- 58 *Inner Insulating V Ring for Commutator*
- 59 *Outer Insulating V Ring for Commutator*
- 60 *Taper Ring for Commutator*
- 61 *Washer*
- 62 *Screw*
- 63 *Nut Lock*
- 64 *Cleat for Holding Leads*
- 65 *Connector for Leads*
- 66 *Carbon Holder Lead*
- 67 *Dust Plate Gasket*
- 92 *Hinge Pin for Commutator Door*
- 105 *Oil Deflector*

Parts of Brake Valve, Fig. 1413.

2 *Rotary Valve Seat*
3 *Body*
4 *Type A Pipe Bracket*
5 *Rotary Valve*
6 *Rotary Valve Key*
7 *Rotary Valve Spring*
8 *Key Washer*
9 *Oil Screw*
10 *Malleable Iron Handle*
18 *Fil. Head Screw*
19 *Upper Gasket*
20 *Lower Gasket*
21 *Bolt and Nut*
22 *Oil Plug*
23 *Holding Stud*
24 *Holding Nut*
25 *Feed Valve Stud and Nut*
26 *Feed Valve Gasket*
27 *C-6 Feed Valve*
33 *Cover*
34 *Thumb Nut*
35 *Eye Bolt*
50 *Bottom Case (Bushed)*
51 *Equalizing Piston and Valve*
52 *Piston Ring*
53 *Equalizing Piston Valve*
54 *Cap Nut*
55 *Piston Washer*
56 *Equalizing Piston Spring*
57 *Middle Gasket*
58 *Tee for Gage and Equalizing Reservoir*
59 *Union Nut*
60 *Union Swivel*
73 *Spider*
76 *Washer*
80 *Limiting Valve Body*
81 *Limiting Valve Piston*
82 *Limiting Valve Piston Ring*
83 *Limiting Valve Slide Valve*
84 *Limiting Valve Slide Valve Spring*
85 *Limiting Valve Cap Nut*
86 *Limiting Valve Cover Gasket*
87 *Limiting Valve Cover*
88 *Limiting Valve Gasket*
89 *Cap Screw*
90 *Cap Screws*
92 *Pawl*
93 *Pawl Spring*
94 *Cap Nut*
95 *Quadrant*
96 *Feather Key*
97 *Finger Board*
98 *Finger Board Screw*
99 *Finger Base*
100 *Finger Base Screw*
101 *Finger*
102 *Screw*
104 *Clip for Finger Base Lead*
105 *Cottered Rivet Pin*

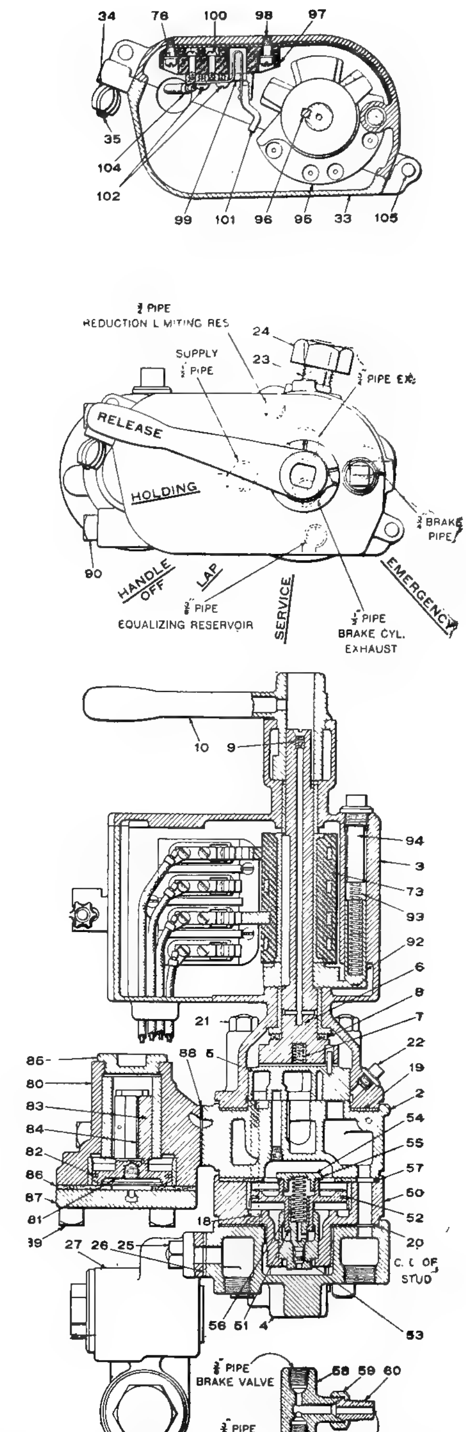


Fig. 1413—Motorman's Electro-Pneumatic Brake Valve, Type ME-23.

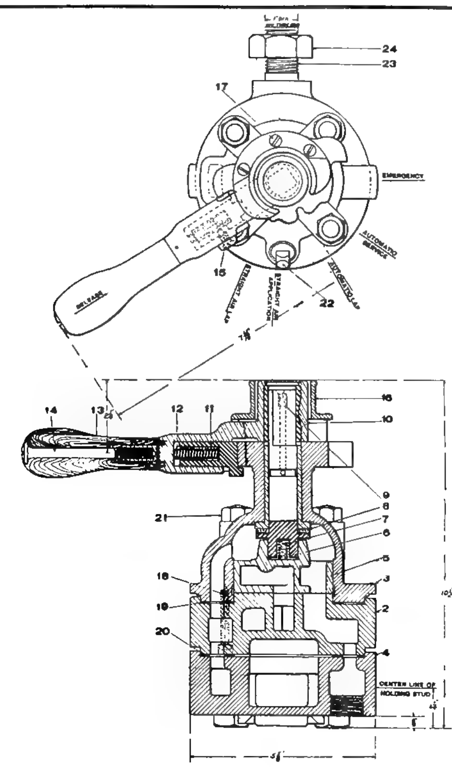


Fig. 1414—Motorman's Automatic Brake Valve, Type M-22.

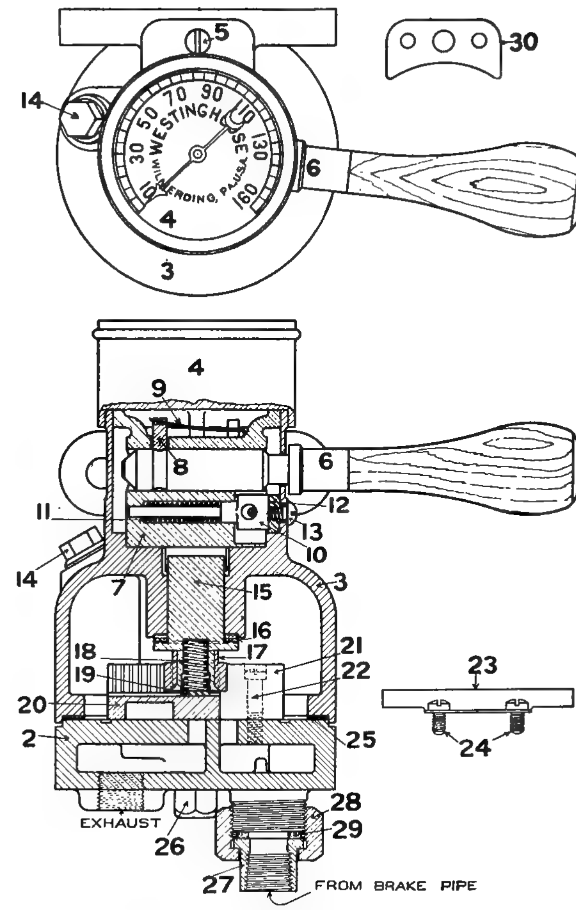


Fig. 1415—Motorman's Straight Air Brake Valve, Type SQ.

Parts of Type M-22 Brake Valve, Fig. 1414.

2 *Valve Seat*
3 *Body*
4 *Type B Pipe Bracket*
5 *Rotary Valve*
6 *Rotary Valve Key*
7 *Rotary Valve Spring*
8 *Key Washer*
9 *Oil Screw*
10 *Handle*
11 *Latch*
12 *Latch Spring*
13 *Handle Grip*
14 *Grip Screw*
15 *Latch Screw*
16 *Handle Guard*
17 *Handle Guard Screw*
18 *Fillister Head Screw*
19 *Upper Gasket*
20 *Lower Gasket*
21 *Bolt and Nut*
22 *Oil Plug*
23 *Holding Stud*
24 *Holding Nut*

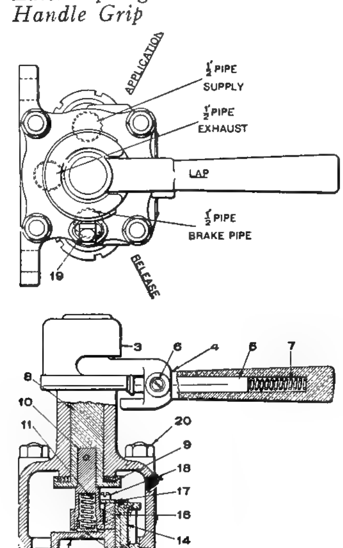


Fig. 1416—Motorman's Straight Air Brake Valve, Type SY.

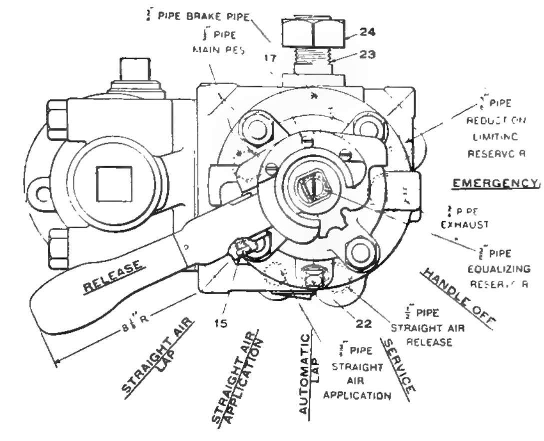
Parts of Type SQ Brake Valve, Fig. 1415.

2 *Valve Seat*
3 *Body*
4 *Air Gage, Single Pointer*
5 *Gage Screw*
6 *Handle*
7 *Handle Socket*
8 *Handle Latch*
9 *Handle Latch Spring*
10 *Socket Latch*
11 *Socket Latch Spring*
12 *Index Plate*
13 *Index Plate Screw*
14 *Oil Plug*
15 *Slide Valve Spindle*
16 *Slide Valve Washer*
17 *Pinion*
18 *Slide Valve Spring*
19 *Slide Valve Wearing Plate*
20 *Slide Valve*
21 *Rear Guide*
22 *Rear Guide Screw*
23 *Front Guide*
24 *Front Guide Screw*
25 *Valve Seat Gasket*
26 *Cap Screw*
27 *Union Swivel*
28 *Union Nut*
29 *Union Gasket*

Parts of Type SY Brake Valve, Fig. 1416.

2 *Valve Seat*
3 *Body*
4 *Handle*
5 *Handle Latch*
6 *Handle Latch Screw*
7 *Handle Latch Spring*
8 *Shaft*
9 *Washer for Shaft*
10 *Pinion*
11 *Slide Valve Spring*
12 *Slide Valve Spring Tip*
13 *Slide Valve and Rack*
14 *Valve and Rack Guide with Dowels*
15 *Fillister Head Screw*
16 *Rack with Dowel*
17 *Rack Plate*
18 *Fillister Head Screw*
19 *Oil Plug*
20 *Bolt and Nut*
21 *Union Nut*
22 *Union Swivel Ring*
23 *Union Gasket*
24 *Gasket*

Westinghouse Air Brake Company.



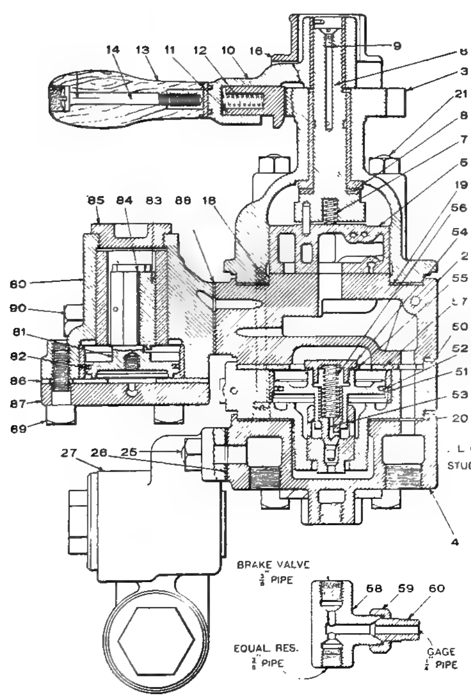
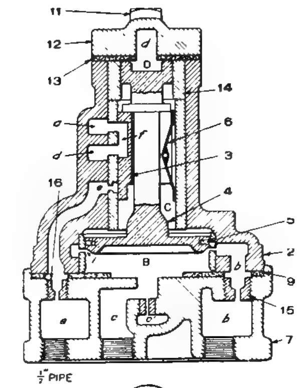
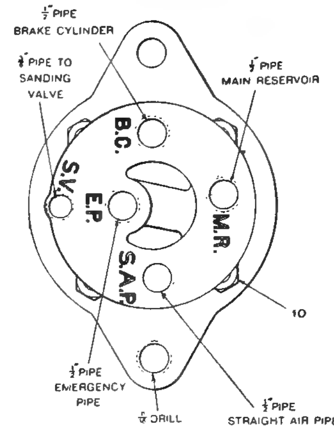


Fig. 1417—Motorman's Automatic Brake Valve, Type M-24-A.





Parts of Brake Valve, Fig. 1417.

2 *Rotary Valve Seat*
3 *Body*
4 *Pipe and Feed Valve Bracket*
5 *Rotary Valve*
6 *Rotary Valve Key*
7 *Rotary Valve Spring*
8 *Key Washer*
9 *Oil Screw*
10 *Piston Spring Tip*
11 *Latch*
12 *Latch Spring*
13 *Hand Grip*
14 *Grip Screw*
15 *Latch Screw*
16 *Handle Guard*
17 *Handle Guard Screw*
18 *Fillister Head Screw*
19 *Upper Gasket*
20 *Lower Gasket*
21 *Bolt and Nut*
22 *Oil Plug*
23 *Holding Stud*
24 *Holding Nut*
25 *Feed Valve Stud and Nut*
26 *Feed Valve Gasket*
27 *C-6 Feed Valve, Complete*
50 *Bottom Case (Bushed)*
51 *Equalizing Piston and Valve*
52 *Piston Ring*
53 *Equalizing Piston Valve*
54 *Cap Nut*
55 *Piston Washer*
56 *Equalizing Piston Spring*
57 *Middle Gasket*
58 *Tee for Gage and Equalizing Reservoir*
59 *Union Nut*
60 *Union Swivel*
80 *Limiting Valve Body*
81 *Limiting Valve Piston*
82 *Limiting Valve Piston Ring*
83 *Limiting Valve Slide Valve*
84 *Limiting Valve Slide Valve Spring*
85 *Limiting Valve Cap Nut*
86 *Limiting Valve Cover Gasket*
87 *Limiting Valve Cover*
88 *Limiting Valve Gasket*
89 *Limiting Valve Cover Cap Screw*
90 *Limiting Valve Cap Screw*

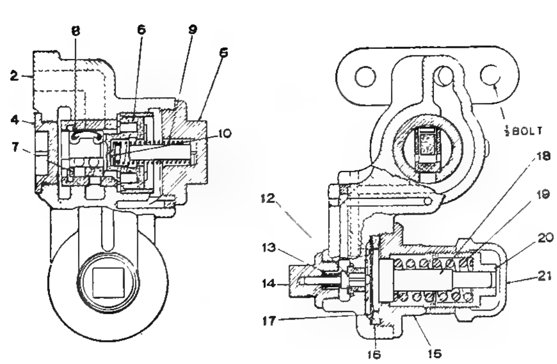


Fig. 1418—C-6 Single Pressure Feed Valve.

Parts of Feed Valve, Fig. 1418.

2 *Valve Body*
4 *Flush Nut*
5 *Cap Nut*
6 *Piston*
7 *Supply Valve*
8 *Supply Valve Spring*
9 *Piston Spring*
10 *Piston Spring Tip*
12 *Regulating Valve*
13 *Regulating Valve Spring*
14 *Regulating Valve Cap Nut*
15 *Spring Box*
16 *Diaphragm Ring*
17 *Diaphragm*
18 *Diaphragm Spindle*
19 *Regulating Spring*
20 *Regulating Nut*
21 *Check Nut*

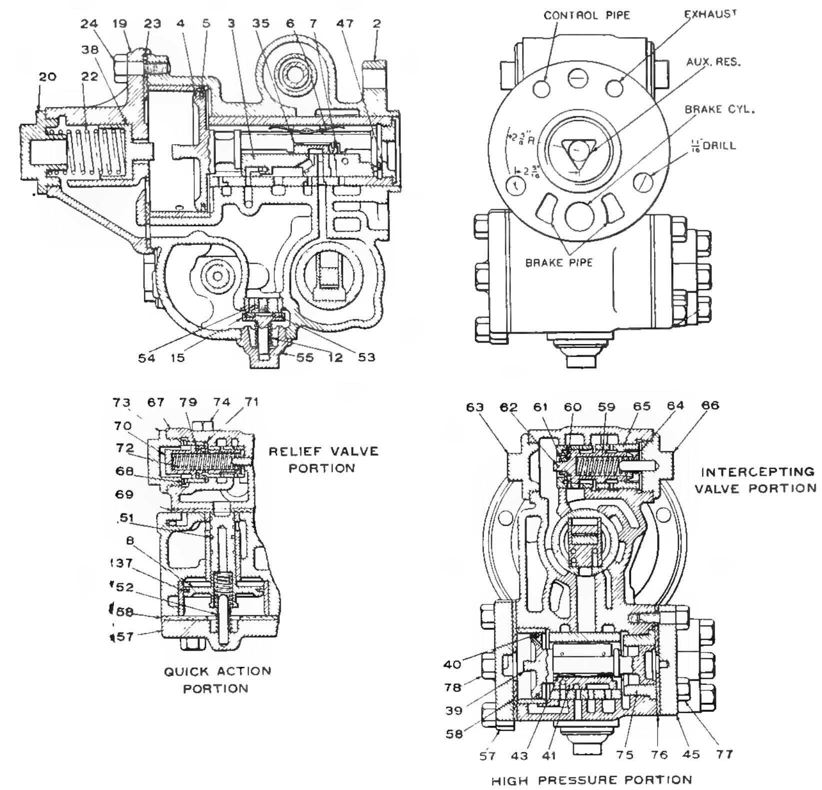


Fig. 1419—Type L-2-G Triple Valve.

Parts of Triple Valve, Fig. 1419.

2 *Body*
3 *Main Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Main Slide Valve Spring*
7 *Graduating Valve*
8 *Quick Action Piston*
12 *Check Valve Spring*
15 *Check Valve*
19 *Main Cylinder Cap*
19 *Cylinder Cap*
20 *Graduating Spring Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Main Cylinder Cap Gasket*
24 *Cap Screw (for Main Cylinder Cap)*
35 *Graduating Valve Spring*
37 *Quick-Action Piston Ring (Large)*
38 *Graduating Sleeve*
39 *High-Pressure Piston*
40 *High-Pressure Piston Ring*
41 *High-Pressure Slide Valve*
43 *High-Pressure Slide Valve Spring*
45 *High-Pressure Cover (Small)*
47 *End Cap*
51 *Quick-Action Piston Ring (Small)*
52 *Quick Action Piston Spring*
53 *Check Valve Seat*
54 *Check Valve Nut*
55 *Check Valve Cap Nut*
56 *Graduating Spring (Small)*
57 *Quick-Action Piston Cover*
58 *Quick-Action Piston Cover Gasket*
59 *Intercepting Valve*
60 *Intercepting Valve Seat*
61 *Intercepting Valve Nut*
62 *Steel Cotter*
63 *Intercepting Valve Cap Nut*
64 *Intercepting Valve Spring*
65 *Intercepting Valve Bush (Small)*
66 *Intercepting Valve Cap Nut and Spring Guide*
67 *Relief Valve Body (Bushed)*
68 *Relief Valve Bush*
69 *Relief Valve Gasket*
70 *Piston Relief Valve*
71 *Piston Relief Valve Seat*
72 *Piston Relief Valve Spring*
73 *Piston Relief Valve Cap Nut*
74 *Cap Screw*
75 *High-Pressure Piston Bush (Small)*
76 *High-Pressure Piston Cover Gasket (Small)*
77 *Cap Screw*
78 *Cap Screw*
79 *Relief Valve Piston Ring*

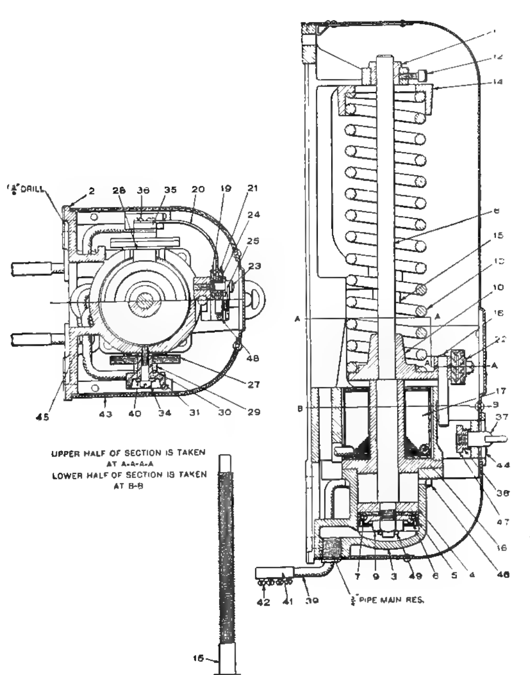


Fig. 1420—Electric Compressor Governor, Type G-1-B.

Parts of Compressor Governor, Fig. 1420.

2 *Base*
3 *Cylinder*
4 *Piston*
5 *Piston Packing*
6 *Piston Follower*
7 *Packing Leather Expander*
8 *Piston Rod*
9 *Piston Nut*
10 *Armature*
11 *Piston Rod Guide*
12 *Set Screw*
13 *Regulating Spring*
14 *Spring Yoke*
15 *Adjusting Bolt*
16 *Magnet Core*
17 *Magnet Coil*
18 *Pin for Armature*
19 *Circuit Closer Insulator*
20 *Circuit Closer*
21 *Circuit Closer Insulator*
22 *Washer*
23 *Fillister Head Screw*
24 *Insulating Bushing*
25 *Lock Screw*
27 *Arc Shield*
28 *Arc Shield Cushion*
29 *Fixed Contact*
30 *Controller Clip*
31 *Contact Screw Insulator*
34 *Contact Screw*
35 *Tip for Circuit Closer*
36 *Button Head Screw*
37 *Latch*
38 *Spring for Latch*
39 *Lead*
40 *Washer*
41 *Connector*
42 *Round Head Screw*
43 *Cover*
44 *Latch Plate*
45 *Insulating Bush*
46 *Fillister Head Screw*
47 *Round Nut for Latch*
48 *Cotter*
49 *Cotter*

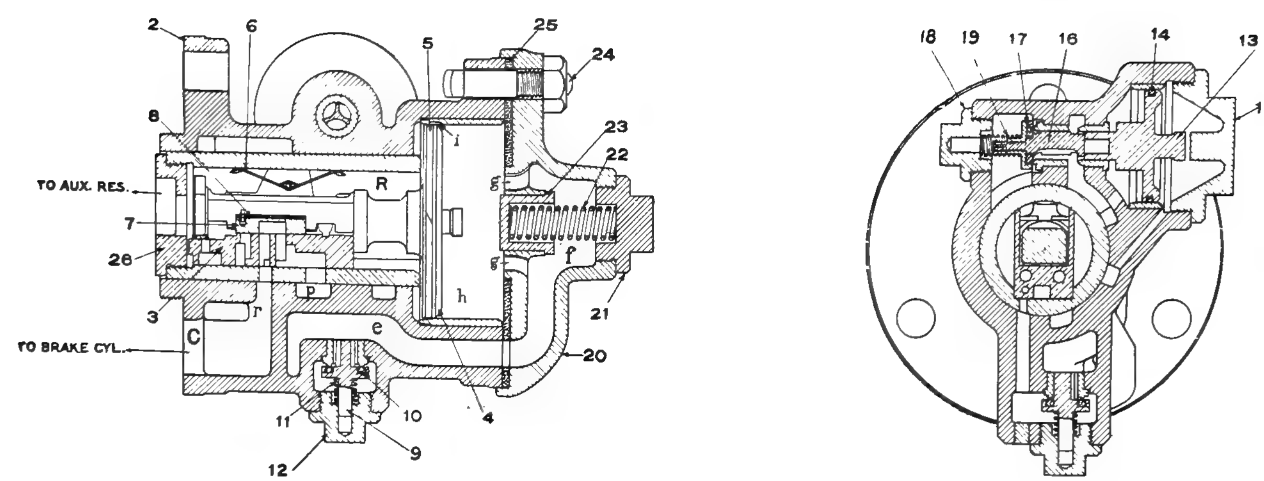


Fig. 1421—Type M-2-A Triple Valve.

Parts of Type M-2-A Triple Valve, Fig. 1421.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Graduating Valve Spring*
9 *Check Valve*
10 *Rubber Seat for Check Valve*
11 *Check Valve Spring*
12 *Check Valve Cap*
13 *By-Pass Piston*
14 *By-Pass Piston Ring*
15 *By-Pass Piston Cap*
16 *By-Pass Valve*
17 *Rubber Seat for By-Pass Valve*
18 *By-Pass Valve Cap*
19 *By-Pass Valve Spring*
20 *Cylinder Cap*
21 *Graduating Spring Nut*
22 *Graduating Spring*
23 *Graduating Sleeve*
24 *Bolt and Nut*
25 *Cylinder Cap Gasket*
26 *End Cap*

Parts of Compressor Governor, Type J, Fig. 1423.

2 *Frame*
3 *Guide Pin*
4 *Finger Board Insulation*
5 *Finger*
6 *Adjusting Screw Jam Nut*
7 *Finger Adjusting Screw*
8 *Finger Base*
9 *Screw for Securing Finger to Finger Base*
10 *Finger Clamp*
11 *Finger Board Screw*
12 *Switch Cover*
13 *Eye Bolt Thumb Nut*
14 *Cover Eye Bolt*
15 *Eye Bolt Rivet*
16 *Switch Piston and Rod*
17 *Piston Spring*
18 *Piston Spring Seat*
19 *Piston Seat*
20 *Switch Piston Ring*
21 *Piston Washer*
23 *Piston Washer Screw*
24 *Large Ring for Double Piston*
25 *Double Piston with Rings*
26 *Regulating Valve Cap*
27 *Regulating Valve Spring*
28 *Regulating Valve for Cutting Out*
36 *Piston Rod Cotter*
37 *Piston Rod Nut*
38 *Piston Rod Brass Washer*
39 *and* 40 *Piston Rod Fibre Washer*
41 *Square Fibre Bush*
42 *Contact Screw*
43 *Switch Spider*
44 *Switch Spider Contact*
45 *Piston Rod Fibre Washer*
46 *Piston Rod Brass Washer*
47 *Lead Screw*
48 *Finger Board*
50 *Porcelain Bush for Leads*
52 *Frame Gasket*
53 *Valve Case*
54 *Cylinder Head and Diaphragm Cover*
55 *Cylinder Gasket*
56 *Small Ring for Double Piston*
57 *Piston Bush*
58 *Diaphragm Cap Nut*
59 *Diaphragm Ring*
60 *Diaphragm*
61 *Diaphragm Spindle*
62 *Regulating Spring*
63 *Regulating Nut*
64 *Regulating Check Nut*
65 *Regulating Valve for Cutting In*
66 *Regulating Valve Spring*
67 *Diaphragm Spindle*
68 *Regulating Nut*
69 *Regulating Check Nut*
70 *Regulating Spring*
71 *Diaphragm*
72 *Diaphragm Ring*
73 *Diaphragm Cap Nut*
74 *Cylinder Gasket*
75 *Cylinder Head and Diaphragm Cover*
76 *Slide Valve*
77 *Slide Valve Spring*
78 *Pipe Plug*
80 *Short Cap Screw for Cylinder Head*
81 *Long Cap Screw for Cylinder Head*
107 *Tee-Head Bolt with Nut for Securing Switch to Controlling Mechanism*

Westinghouse Air Brake Company.

Parts of Type E-6 Safety Valve, Fig. 1422.

2 *Body*
3 *Cap Nut*
4 *Valve*
5 *Valve Stem*
6 *Spring (50 lbs. to 90 lbs.)*
7 *Regulating Nut*

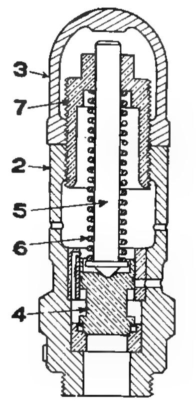


Fig. 1422—Type E-6 Safety Valve.

Parts of Application and Release Magnets, Fig. 1424.

501 *Pipe Bracket*
502 *Magnet Bracket Body*
503 *Cap Nut and Valve Stop*
504 *Cylinder Supply Valve*
505 *Seat for Cylinder Supply Valve*
506 *Cap Nut with Choke*
507 *Magnet Bracket Gasket*
508 *Spring (15 lbs. Differential)*
509 *Pipe Bracket Gasket*
510 *Tee-Head Bolt and Nut*

Parts Common to Application and Release Magnets.

511 *Magnet Cap*
512 *Top Cover*
513 *Leather Gasket*
514 *Cotter*
515 *Plunger*
516 *Special Washer*
517 *Terminal Insulator*
518 *Terminal*
519 *Brass Washer*
520 *Nut*
521 and 522 *Rubber Gasket*
523 *Lead Washer*
524 *Magnet Valve Spring*
525 *Magnet Valve Cap*

Application Magnet.

526 *Magnet Core*
527 *Back Strap*
528 *Magnet Coil*
529 *Armature Stem*
530 *Magnet Valve*
531 *Cover*

Release Magnet.

540 *Magnet Core*
541 *Back Strap*
542 *Magnet Coil*
543 *Armature Stem*
544 *Magnet Valve*
545 *Spring Guide*

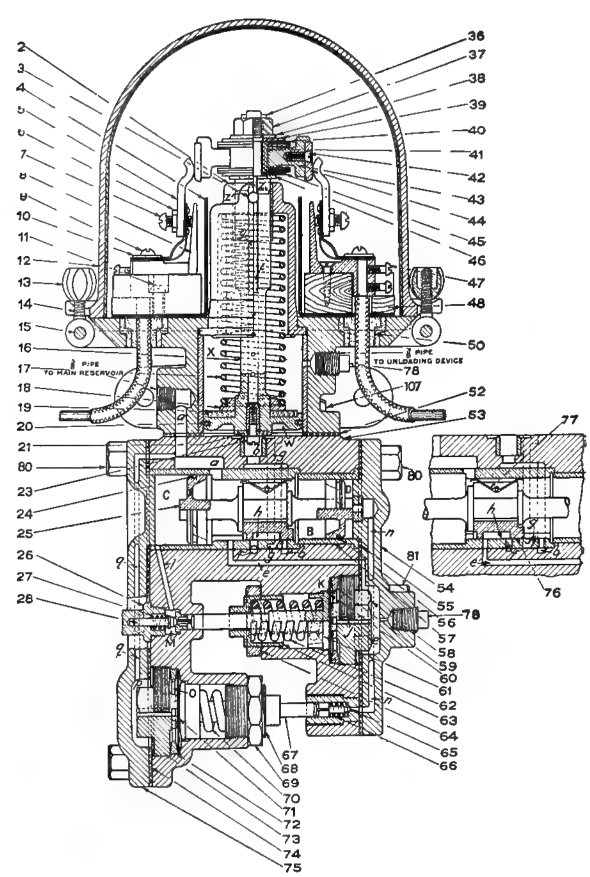


Fig. 1423—Type J Electric Compressor Governor.

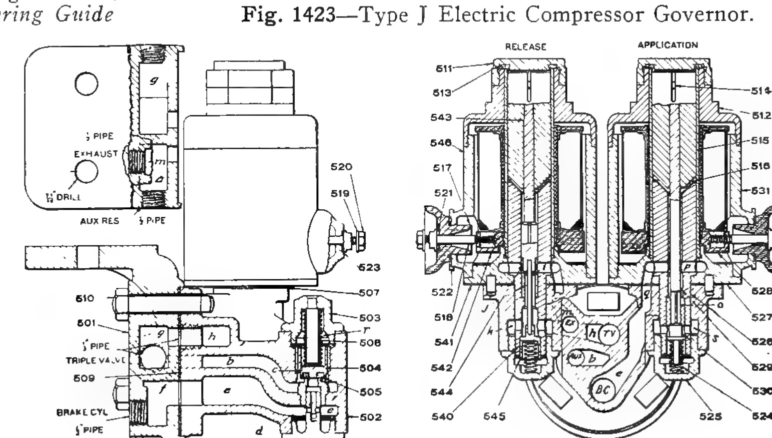


Fig. 1424—Application and Release Magnets for Interborough Rapid Transit Company.

Parts of Type R Brake Cylinder, Fig. 1425.

2 *Cylinder Body*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Pressure Head*
6 *Follower*
7 *Packing Leather*
8 *Packing Expander*
9 *Release Spring*
10 *Follower-Stud and Nut*
11 *Pressure-Head Bolt and Nut*
12 *Non-Pressure-Head Bolt and Nut*
13 *Cylinder Gasket*
14 *Push Rod with Pin and Cotter*
15 *Push Rod Pin with Cotter*
16 *Detachable Lever Bracket*
17 *Lever Bracket Bolt and Nuts*
18 *¼ in. Pipe Plug*
19 *Exhaust Pipe Plug*
20 *½ in. Pipe Plug*
21 *¾ in. Pipe Plug*
22 *1 in. Pipe Plug*
23 *Triple Valve Gasket*
24 *Triple Valve Stud and Nut*
25 *Triple Valve Bolt and Nut*

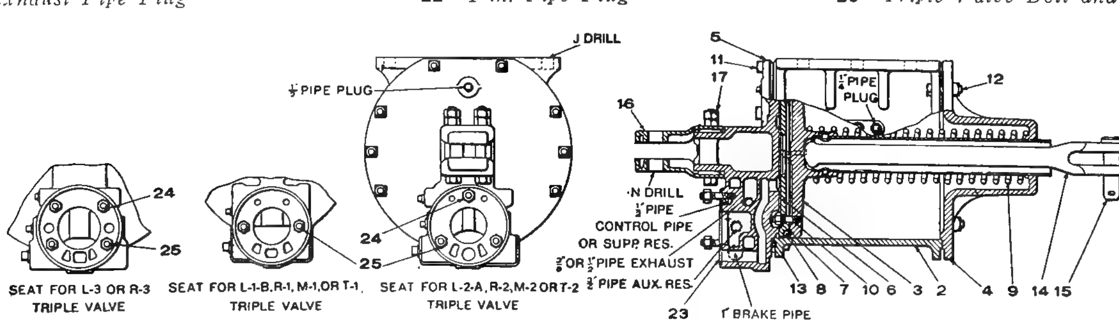


Fig. 1425—Traction Brake Cylinder, Type R.

Westinghouse Air Brake Company.

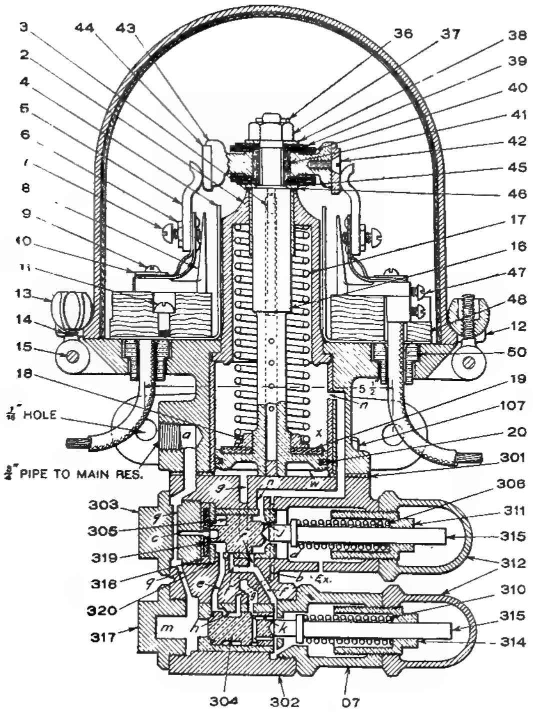


Fig. 1426—Electric Compressor Governor

Parts of Signal Valve, Fig. 1427.

2 *Diaphragm Case*
3 *Diaphragm Cap*
4 *Union Swivel*
5 *Union Nut*
6 *Union Gasket*
7 *Eye Bolt and Nut*
8 *Diaphragm Valve Nut*
9 *Eye Bolt Rivet*
10 *Lower Diaphragm Plate and Valve Stem*
11 *Upper Diaphragm Plate*
12 *Diaphragm*
13 *Union Nut*
14 *Union Gasket*
15 *Union Swivel*
16 *Lower Cap Nut*
17 *Pin for Diaphragm Valve Nut*

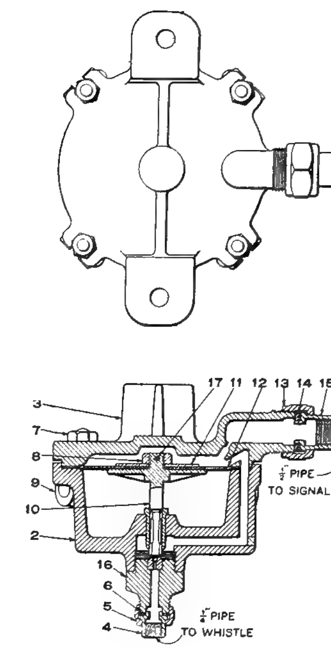


Fig. 1427—Signal Valve.

Parts of Signal Reducing Valve, Fig. 1429.

2 *Body, Bushed*
3 *Spring Box*
4 *Supply Valve*
5 *Supply Valve Cap Nut*
6 *Supply Valve Spring*
7 *Piston (includes 8)*
8 *Piston Ring*
9 *Piston Nut*
10 *Piston Rod*
11 *Large Diaphragm*
11 *Small Diaphragm*
12 *Diaphragm Ring*
13 *Regulating Spring*
14 *Regulating Nut*
15 *Check Nut*
16 *Cock Cap Nut*
17 *Cock Spring*
18 *3/8-in. Union Nut*
19 *3/8-in. Union Swivel*
20 *3/8-in. Union Gasket*
21 *Cock Key*
22 *Choke Plug*
23 *Cotter*

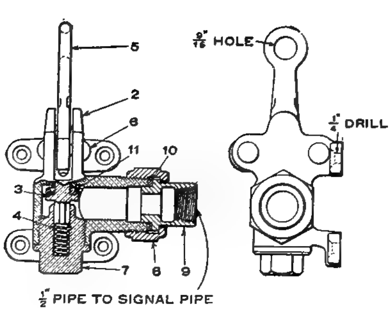


Fig. 1428—Car Discharge Valve.

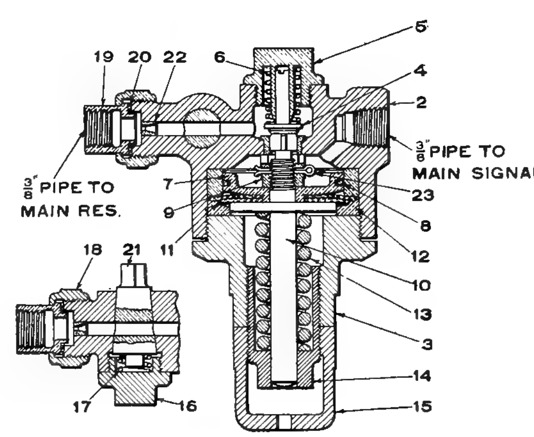
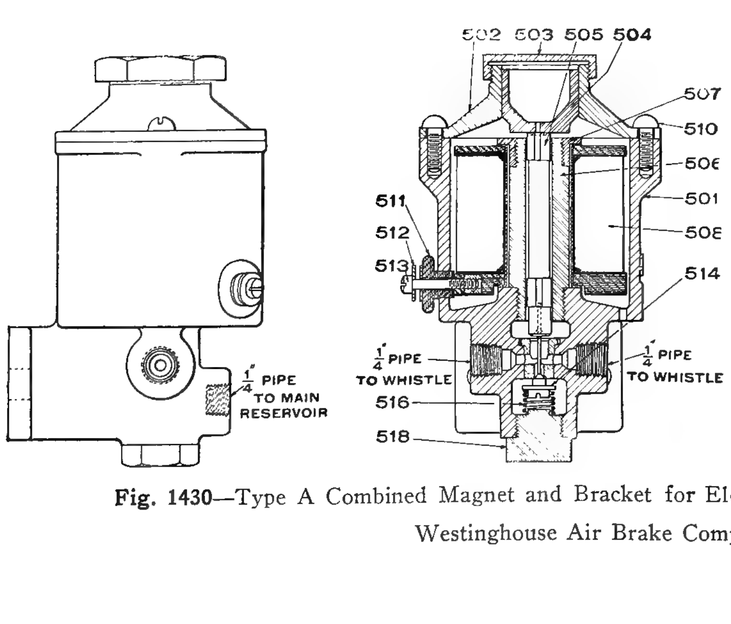


Fig. 1429—Signal Reducing Valve.



Parts of Magnet and Bracket, Fig. 1430.

501 *Body*
502 *Cover*
503 *Cap*
504 *Armature*
505 *Armature Stem*
506 *Magnet Core*
507 *Magnet Core Pole*
508 *Magnet Coil*
510 *Cap Screw*
511 *Insulator*
512 *Brass Washer*
513 *Contact Screw*
514 *Valve*
516 *Spring*
518 *Cap Nut*

Fig. 1430—Type A Combined Magnet and Bracket for Electro-Pneumatic Signal System.

Westinghouse Air Brake Company.

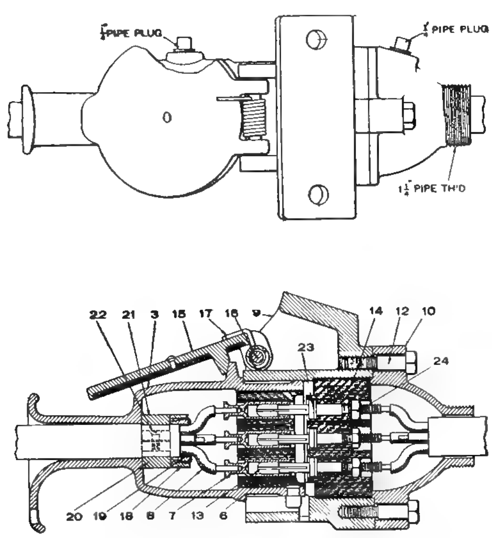


Fig. 1431—Five-Point Plug Connector.

Parts of Plug Connector, Fig. 1431.

3 *Plug Body*
6 *Jumper Contact*
7 *Jumper Contact*
8 *Jumper Cable*
9 *Receptacle Body*
10 *Receptacle Cover*
12 *Cap Screw*
13 *Receptacle Contact*
14 *Receptacle Socket*
15 *Receptacle Door*
16 *Hinge Pin*
17 *Door Spring*
18 *Conical Clamp (Outside Ring)*
19 *Conical Clamp (Inside Ring)*
20 *Cable Clamp (Lower Half)*
21 *Cable Clamp (Upper Half)*
22 *Machine Screw*
23 *Contact Washer*
24 *Contact Nut*

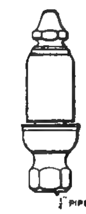


Fig. 1432—Signal Whistle.

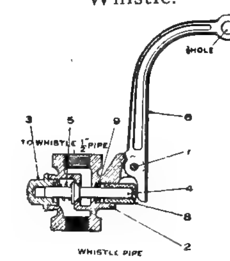


Fig. 1433—Whistle Valve.

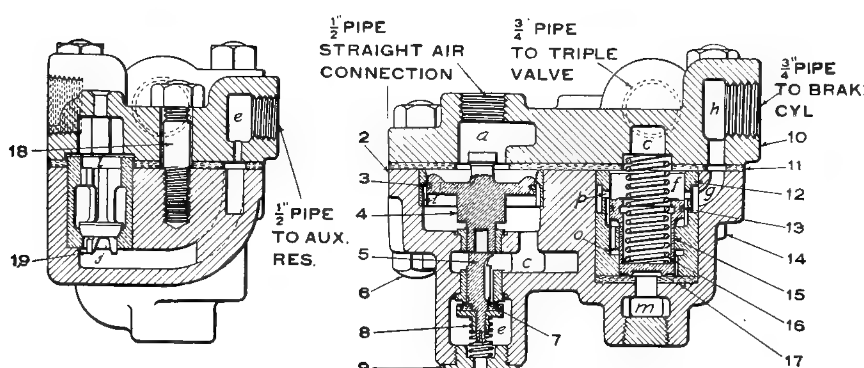


Fig. 1434—No. 14 Double Check Valve.

Parts of Double Check Valve, Fig. 1434.

2 *Body*
3 *Supply Valve Piston Ring*
4 *Supply Valve Piston*
5 *Auxiliary Reservoir Check Valve*
6 *Tee Head Bolt*
8 *Auxiliary Reservoir Check Valve Spring*
9 *Auxiliary Reservoir Check Valve Cap Nut*
10 *Pipe Bracket*
11 *Pipe Bracket Gasket*
12 *Double Piston Bush*
13 *Double Piston Ring*
14 *Tee Head Bolt*
15 *Double Piston*
16 *Double Piston Spring*
17 *Double Piston Seat*
18 *Stud*
19 *Exhaust Check Valve*

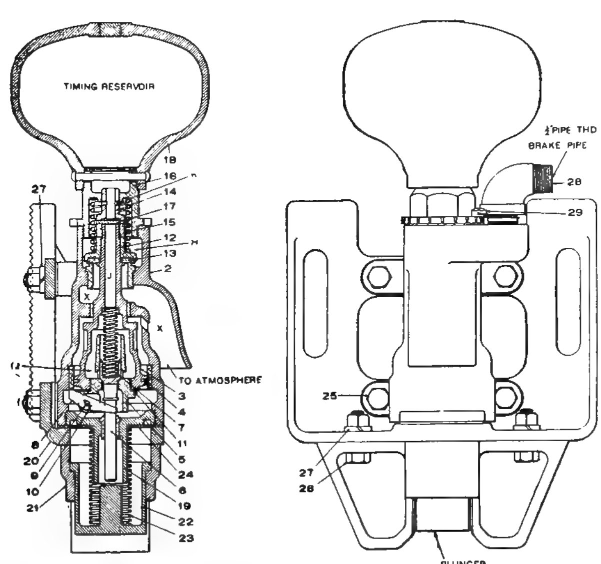


Fig. 1435—Automatic Train Stop with Timing Feature.

Parts of Automatic Train Stop, Fig. 1435.

2 *Body*
3 *Piston*
4 *Piston Ring*
5 *Pilot Valve Seat*
6 *Pilot Valve*
7 *Pilot Valve Spring*
8 *Locking Lever*
9 *Locking Lever Pin*
10 *Locking Lever Cotter*
11 *Lock Washer*
12 *Valve*
13 *Valve Seat*
14 *Lock Nut with Timing Valve*
15 *Piston Valve Spring*
16 *Top Cap*
17 *Lock Nut Pin*
18 *Reservoir*
19 *Cap and Pilot Valve Guide*
20 *Adjusting Bracket*
21 *Plow*
22 *Plunger*
23 *Plunger Spring*
24 *Adjusting Bracket Gasket*
25 *Bolt and Nut*
26 *Bolt and Nut*
27 *Lock Washer*
28 *Street Elbow*
29 *Fillister Head Cap Screw*

Westinghouse Air Brake Company.

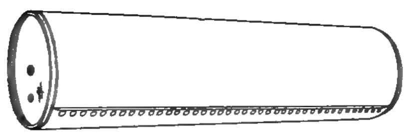
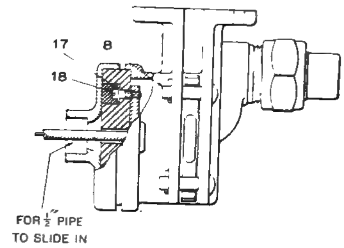


Fig. 1436—Main Reservoir.



Parts of Car Discharge Valve, Fig. 1437.

2 *Valve Body*
3 *Valve Stem*
4 *Valve Seat*
5 *Valve Spring*
6 *Cap Nut*
7 *Handle*
8 *Rivet*
10 *Union*
11 *Union Nut*
12 *Union Swivel*
13 *Contact Base*
14 *Lower Contact*
15 *Upper Contact*
16 *Terminal*
17 *Brass Washer*
18 *Machine Screw*
19 *Machine Screw*
20 *Contact Pin*
21 *Cover for Contact Base*
22 *Machine Screws*
23 *Lead*

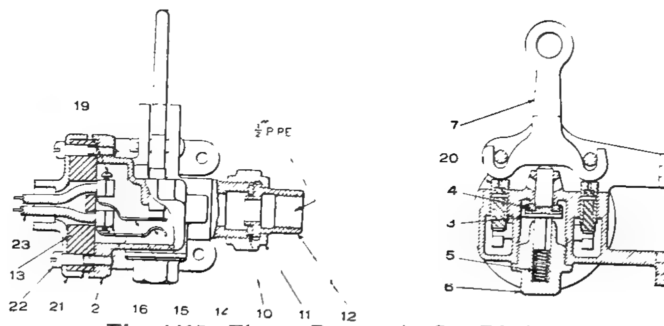


Fig. 1437—Electro-Pneumatic Car Discharge Valve.

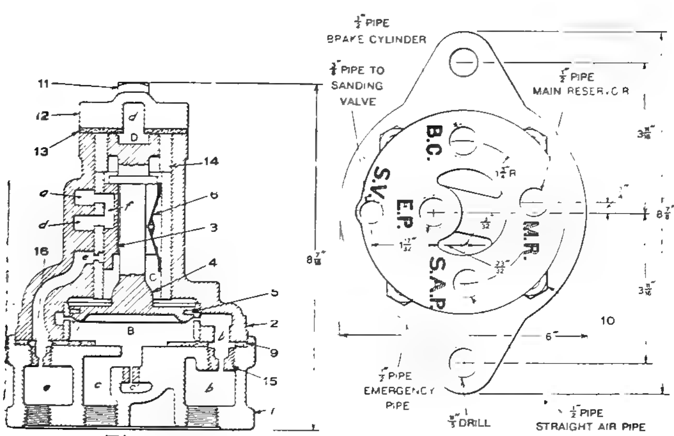


Fig. 1438—Type H-2 Emergency Valve.

Parts of Emergency Valve, Fig. 1438.

2 *Body (Bushed)*
3 *Slide Valve*
4 *Double Piston*
5 *Piston Ring*
6 *Slide Valve Spring*
7 *Floor Bracket*
9 *Floor Bracket Gasket.*
10 *Bolt and Nut*
11 *Cap Screw*
12 *Small Piston Cap*
13 *Small Piston Cap Gasket*
14 *Small Piston Bush*
15 *Choke Plug*
16 *Choke Plug*

Parts of Cut-Out Cock, Fig. 1439.

2 *Body*
3 *Key*
4 *Cap*
5 *Spring*
6 *Handle*

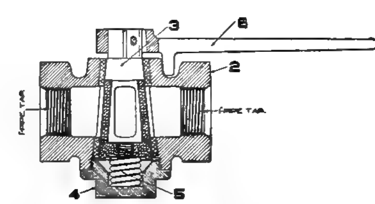


Fig. 1439—One-Inch Cut-Out Cock.

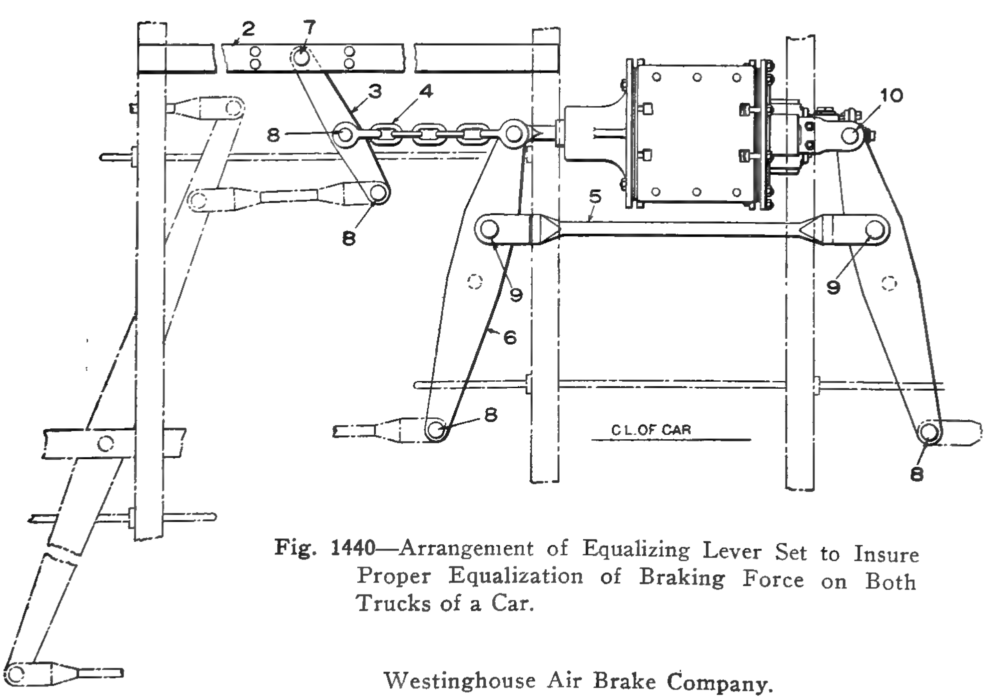


Fig. 1440—Arrangement of Equalizing Lever Set to Insure Proper Equalization of Braking Force on Both Trucks of a Car.

Parts of Hose and Coupling, Fig. 1443.

2 *1¼ in. by 22 in. Hose*
3 *Union Hose Nipple*
4 *Union Nut*
5 *Union Swivel*
6 *Union Gasket*
7 *Hose Clamp*
8 *Hose Clamp Bolt and Nut*
9 *Tapped Hose Nipple*

Parts of Equalizing Lever Set, Fig. 1440.

2 *Multiplying Lever Fulcrum Bracket*
3 *Multiplying Lever*
4 *Connecting Chain*
5 *Cylinder Lever Rod*
6 *Cylinder Lever*
7 *Pin for Fulcrum Bracket*
8, 9 *and* 10 *Pins*

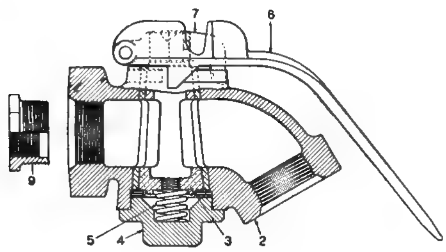


Fig. 1441—Self Locking Angle Cock.

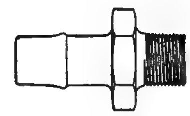


Fig. 1442—Threaded Hose Nipple.

Parts of Angle Cock, Fig. 1441.

2 *Body*
3 *Key*
4 *Cap*
5 *Spring*
6 *Handle*
7 *Handle Socket*
9 1¼ *in. by* 1 *in. Bushing*

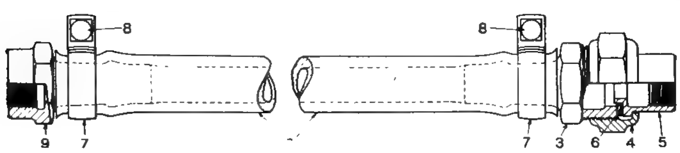
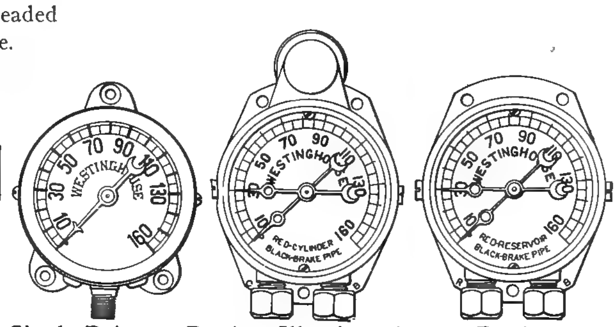


Fig. 1443—Hose and Coupling.



Single Pointer. Duplex, Illuminated. Duplex.

Fig. 1444—Air Gages.

Westinghouse Air Brake Company.

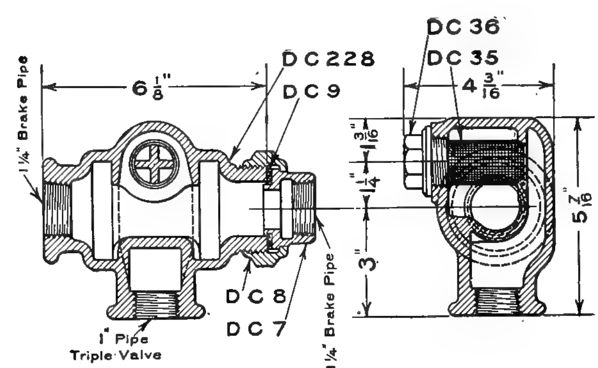


Fig. 1445—Brake Pipe Strainer.

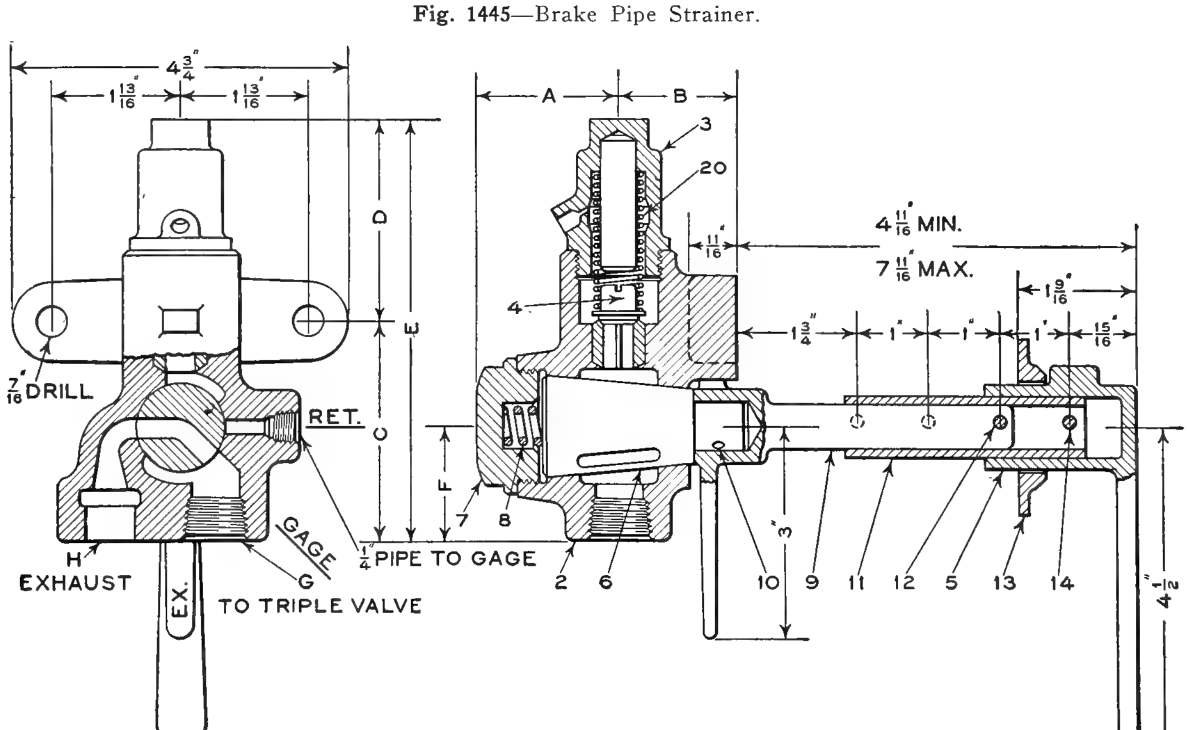
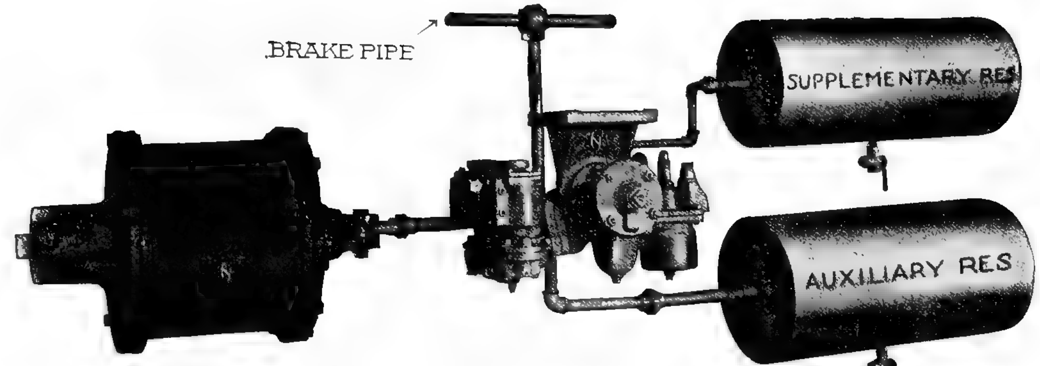


Fig. 1446—Pressure Retaining Valve for Passenger Cars, Spring Type.

New York Air Brake Company.



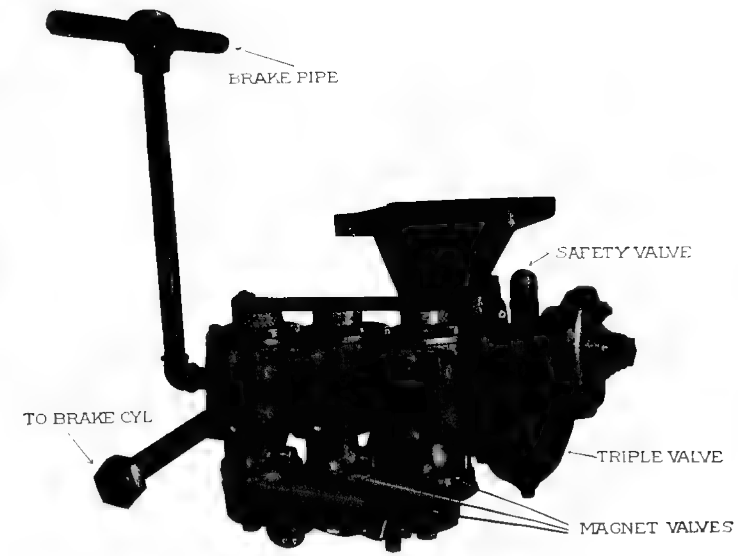


Fig. 1447—PS Electro-Pneumatic Brake Equipment.

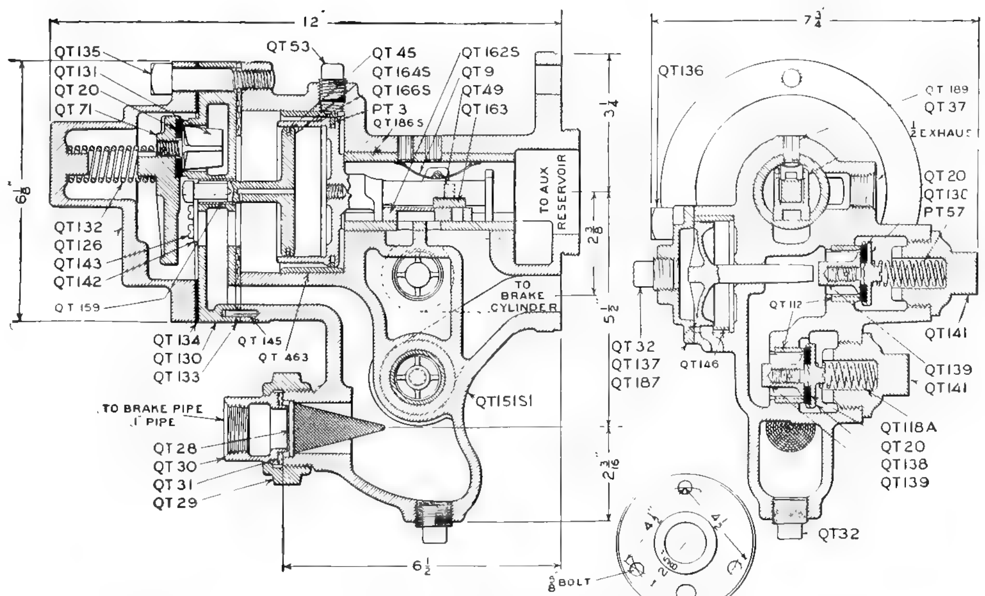


Fig. 1448—Quick Action Triple Valve, Style S1B, for 12 in., 14 in. and 16 in. Passenger Brake Cylinders.

Parts of Triple Valve, Fig. 1448.

QT 3	*Main Piston Spring*	QT 133	*Main Cylinder Gasket*
QT 9	*Exhaust Valve Spring*	QT 134	*Front Cap Gasket*
QT 20	*Rubber Valve Seat*	QT 135	*Front Cap Bolt*
QT 28	*Strainer*	QT 136	*Side Cap Bolt*
QT 29	*Union Nut*	QT 137	*Quick Action Valve Piston*
QT 30	*Union Swivel*	QT 138	*Check Valve*
QT 31	*Union Gasket*	QT 139	*Check Valve Guide*
QT 32	*Pipe Plug*	QT 141	*Check Valve Cap*
QT 37	*Exhaust Valve Pin*	QT 142	*Piston Stop*
QT 45	*Vent Valve Piston Ring*	QT 143	*Piston Stop Screw*
QT 49	*Graduating Valve Spring*	QT 151SI	*Triple Valve Body*
QT 53	*Pipe Plug*	QT 161S	*Exhaust Valve*
QT 69	*Triple Valve Gasket*	QT 163	*Graduating Valve*
QT 71	*Vent Valve*	QT 164S	*Vent Valve Piston*
QT 118A	*Check Valve Spring*	QT 166S	*Main Piston*
QT 126	*Front Cap*	QT 187	*Side Cap*
QT 130	*Vent Valve Seat*	PT 57	*Quick Action Valve Spring*
QT 131	*Vent Valve Guide*	QT 63S	*Bushing*
QT 132	*Vent Valve Spring*	QT 186S	*Bushing*

New York Air Brake Company.

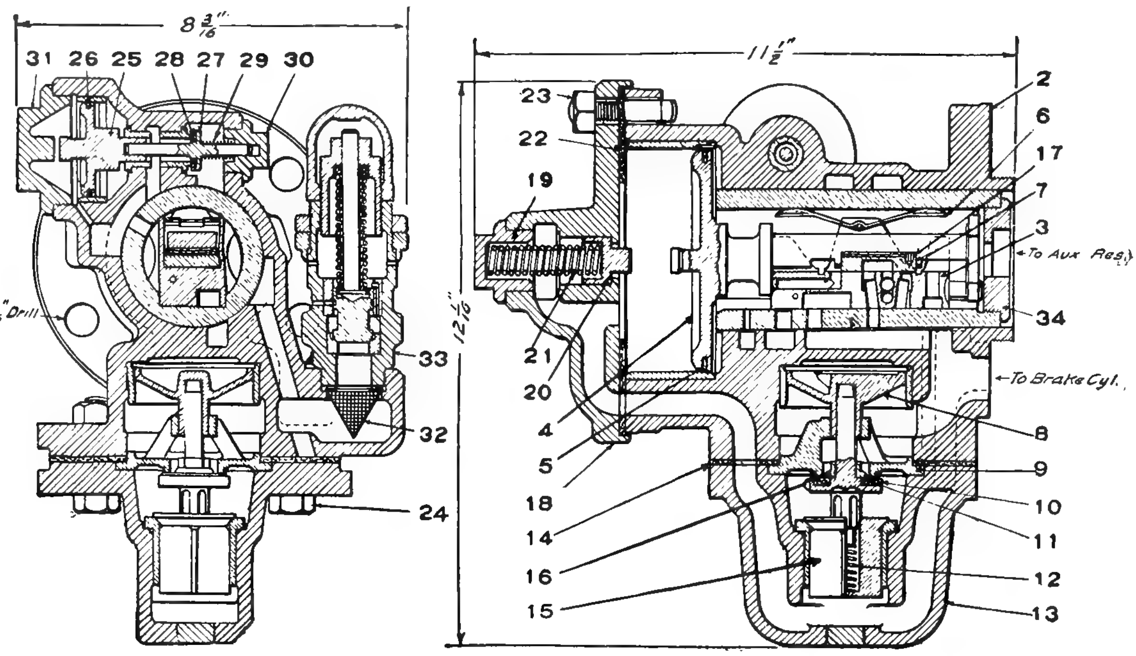


Fig. 1449—Quick Action Pipeless Triple Valve, L-3. Used with 16 and 18 in. Passenger Brake Cylinders.

Parts of Triple Valve, Fig. 1449.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat for Emergency Valve*
12 *Check Valve Spring*
13 *Check Valve Case*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Emergency Valve Nut*
17 *Graduating Valve Spring*
18 *Cylinder Cap*
19 *Graduating Spring Nut*
20 *Graduating Sleeve*
21 *Graduating Spring*
22 *Cylinder Cap Gasket*
23 *Bolt and Nut*
24 *Bolt and Nut*
25 *By-Pass Piston*
26 *By-Pass Piston Ring*
27 *By-Pass Valve*
29 *By-Pass Valve Spring*
30 *By-Pass Valve Cap*
31 *By-Pass Piston Cap*
32 *Strainer*
33 *E-7 Safety Valve*
34 *End Cap*

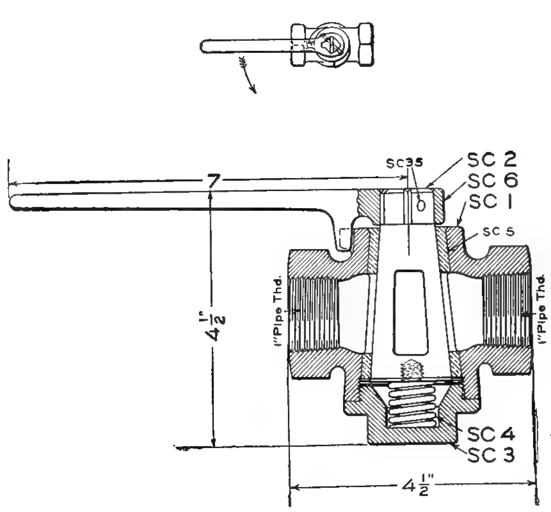


Fig. 1450—One Inch Cut Out Cock.

Parts of One Inch Cut Out Cock, Fig. 1450.

SC 1 *Body*
SC 2 *Plug*
SC 3 *Cap*
SC 4 *Spring*
SC 6 *Handle*
SC 35 *Handle Pin*

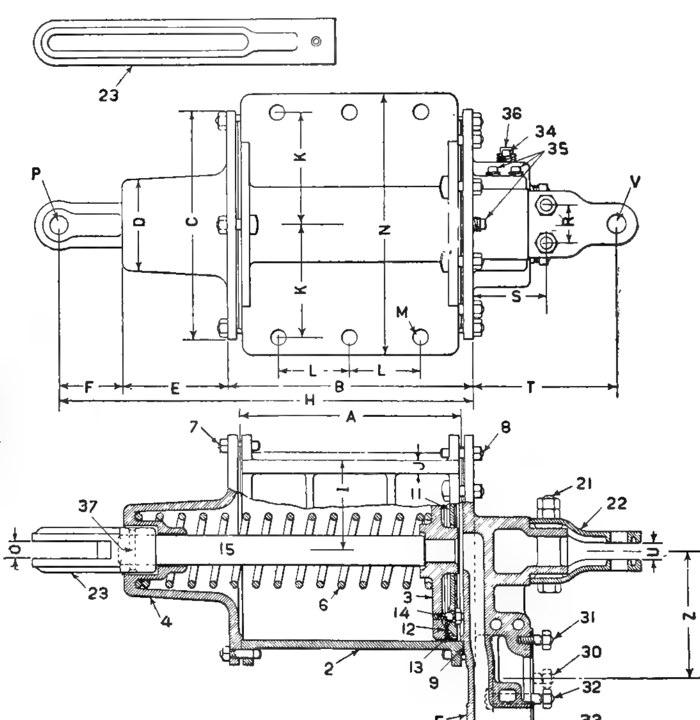


Fig. 1451—Passenger Train Car Cylinder, Style M, for Pipeless Triple Valve.

New York Air Brake Company.

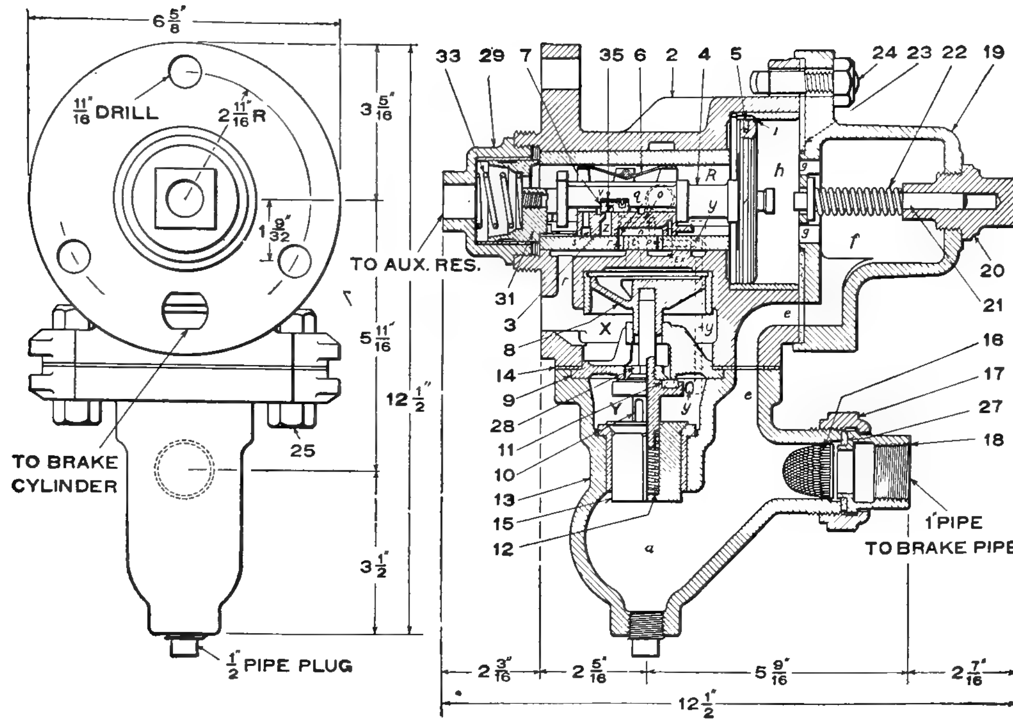


Fig. 1452—Quick Action Triple Valve, Style K-2, with Quick Service, Uniform Release and Uniform Recharge, for 10 in. Freight Brake Cylinders.

Parts of Triple Valve, Fig. 1452.

2	*Body*	8	*Emergency Piston*	20	*Graduating Stem Nut*
3	*Slide Valve*	9	*Emergency Valve Seat*	21	*Graduating Stem*
4	*Main Piston*	10	*Emergency Valve*	22	*Graduating Spring*
5	*Main Piston Ring*	11	*Rubber Seat*	23	*Cylinder Cap Gasket*
6	*Slide Valve Spring*	12	*Check Valve Spring*	24	*Bolt and Nut*
7	*Graduating Valve*	13	*Check Valve Case*	25	*Bolt and Nut*
		14	*Check Valve Case Gasket*	27	*Union Gasket*
		15	*Check Valve*	28	*Emergency Valve Nut*
		16	*Strainer*	29	*Retarding Device Body*
		17	*Union Nut*	31	*Retarding Stem*
		18	*Union Swivel*	33	*Retarding Spring*
		19	*Cylinder Cap*	35	*Graduating Valve Spring*

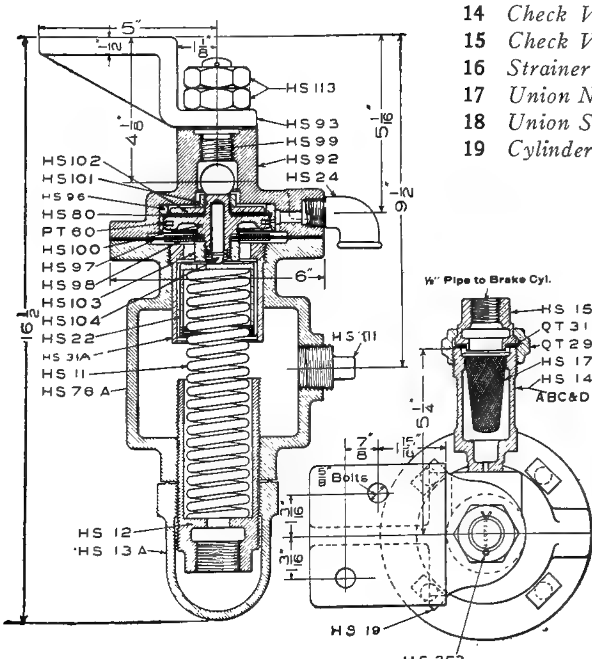


Fig. 1453—Compensating Valve, Style B1.

Parts of Compensating Valve, Fig. 1453.

HS 11	*Regulating Spring*	HS 99	*Bracket Stud*
HS 12	*Regulating Nut*	HS 100	*Piston*
HS 13A	*Check Nut*	HS 101	*Top Piston Nut*
HS 14A	*Union Stud*	HS 102	*Piston Disc*
HS 15	*Union Swivel*	HS 103	*Bottom Piston Nut*
HS 17	*Union Strainer*	HS 104	*Rider Pin*
HS 19	*Tee Head Bolt*	HS 111	*Plug*
HS 22	*Spring Abutment*	HS 113	*Holding Nut*
HS 24	*Street Elbow*	HS 252	*Cotter*
HS 76A	*Spring Box*	PT 60	*Packing Ring*
HS 80	*Leather Washer*	QT 29	*Union Nut*
HS 92	*Body*	QT 31	*Union Gasket*
HS 93	*Bracket*	HS 31A	*Spring Box Bush*
HS 97	*Diaphragm*	HS 96	*Piston Bush*
HS 98	*Diaphragm Washer*		

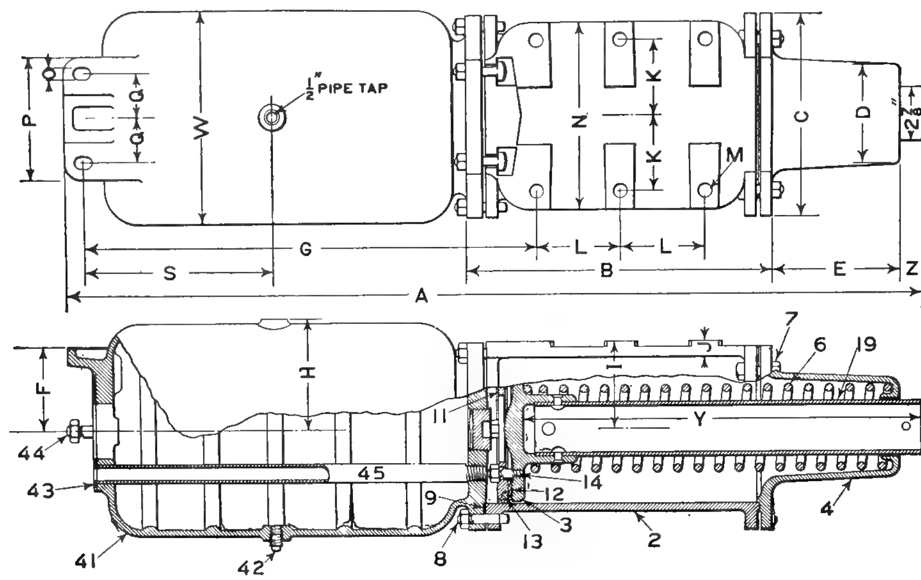


Fig. 1454—Combined Brake Cylinder and Reservoir for Freight Cars.

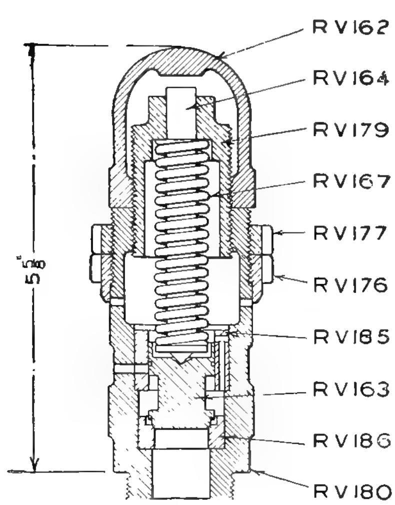


Fig. 1455—Safety Valve.

Parts of Safety Valve, Fig. 1455.

RV 162 *Cap Nut*
RV 163 *Valve*
RV 164 *Valve Stem*
RV 166 *Spring*
RV 176 *Exhaust Regulating Ring*
RV 177 *Lock Ring*
RV 179 *Regulating Nut*
RV 180 *Body*

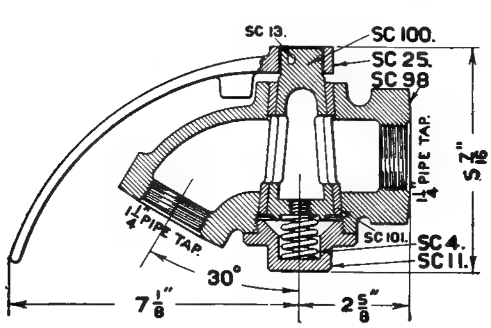


Fig. 1456—Angle Cock with Self-Locking Handle.

Parts of Angle Cock, Fig. 1456.

SC 4 *Spring*
SC 11 *Cap*
SC 35 *Socket Pin*
SC 98 *Body*
SC 100 *Plug*
SC 131 *Handle*
SC 132 *Handle Socket*
SC 290 *Handle Pin*

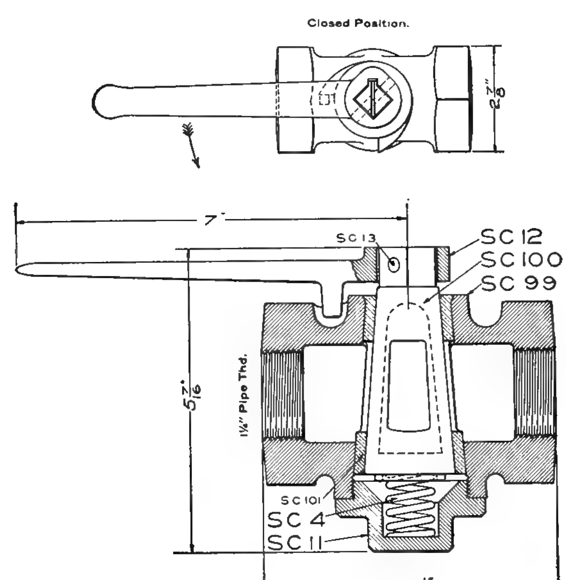


Fig. 1457—1¼-in. Cut Out Cock.

Parts of 1¼-in. Cut Out Cock, Fig. 1457.

SC 4 *Spring*
SC 11 *Cap*
SC 12 *Handle*
SC 13 *Handle Pin*
SC 99 *Body*
SC 100 *Plug*

New York Air Brake Company.

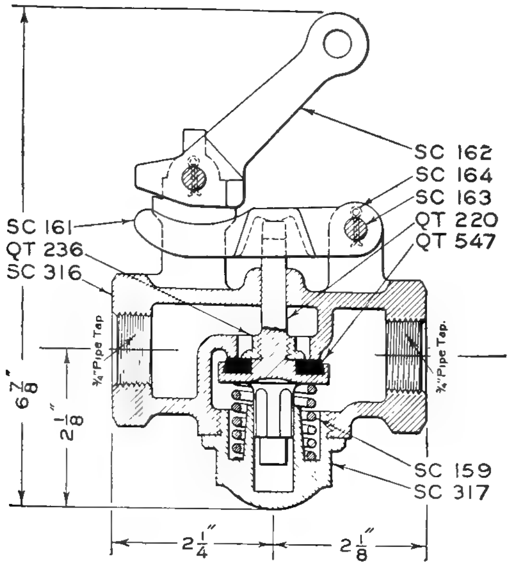


Fig. 1458—Conductor's Valve, Style B-3-A.

Parts of Conductor's Valve, Fig. 1458.

SC 159	*Spring*	**SC 161**	*Valve Lever*
SC 317	*Cap*	**SC 162**	*Lever*
SC 316	*Body*	**QT 236**	*Nut*
QT 220	*Vent Valve*	**QT 547**	*Seat*

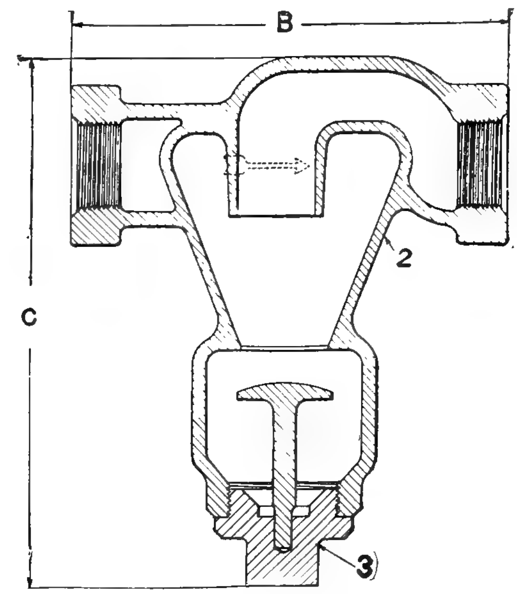


Fig. 1459—Centrifugal Dirt Collector.

Parts of Single Pressure Retaining Valve, Fig. 1461.

2 *Body*
3 *Cap Nut*
4 *Valve*
5 *Handle*
6 *Plug*
7 *Cap*
8 *Plug Spring*
20 *Valve Spring*

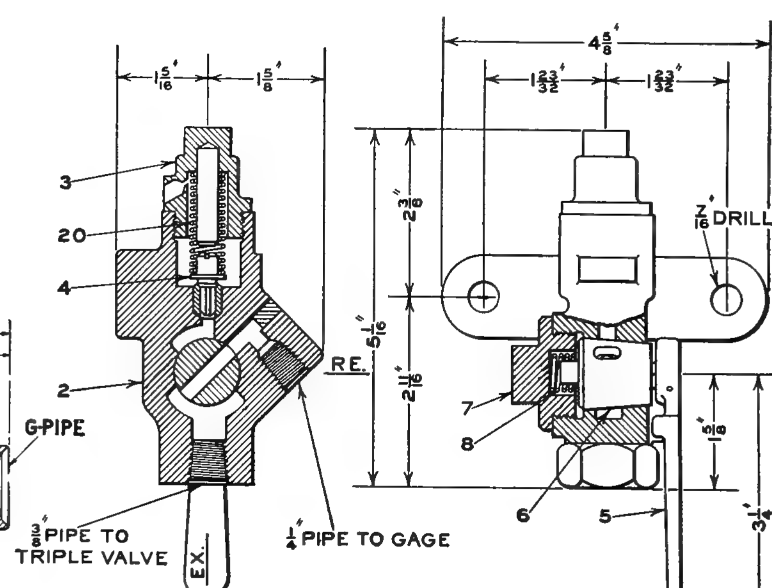


Fig. 1461—Single-Pressure Retaining Valve, Spring Type.

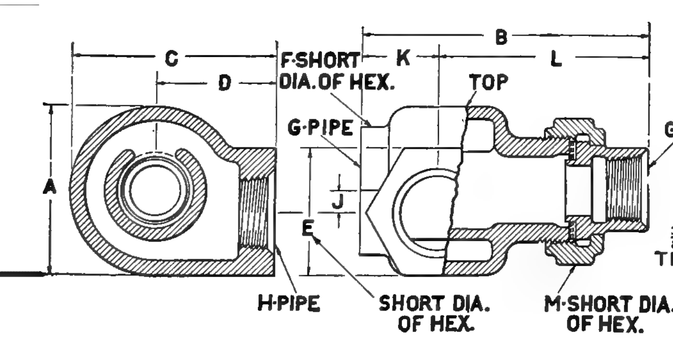


Fig. 1460—Branch Pipe Tee with Side Outlet.

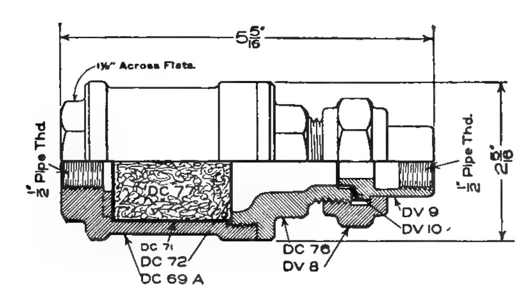


Fig. 1462—Reducing Valve Strainer.

Parts of Strainer, Fig. 1462.

DC 69A	*Body*	**DV 8**	*Union Nut*
DC 72	*Strainer*	**DV 9**	*Union Swivel*
DC 76	*Cap*	**DV 10**	*Union Gasket*
DC 77	*Curled Hair (½ oz.)*		

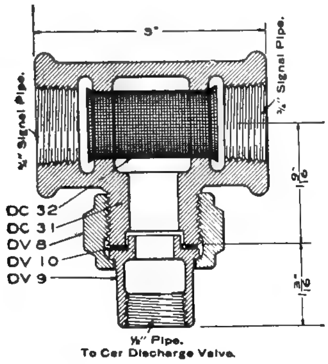


Fig. 1463—Signal Pipe Strainer.

Parts of Strainer, Fig. 1463.

DC	31	*Body*
DC	32	*Strainer*
DV	8	*Union Nut*
DV	9	*Union Swivel*
DV	10	*Union Gasket*

Parts of Strainer, Fig. 1464.

QT	28	*Strainer*
QT	29	*Union Nut*
QT	30	*Union Swivel*
QT	31	*Union Gasket*
QT	472	*Body*

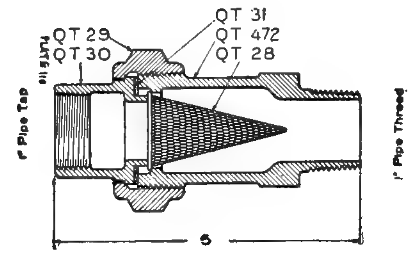


Fig. 1464—Branch Pipe Strainer.

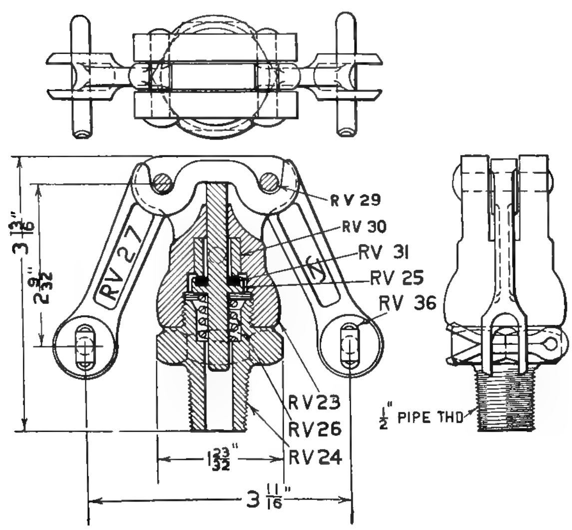


Fig. 1465—Release Valve.

Parts of Release Valve, Fig. 1465.

RV 23	*Cylinder*	RV 27	*Handle*
RV 24	*Stud*	RV 29	*Rivet*
RV 25	*Vent Valve*	RV 31	*Rubber Valve Seat*
RV 26	*Spring*	RV 36	*Handle Cotter*

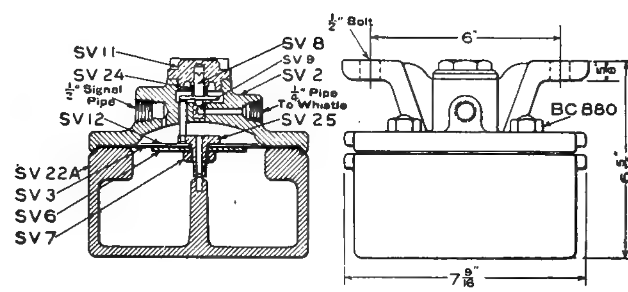


Fig. 1466—Signal Valve, Style BA.

Parts of Signal Valve, Fig. 1466.

SV	2	*Upper Case*
SV	3	*Diaphragm*
SV	6	*Lower Diaphragm Plate*
SV	7	*Nut*
SV	8	*Valve*
SV	11	*Cap*
SV	12	*Upper Diaphragm Washer*
SV	22A	*Lower Case*
SV	24	*Spring*
SV	25	*Diaphragm Stem*
BC	880	*Stud and Nut*

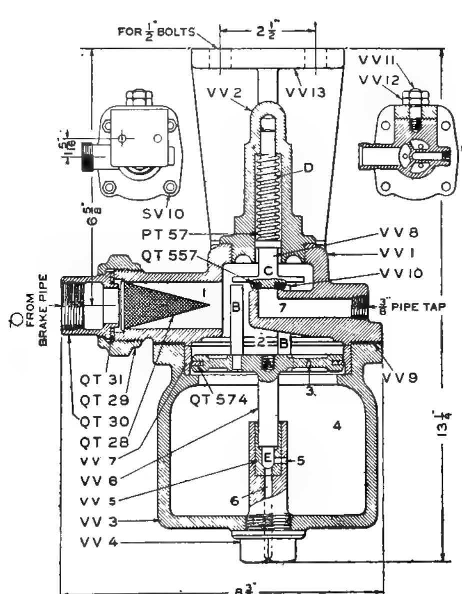


Fig. 1467—Vent Valve, Style A.

Parts of Vent Valve, Fig. 1467.

VV	1	*Upper Case*
VV	2	*Upper Case Cap Nut*
VV	3	*Lower Case*
VV	4	*Post*
VV	6	*Piston*
VV	8	*Valve*
VV	9	*Lower Case Gasket*
VV	10	*Lifting Pins*
VV	12	*Holding Nut*
VV	13	*Bracket*
PT	57	*Valve Spring*
QT	28	*Strainer*
QT	29	*Union Nut*
QT	30	*Union Swivel*
QT	31	*Union Gasket*
QT	574	*Valve Seat*
QT	557	*Piston Ring*
SV	10	*Tee Head Bolt and Nut*

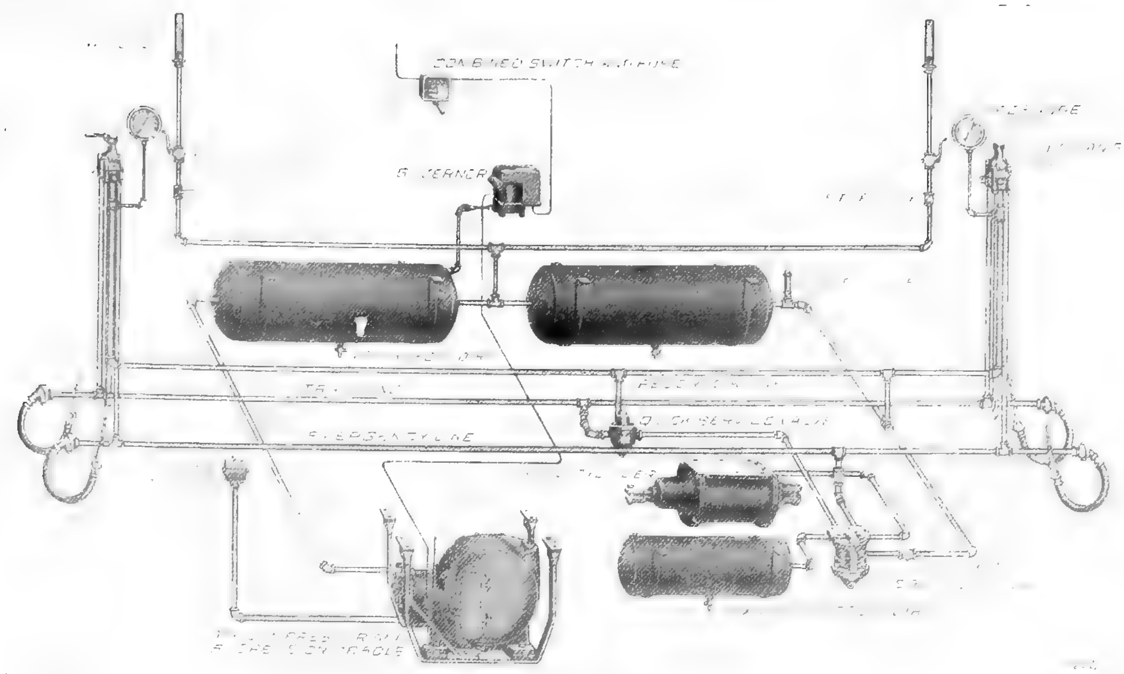


Fig. 1468—Diagram of Piping and Electrical Connect ions for General Electric Emergency-Straight Air Brake Equipment for Electric Cars.

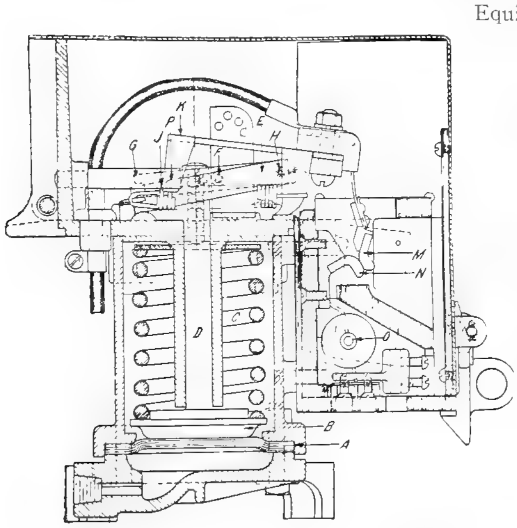


Fig. 1469—Section Through Air Compressor Governor.

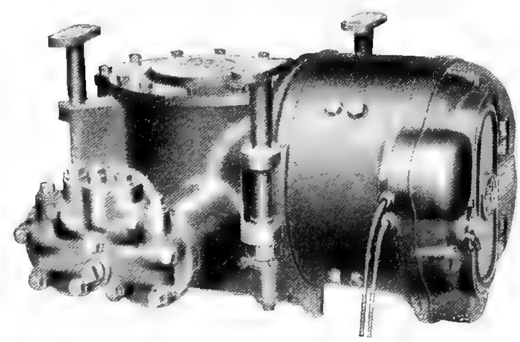


Fig. 1470—Air Compressor With Tee Bolt Suspension

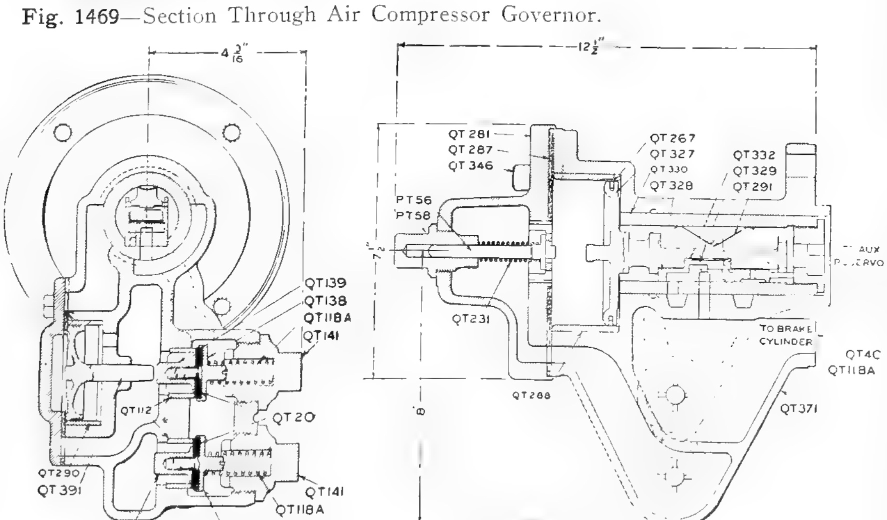


Fig. 1471—Triple Valve for Variable Release Equipment.

General Electric Company.

Parts of Triple Valve, Fig. 1471.

QT 290	*Bush*
QT 391	*Piston Stem*
QT 112	*Check Valve Seat*
QT 139	*Check Valve Guide*
QT 138	*Check Valve*
QT 118A	*Check Valve Spring*
QT 141	*Check Valve Cap*
QT 20	*Rubber Seat*
PT 56	*Graduating Stem*
PT 58	*Graduating Stem Cap Nut*
QT 281	*Front Cap*
QT 287	*Front Cap Gasket*
QT 346	*Front Cap Bolt*
QT 231	*Graduating Stem Spring*
QT 288	*Bush*
QT 267	*Piston Ring*
QT 327	*Main Piston*
QT 330	*Exhaust Valve Bush*
QT 328	*Exhaust Valve*
QT 332	*Graduating Valve Spring*
QT 329	*Graduating Valve*
QT 291	*Exhaust Valve Spring*
QT 371	*Body*

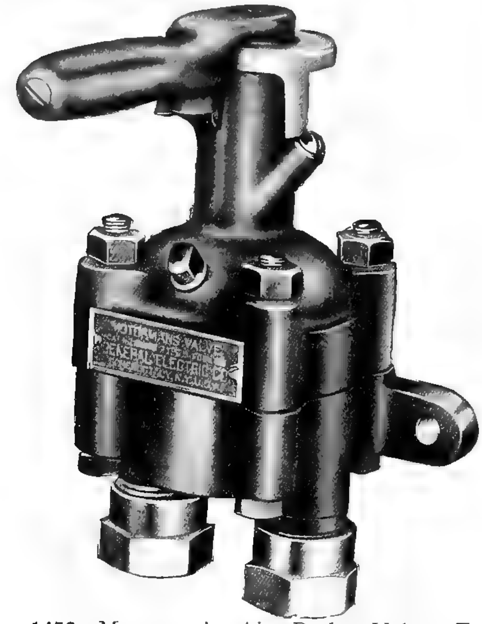


Fig. 1472—Motorman's Air Brake Valve, Type S, Form F4. General Electric Company.

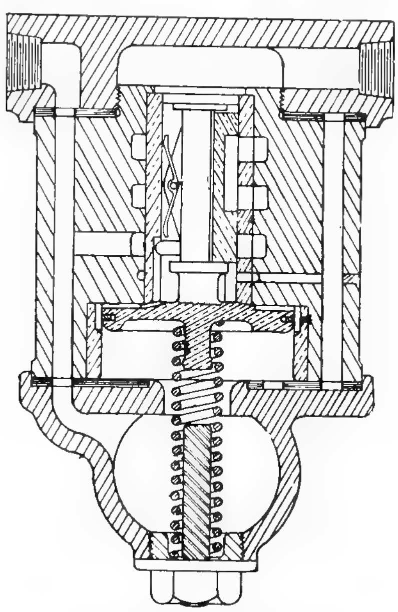


Fig. 1473—Emergency Valve, Type E, Form H-1. General Electric Company.

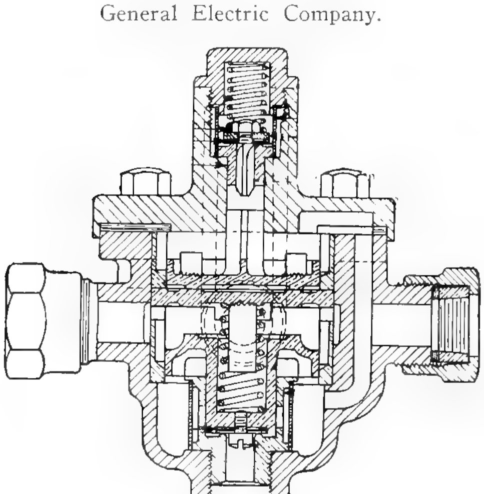


Fig. 1474—Quick Service Valve. General Electric Company.

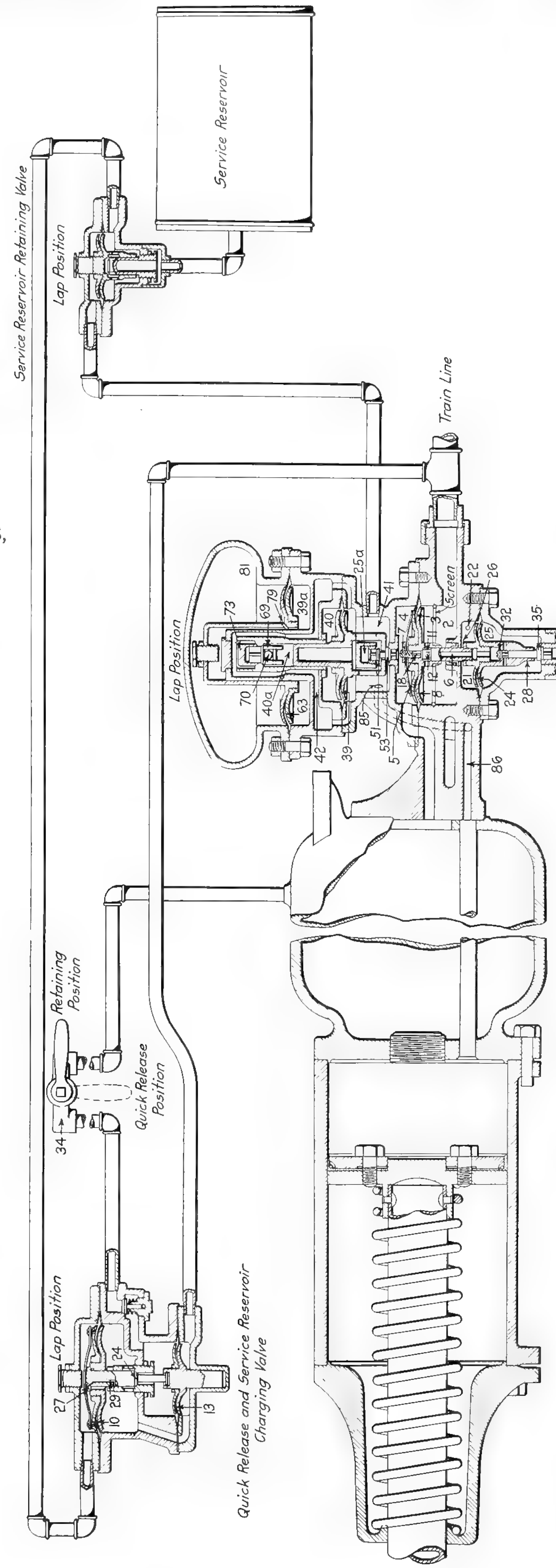


Fig. 1474A—Automatic Straight Air Brake Equipment for Freight Cars. California Valve & Air Brake Co.

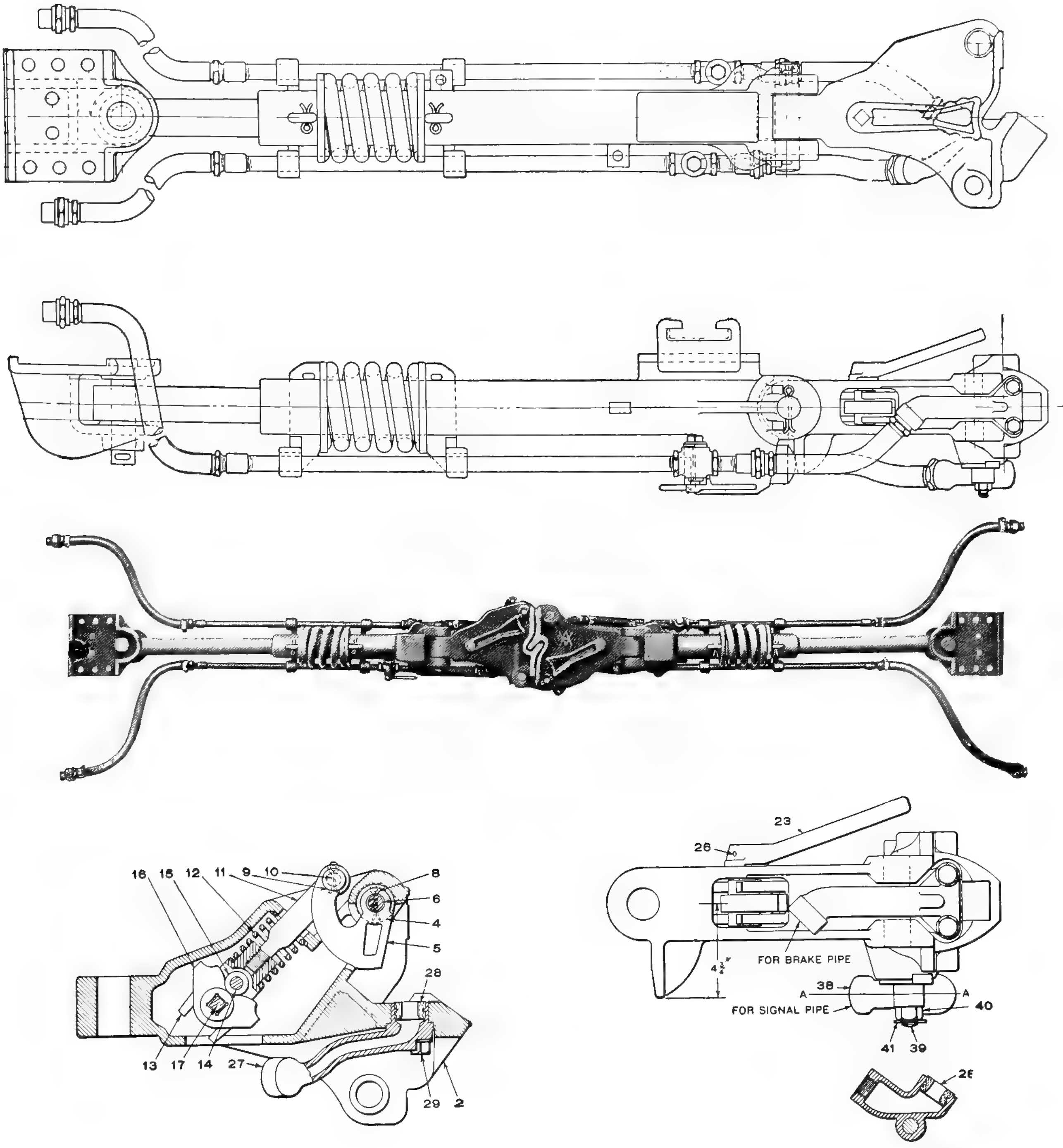


Fig. 1475—Westinghouse Automatic Car and Air Coupler, Type C-3-A, with Draft Gear, Anchor Castings, Etc

Parts of New York Freight Connector, Fig. 1477.

4 HC 7	*1¼ in. Swivel Elbow*	HC 766	*1¼ in. by 5 in. Nipple*
16 HC	*1⅜ in. Coupling*	HC 7125	*Bolt*
25 SC	*1¼ in. Three-Way Reversing Cock*	HC 7127	*Spring Seat*
		HC 7128	*Spring*
		HC 7131	*Fingers*
HC 78	*Gasket*	HC 7132	*Center Pipe*
HC 760	*Head*	HC 7134	*Side Plate*

Parts of New York Passenger Connector, Fig. 1476.

3 HC 7	*Automatic Drip Valve*	HC 7129	*Steam Heat Retainer*
HC 71	*Head*	HC 7130	*Steam Heat Seat*
HC 78	*Packing Ring*	HC 7131	*Fingers*
HC 7125	*Bolt*	HC 7132	*Center Pipe*
HC 7126	*1¼ in. Elbow*	HC 7134	*Side Plate*
HC 7127	*Spring Seat*	HC 759	*Bush*
HC 7128	*Spring*		

Westinghouse Air Brake Company.

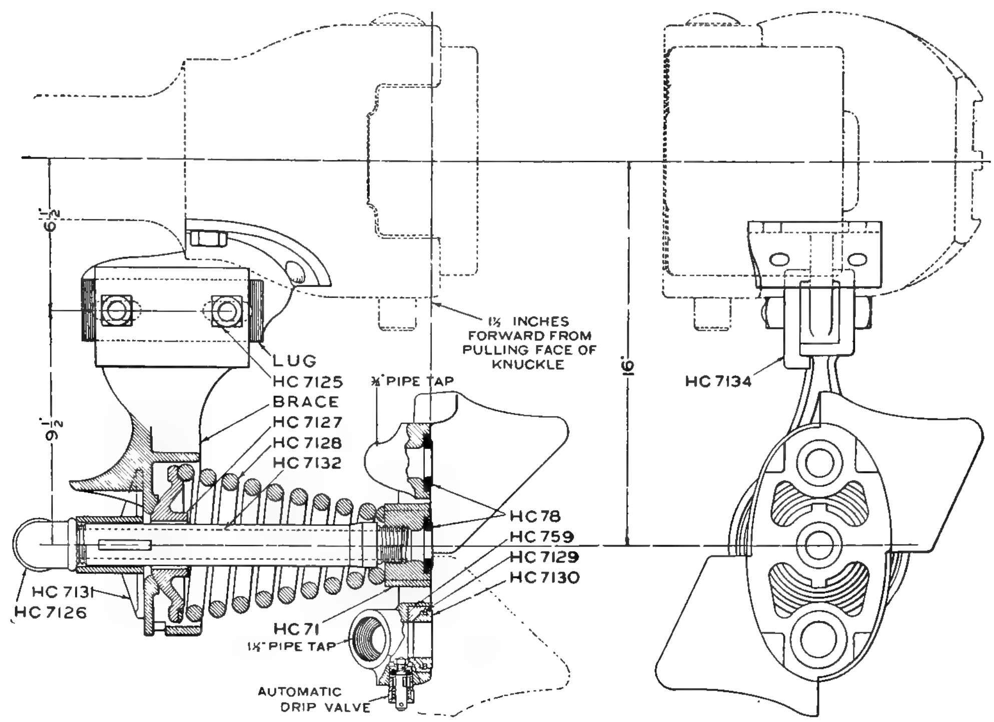


Fig. 1476—Passenger Connector for Air Brake, Signal and Steam Heat Pipes. New York Air Brake Company.

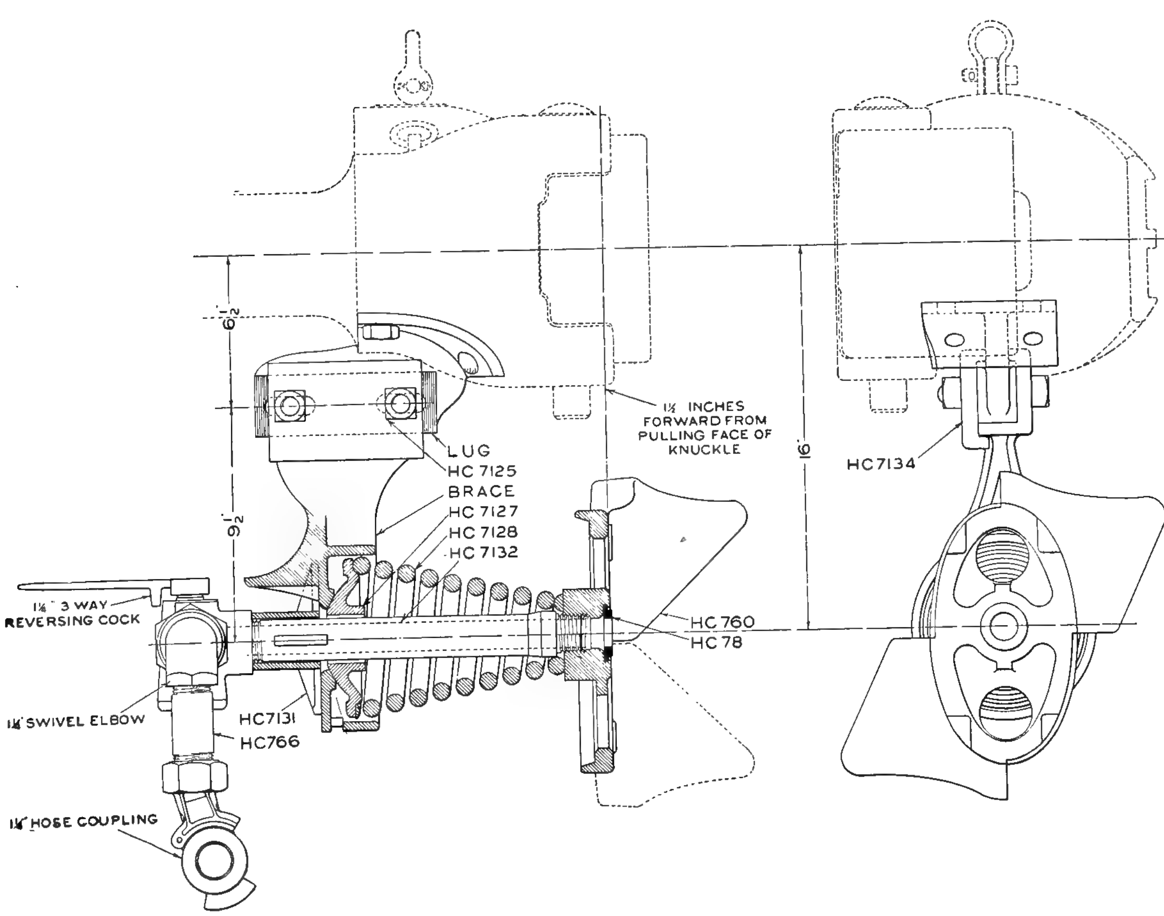


Fig. 1477—Freight Connector for Air Brake Pipes. New York Air Brake Company.

Parts of Emergency Head, Fig. 1478.

HC 78	*Packing Ring*
HC 519	*Packing Ring*
HC 710	*Steam Heat Gasket*
HC 725	*Packing Nut*
HC 726	*Swivel*
HC 729	*Packing Nut*
HC 730	*Swivel*
HC 734	*Hook*
HC 735	*Cam*
HC 737	*Coupling*
HC 738	*Signal Coupling*
HC 739	*Elbow*
HC 740	*Bend*
HC 741	*Cam Pin*
HC 7122	*Street Elbow*
HC 7123	*Cam Spring*
HC 7124	*Cam Bearing*
HC 7133	*Head*

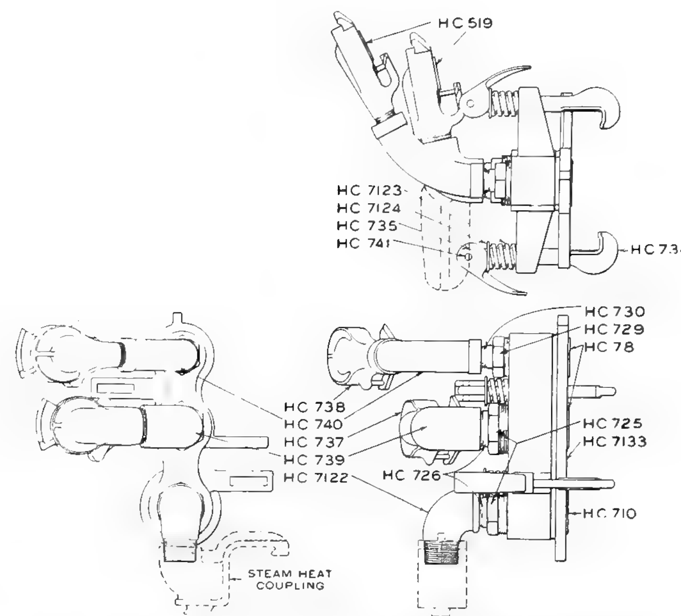


Fig. 1478—Emergency Head Back-Up Connection. New York Air Brake Company.

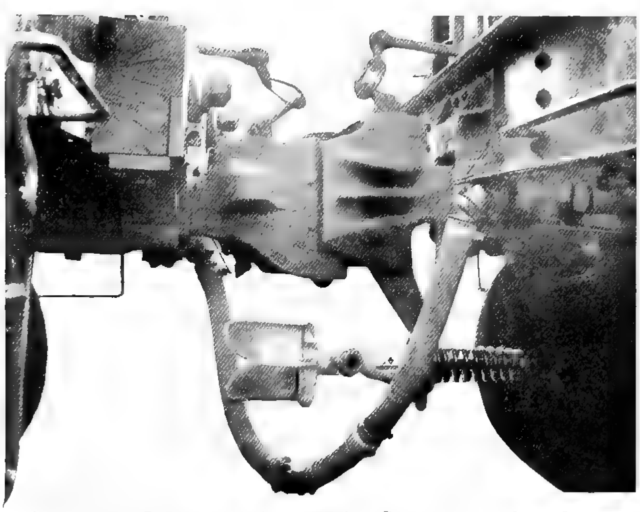


Fig. 1479—Robinson Automatic Connector, Cut Out When Car Is Coupled to a Car Without Automatic Connectors.

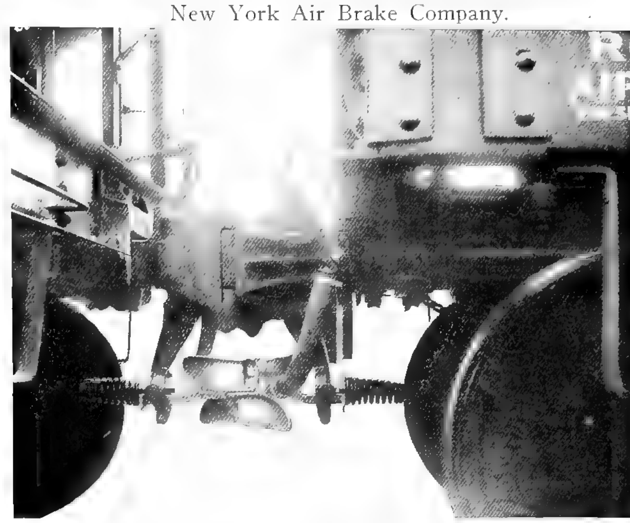


Fig. 1480—Robinson Automatic Connector Applied to Freight Cars.

Robinson Connector Company.

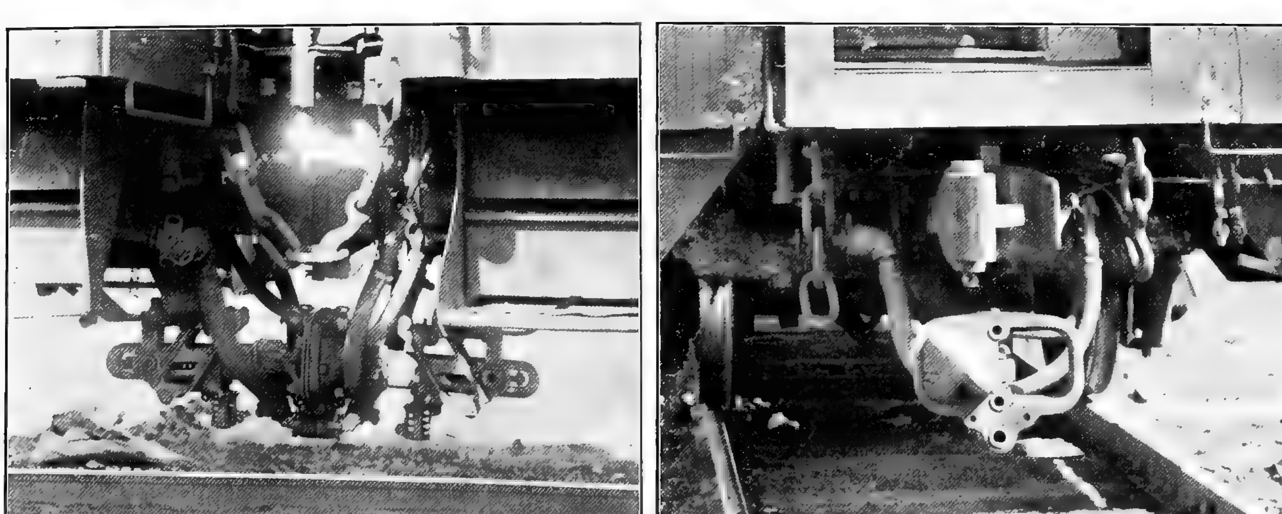


Fig. 1481—Durbin Automatic Train Pipe Connector Applied to Passenger Train Cars. Durbin Automatic Train Pipe Connector Company.

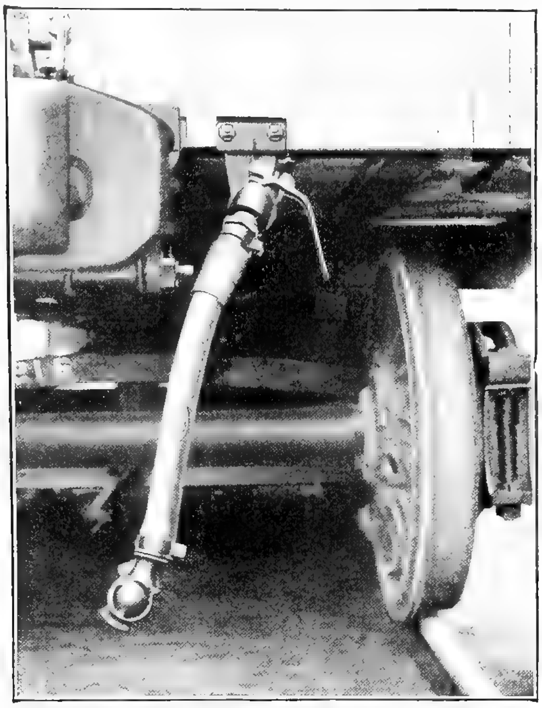


Fig. 1482—Monogram Pipe Bracket and Nipple End Hose Protector. Guilford S. Wood.

Parts of Figs. 1483 and 1484.

A *Whistle*
B *Whistle Push Button*
C *Train Pipe Exhaust*

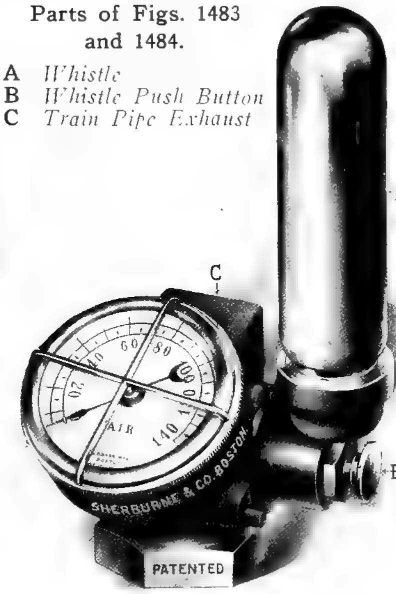


Fig. 1483—Brakeman's Back-up Air Brake and Signal Cock, with Gage.

Fig. 1484—Brakeman's Back-up Air Brake Cock.

Sherburne & Company.

Fig. 1485—Universal Hose Protector. McCord & Company.

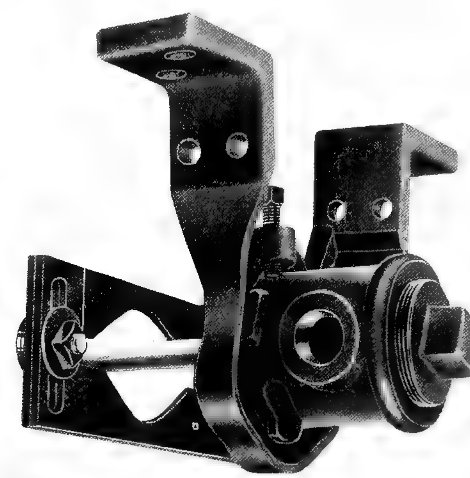


Fig. 1486—Safety Device for Automatically Applying Air Brakes in Case of Broken or Spreading Rails, Damage to Truck, Etc. Wright Safety Air Brake Company.

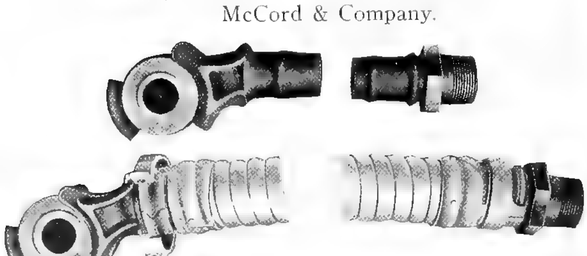


Fig. 1487—Sprague Flexible Steel Armored Hose and Nipples. Sprague Electric Works.

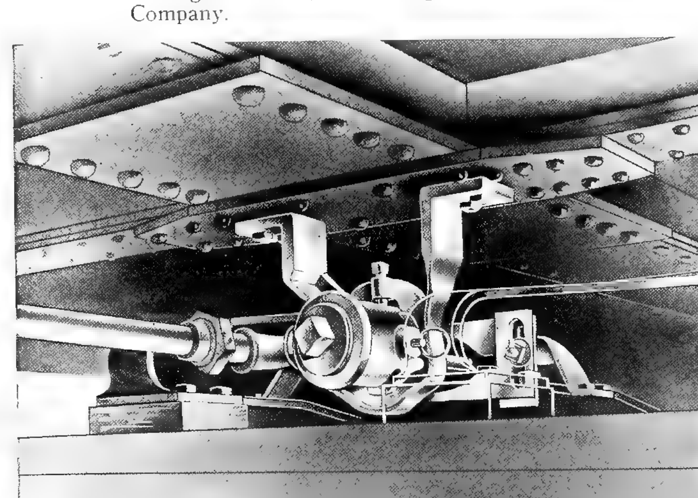


Fig. 1488—Device Shown in Fig. 1486, as Applied to a Car. Wright Safety Air Brake Company.

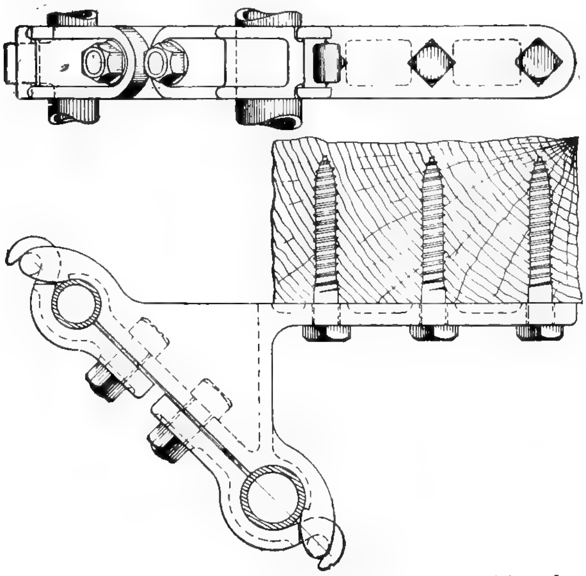


Fig. 1489—Acme Pipe Clamp for Use on Side of a Longitudinal Sill.

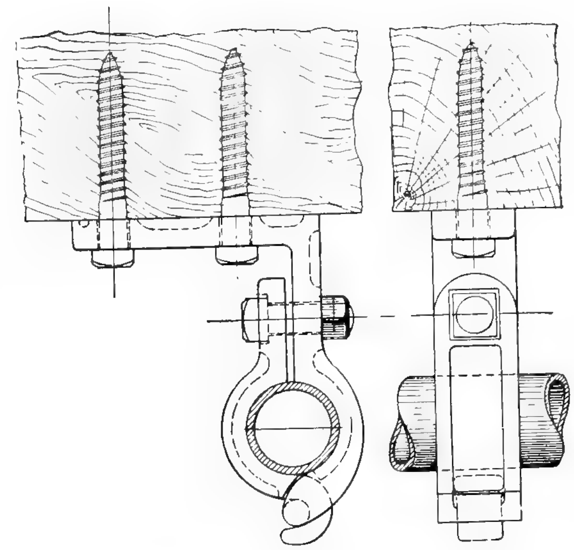


Fig. 1490—Acme Pipe Clamp for Use on Bottom of End Sill.

Western Railway Equipment Company.

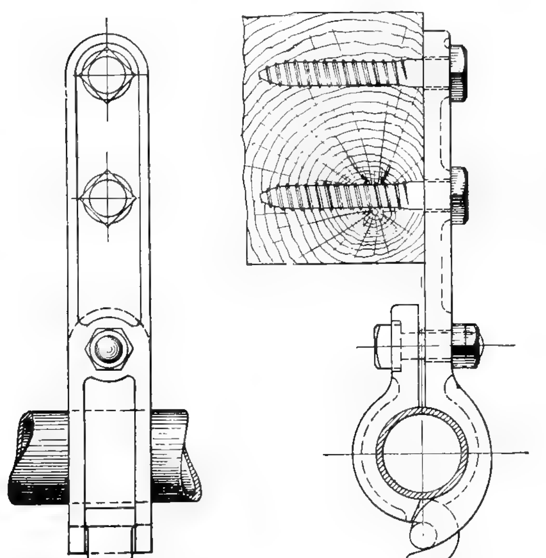


Fig. 1491—Acme Pipe Clamp for Side of Longitudinal Sill. Western Railway Equipment Company.

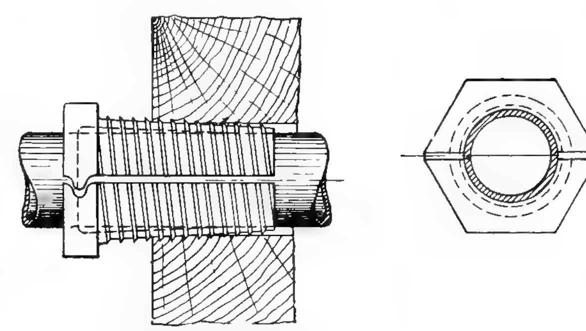


Fig. 1492—Acme Pipe Clamp for Use in Needle Beam. Western Railway Equipment Company.

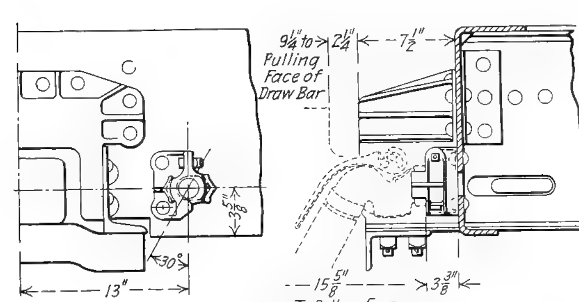


Fig. 1494—Security Angle Cock Bracket Applied to Dump Car. D. R. Niederlander.

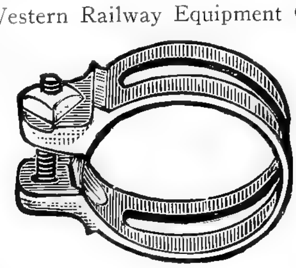


Fig. 1493—Yerdon Hose Band. William Yerdon.

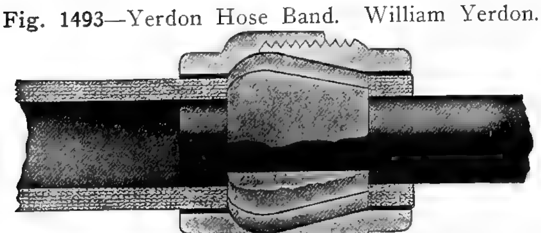


Fig. 1495—Strong Hose Clamp. Strong, Carlisle & Hammond Company.

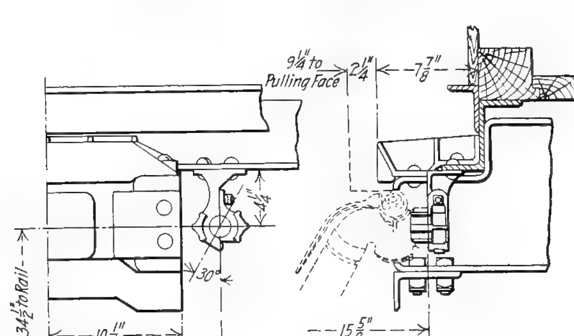


Fig. 1496—Security Angle Cock Holder Applied to Box Car. D. R. Niederlander.

Fig. 1497.
Pipe Hanger.

Fig. 1498.
Pipe Clamp.

Fig. 1499.
Pipe Clamp.

Fig. 1500
Pipe Hanger.

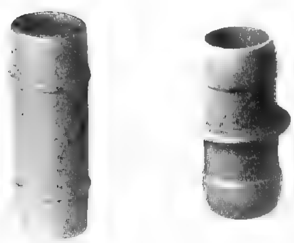


Fig. 1501.
Repair Nipples.

Fig. 1502.
Hose Clamp

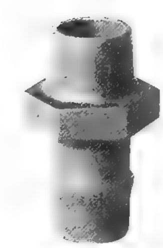


Fig. 1503.
Hose Nipple.

National Malleable Castings Company.

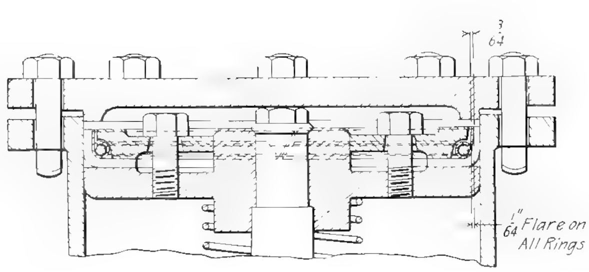


Fig. 1504—J-M Slip Type Expander Ring for Air Brake Cylinder Packing Leathers. H. W. Johns-Manville Company.

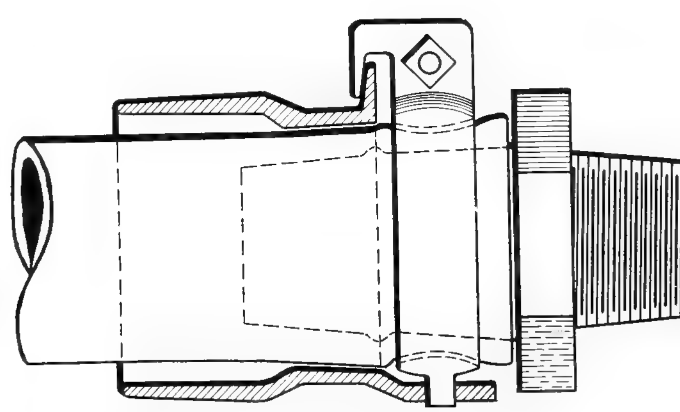


Fig. 1505—Air Hose Protector.
A. Roy Peffers.

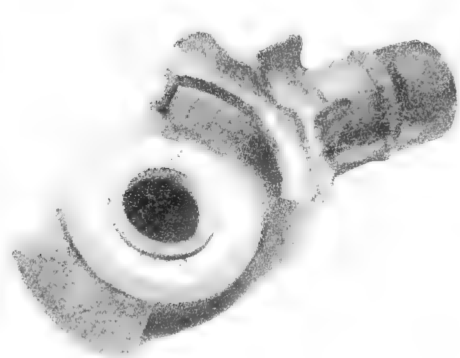
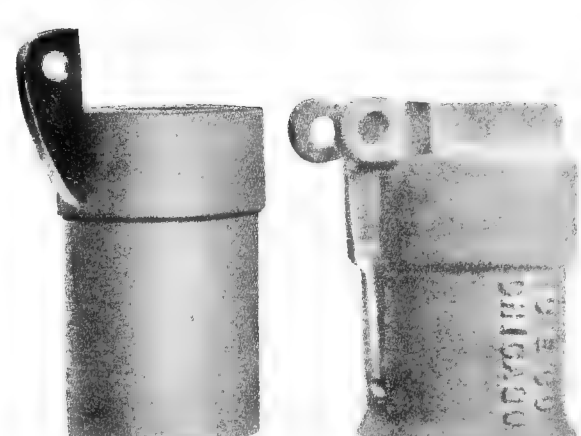


Fig. 1506—Sheafe Air Hose Coupling.



Style A. Style B.

Fig. 1507—Sheafe Air Hose Protectors.

Central Engineering Company.

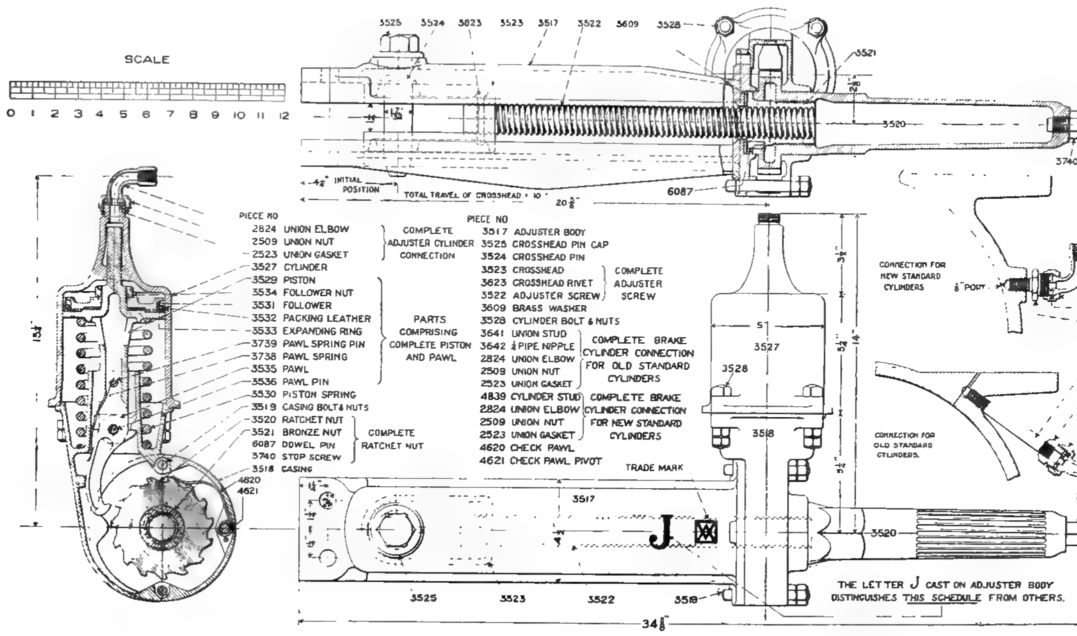


Fig. 1508—American Automatic Slack Adjuster. American Brake Company.

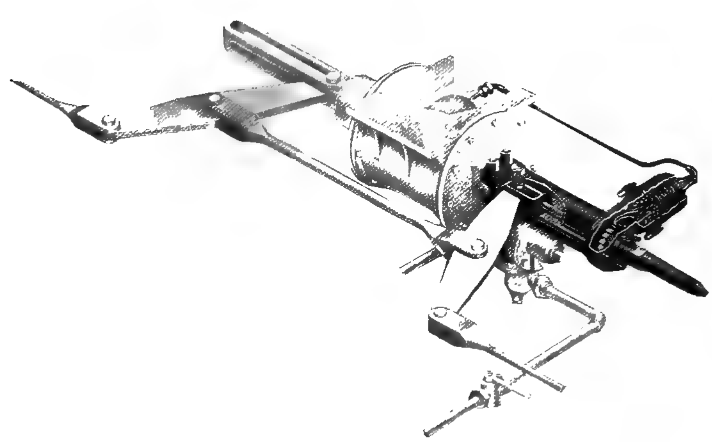


Fig. 1509—American Automatic Slack Adjuster Applied to Brake Cylinder. American Brake Company.

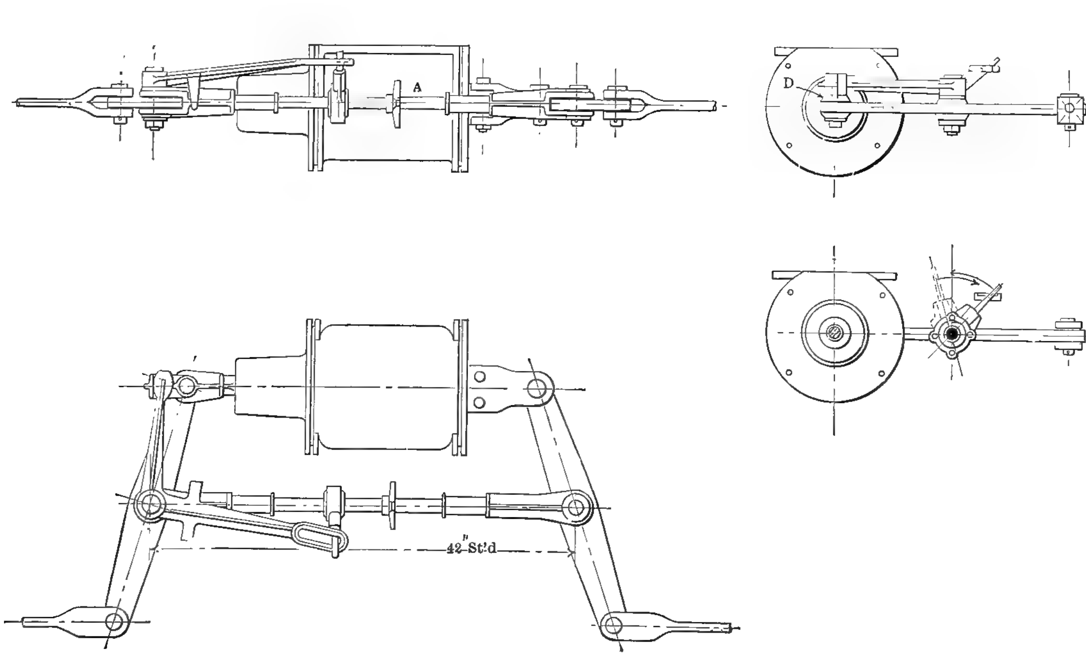


Fig. 1510—Creco Slack Adjuster for Passenger Train Cars. Chicago Railway Equipment Company.

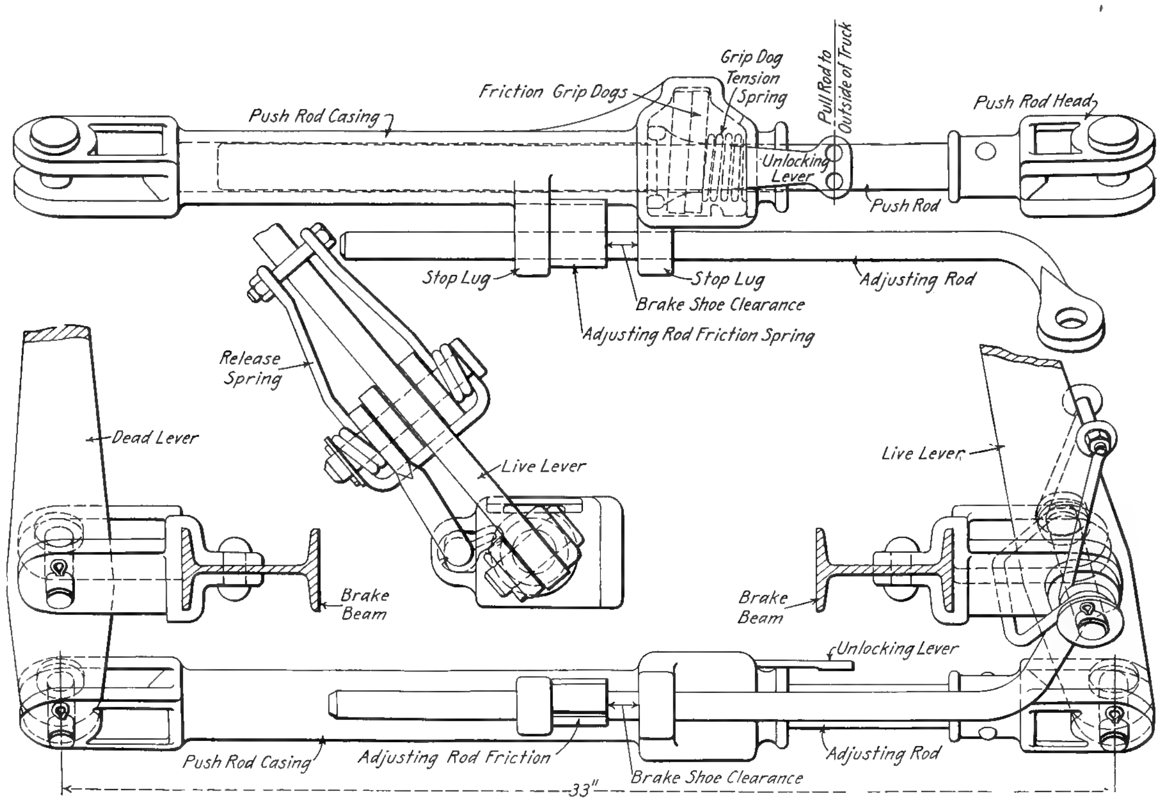


Fig. 1511—Universal Type Automatic Brake Adjuster for Freight Cars. Gould Coupler Company.

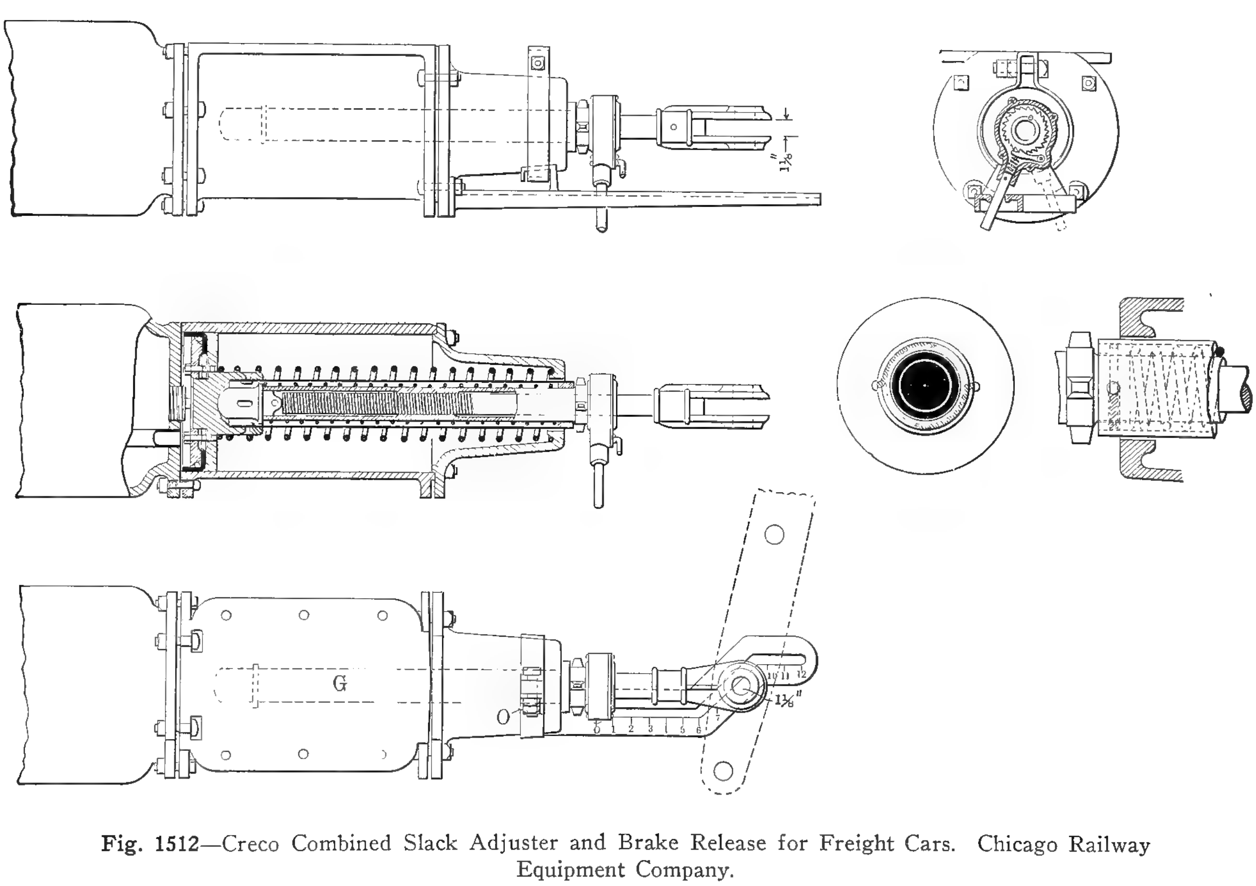


Fig. 1512—Creco Combined Slack Adjuster and Brake Release for Freight Cars. Chicago Railway Equipment Company.

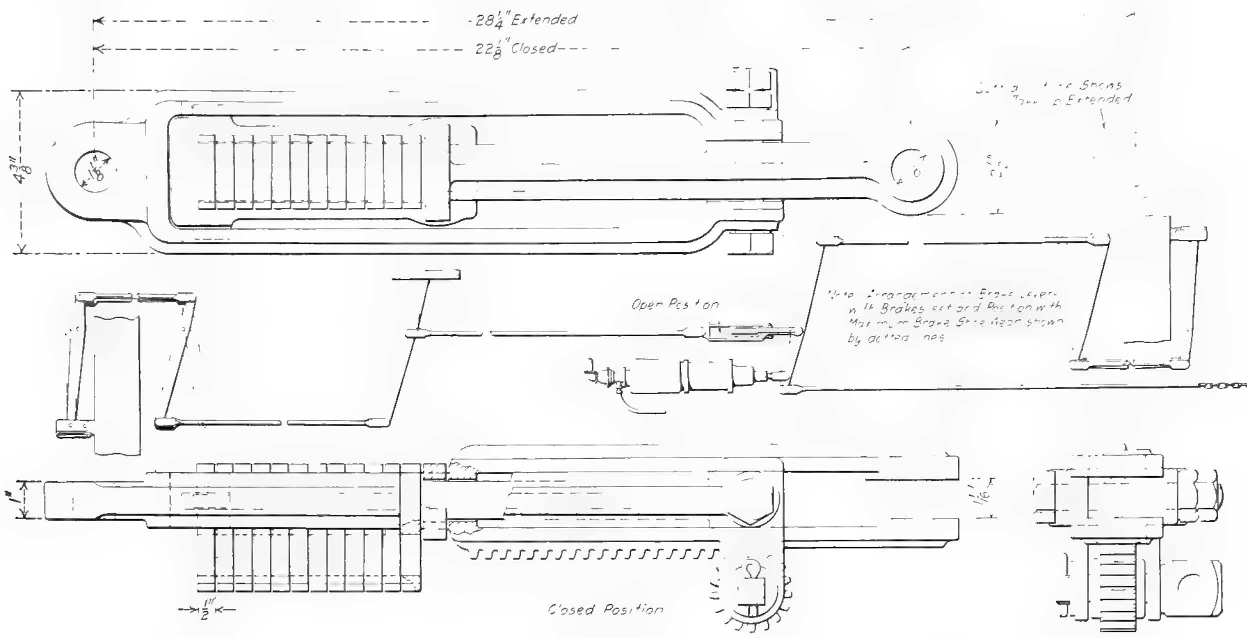


Fig. 1513—J-M Manual Take-up. H. W. Johns-Manville Company.

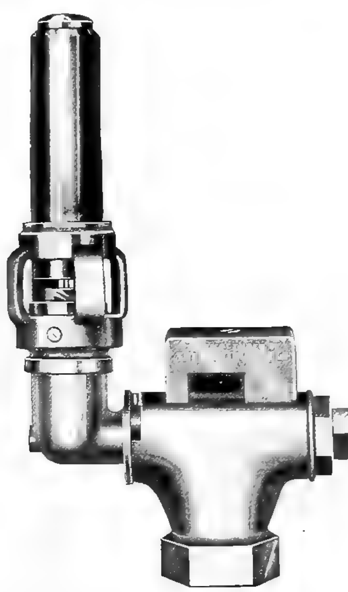


Fig. 1515—Back-Up Air Brake Cock. Ashton Valve Company.

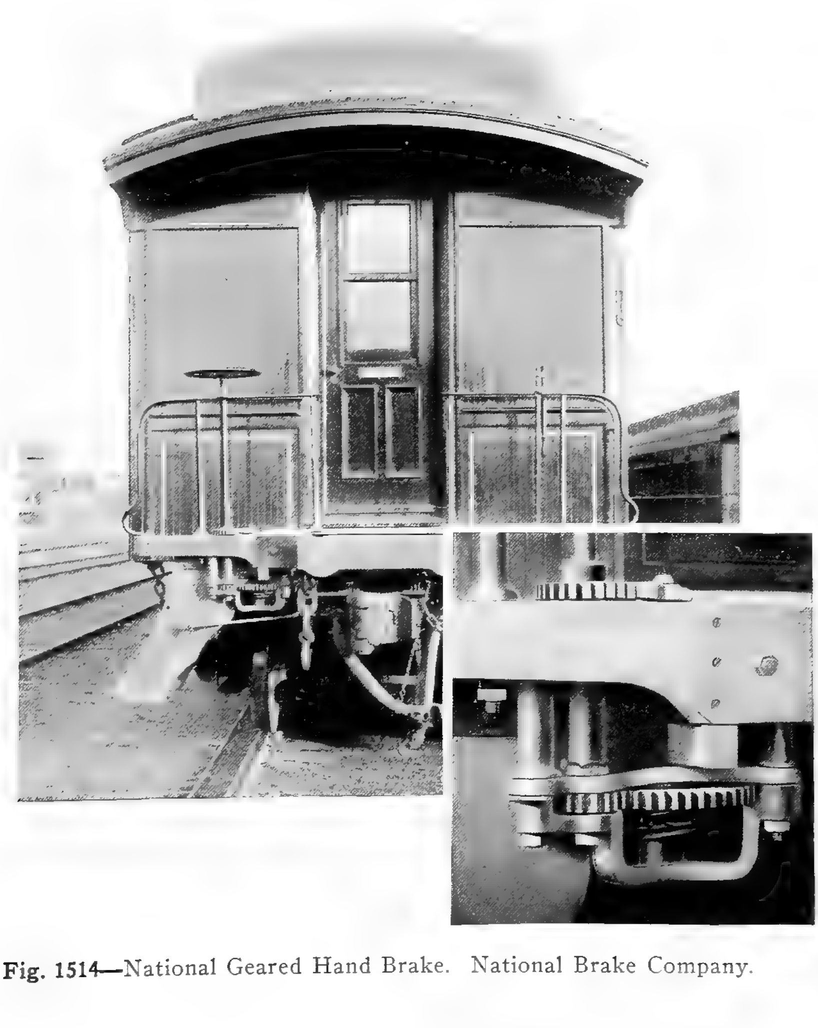


Fig. 1514—National Geared Hand Brake. National Brake Company.

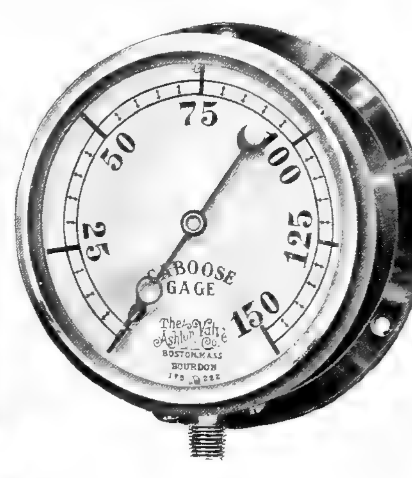


Fig. 1516—Air Gage for Caboose. Ashton Valve Company.

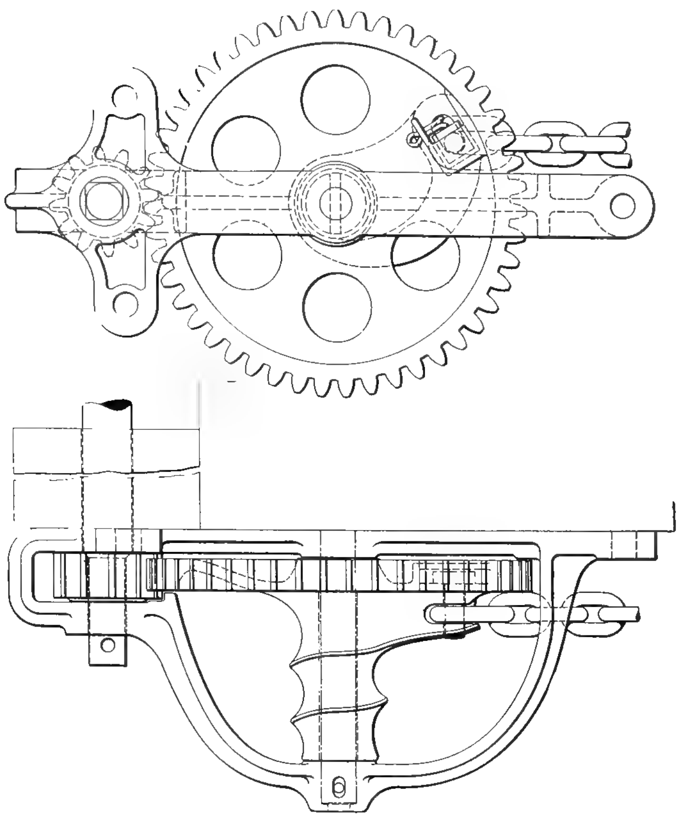


Fig. 1517—Peacock Geared Hand Brake for Freight Cars. National Brake Company.

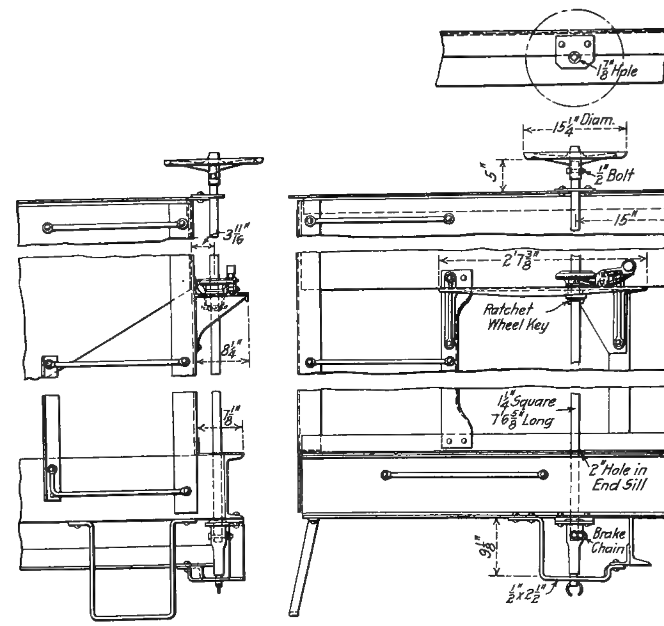


Fig. 1518—Square Brake Shaft Applied to Gondola Car on the Buffalo, Rochester & Pittsburgh.

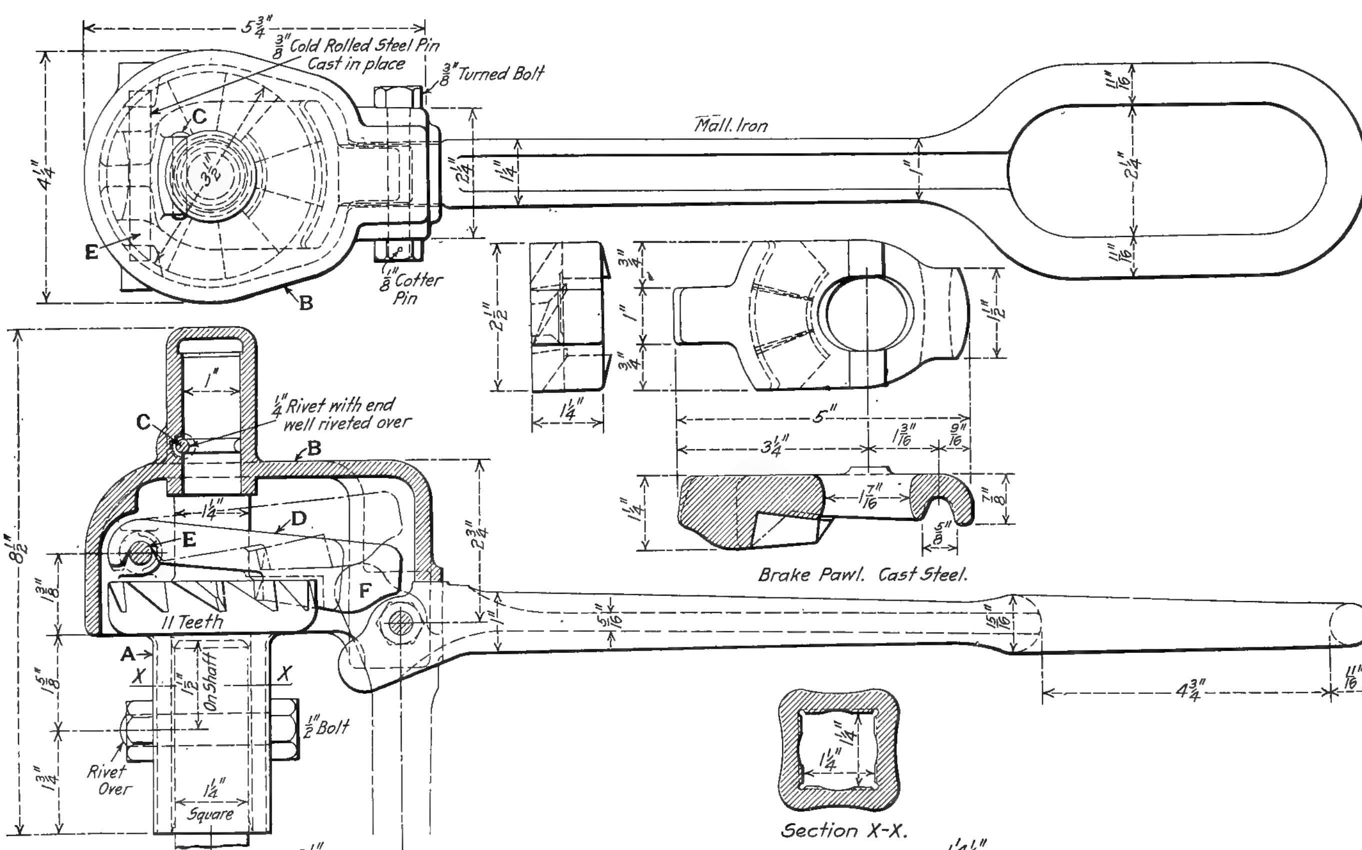


Fig. 1519—Brake Shaft, Ratchet Head and Drop Handle Used on the Buffalo, Rochester & Pittsburgh.

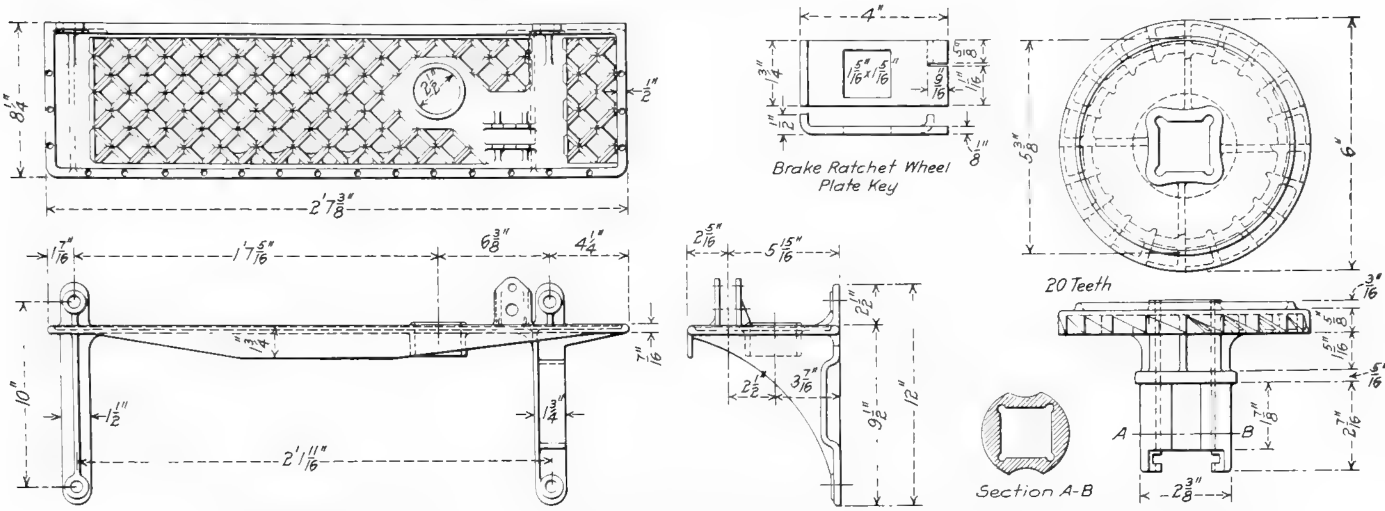


Fig. 1520—Metal Brake Step and Ratchet Used with Square Brake Shaft, Buffalo, Rochester & Pittsburgh.

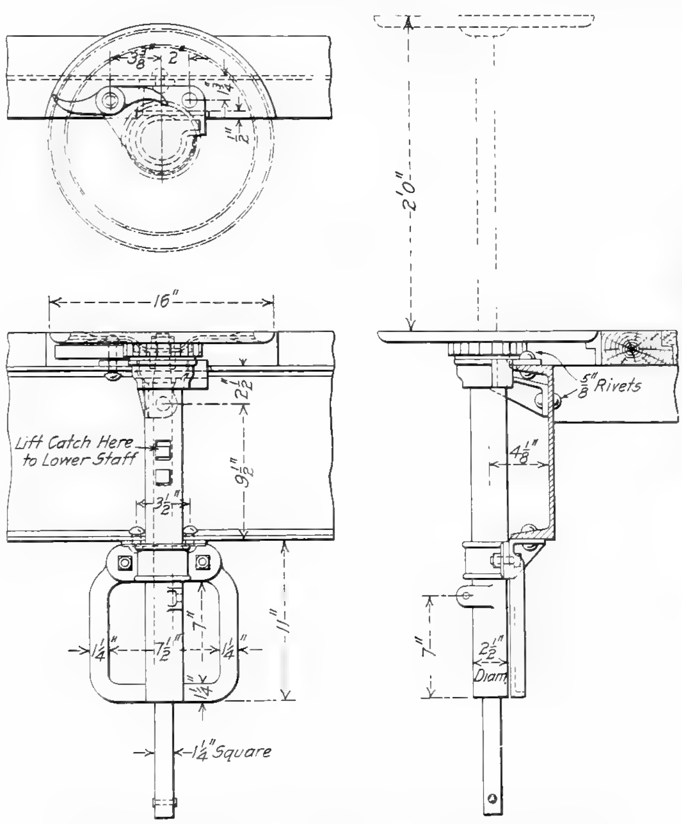


Fig. 1521—Union Drop Brake Shaft. Union Railway Equipment Company.

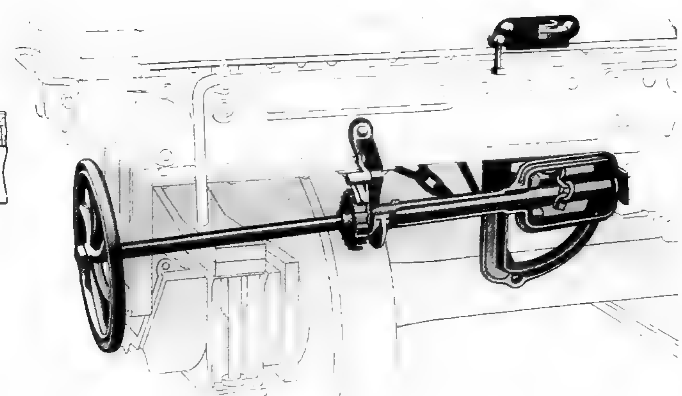


Fig. 1522—Barber Tilting Brake Staff Standard Car Truck Company.

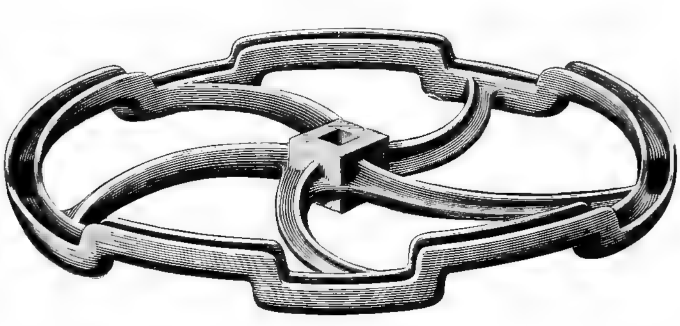


Fig. 1523—Perfect Brake Wheel. Dayton Malleable Iron Company.

Fig. 1524—Feasible Drop Brake Staff. U. S. Metal & Manufacturing Company.

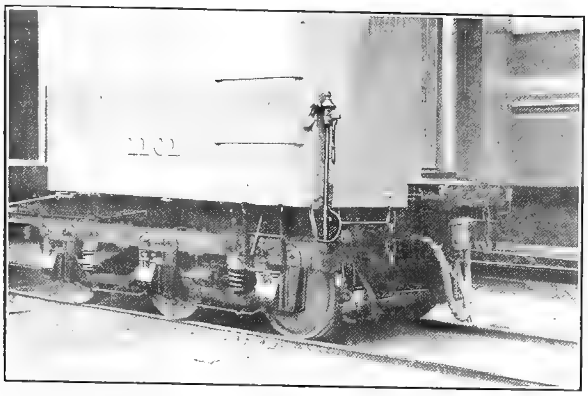


Fig. 1525—Type B Acme Brake Applied to Baggage Car with Dummy End.

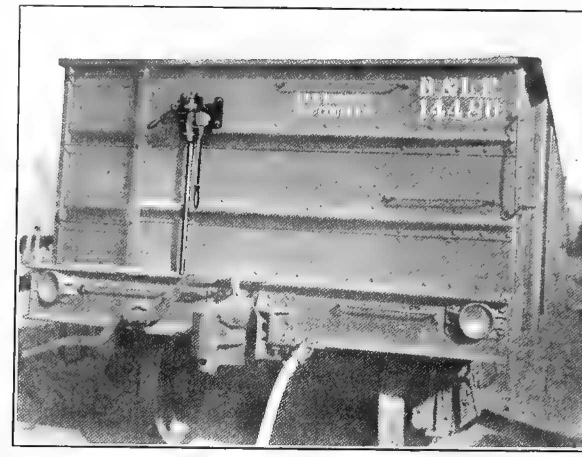


Fig. 1526—Type A Acme Brake Applied to Gondola Car.

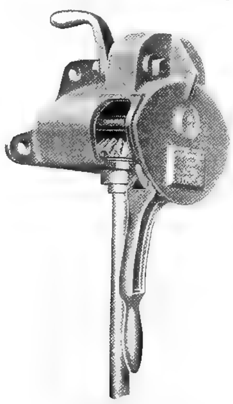


Fig. 1527—Type C Acme Pull-Up Brake for All Classes of Freight and Baggage Cars

Fig. 1528—Type B Acme Brake for Vestibule and Dummy End Cars.

Fig. 1529—Type A Acme Brake for All Classes of Freight Equipment.

Pittsburgh Railway Appliance Company

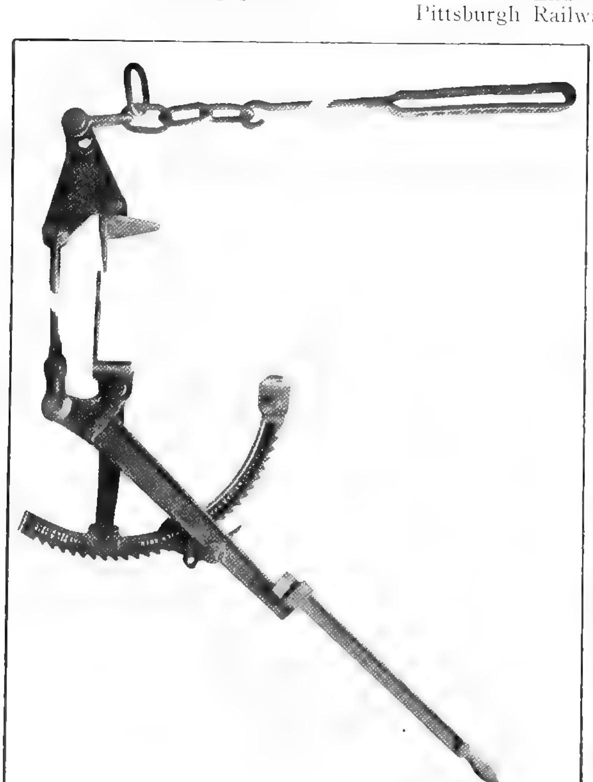


Fig. 1530—Klasing Brake.

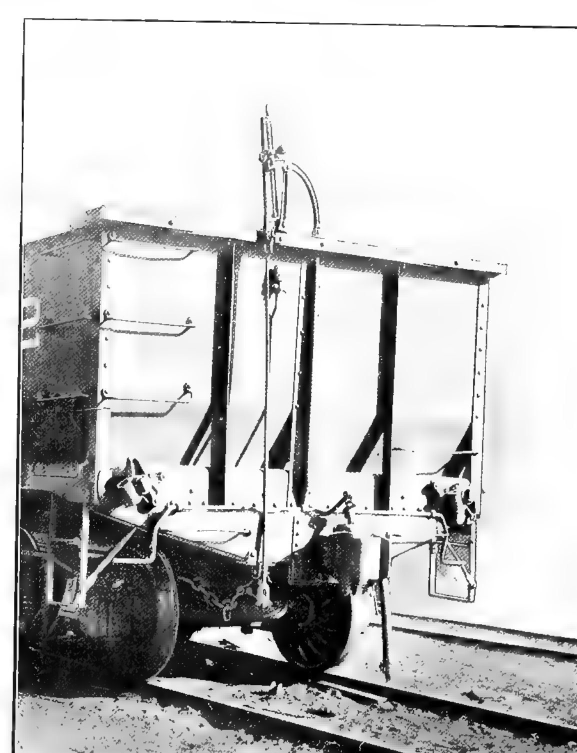


Fig. 1530A—Klasing Brake Applied to Gondola Car.

D. R. Niederlander.

Fig. 1531—Ratchet Wheel Pawl and Plate for Square Shaft—Assembled. (Patented.)

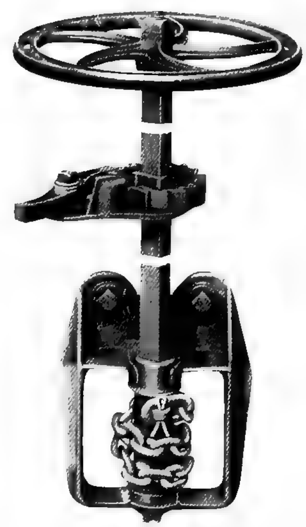


Fig. 1533—Square Brake Shaft Castings. (Patented.)

Fig. 1534—Ratchet Wheel, Pawl and Plate for Round Brake Shaft—Assembled.

Fig. 1532—Section Through Ratchet, Etc., in Fig. 1531.

Fig. 1535—Application of Square Brake Shaft Castings to Brake Step.

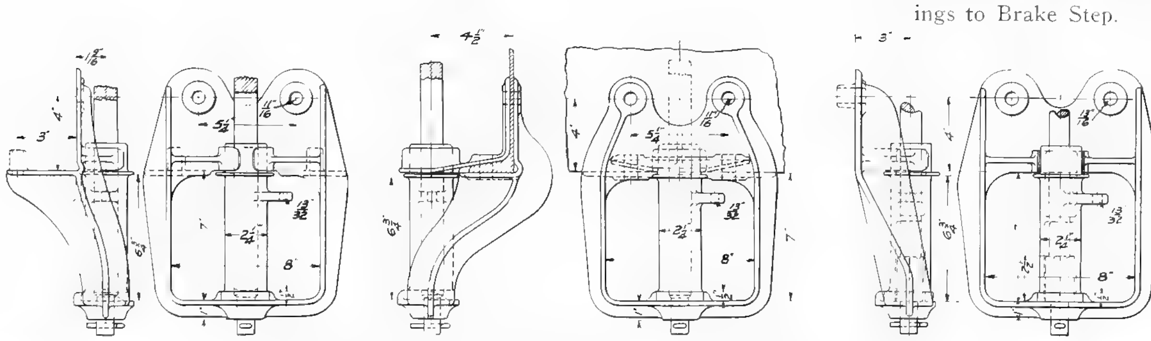


Fig. 1536 Brake Shaft Steps for Square and Round Shafts. (Patented.)

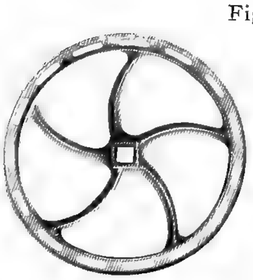


Fig. 1537—Five-Spoke Hand Brake Wheel. (Patented.)

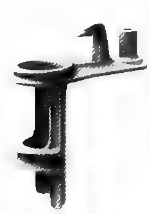


Fig. 1538—Square Shaft Roof Bracket. (Patented.)

Fig. 1539—Round Shaft Roof Bracket.

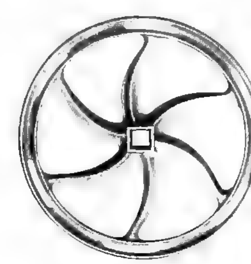


Fig. 1540—Six-Spoke Hand Brake Wheel. (Patented.)

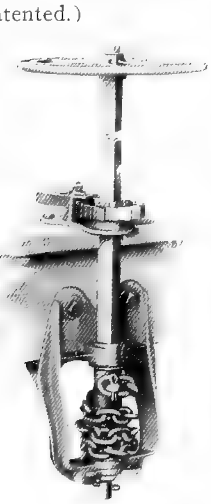


Fig. 1541—Square Drop Shaft in Raised Position.

Fig. 1542—Square Drop Shaft Step Sleeve and Seat. (Patented.)

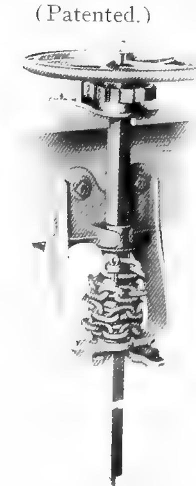


Fig. 1543—Square Drop Shaft in Lowered Position.

Hand Brake Mechanism.
National Malleable Castings Company.

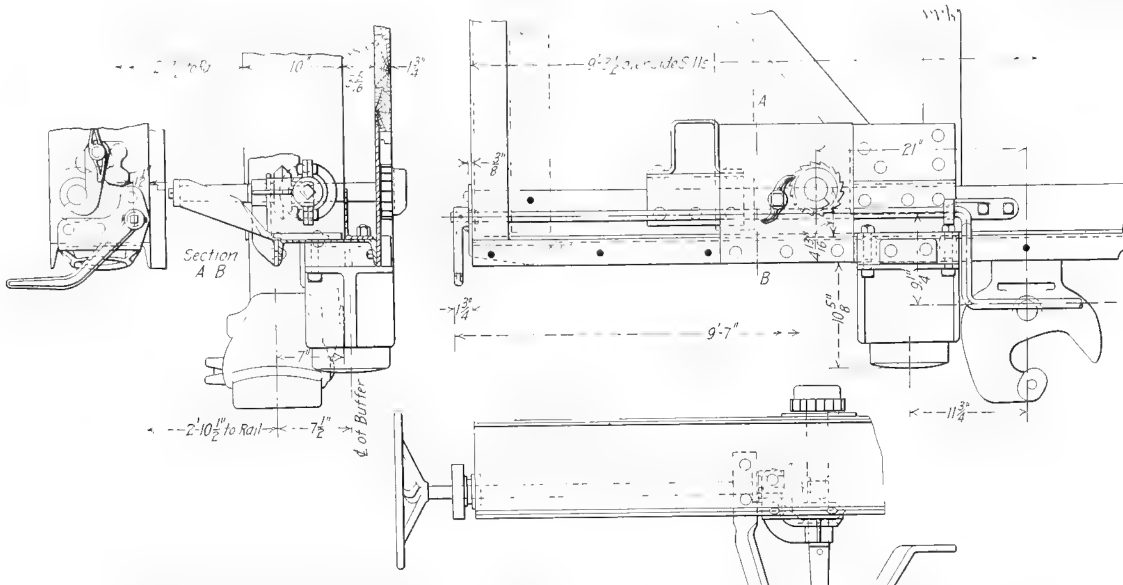


Fig. 1544—Shifting Brake Shaft Device Applied to Flat Car. (Patented.) Pressed Steel Car Company.

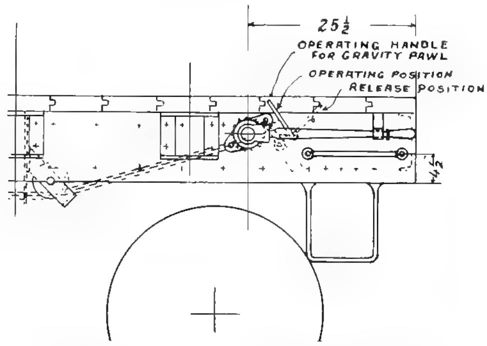


Fig. 1545—Normal Position of Operating Handle for Blackall and Lindstrom Brakes.

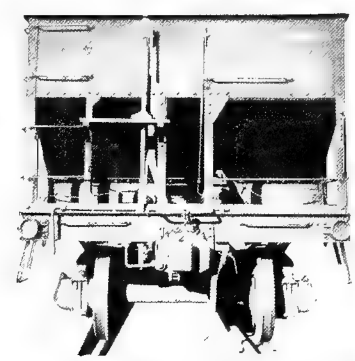


Fig. 1546—Ratchet Brake Applied to Hopper Car.

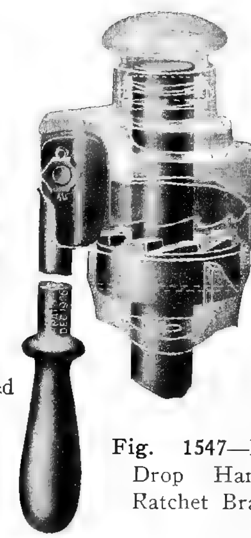


Fig. 1547—Blackall Drop Handle Type Ratchet Brake.

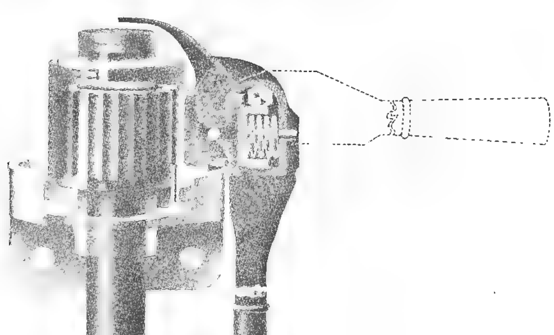


Fig. 1548—Improved Lindstrom Brake.

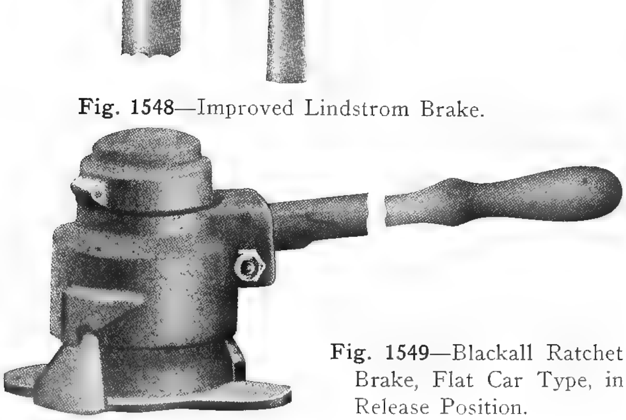


Fig. 1549—Blackall Ratchet Brake, Flat Car Type, in Release Position.

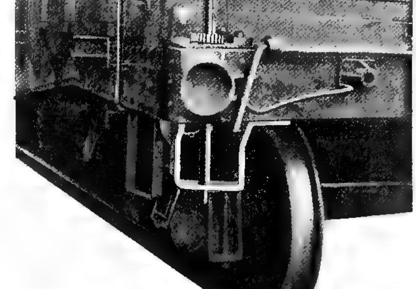


Fig. 1550 H-R Ratchet Brake Lever Applied to Gondola Car.

Robert H. Blackall.

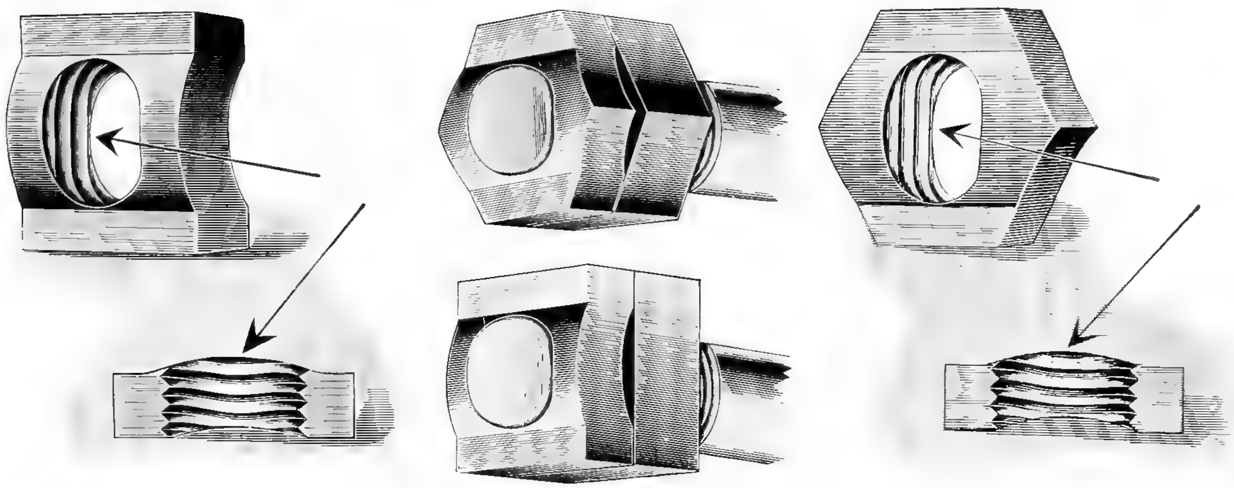


Fig. 1551—Square and Hexagon Grip Nuts, Showing Curve in Thread-Pitch Exaggerated to Show Locking Method. Grip Nut Company.

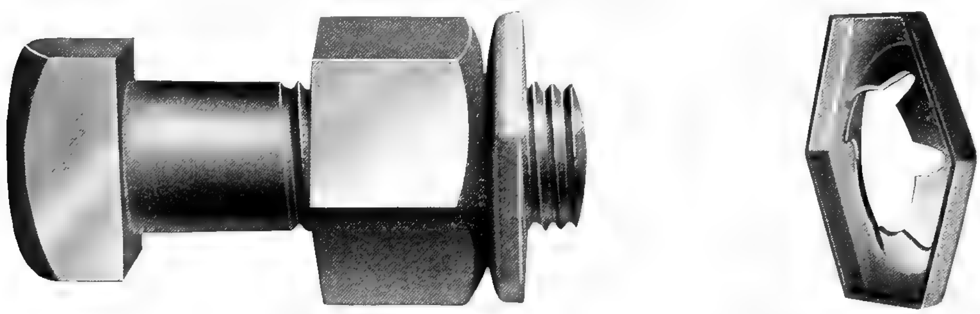


Fig. 1552 -K-P Nut Lock. Waugh Draft Gear Company.

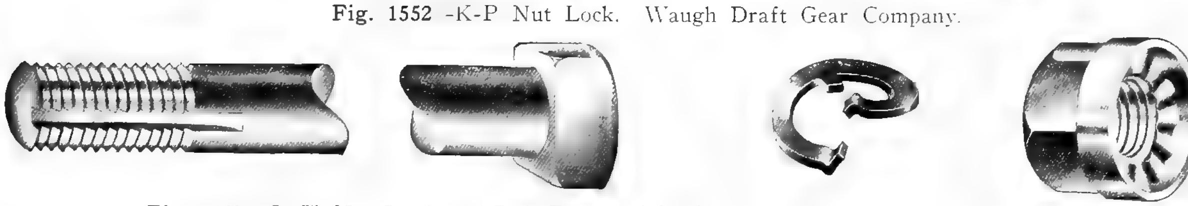


Fig. 1553—O. K. Nut Lock and Bolt Prepared for its Application. O. K. Nut Company.

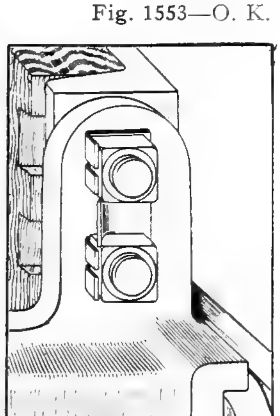


Fig. 1554—Application of Jones Multiple Two-Hole Nut Lock.

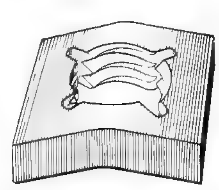


Fig. 1555—Square Toggle Lock Nut.

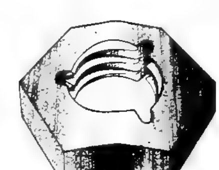


Fig. 1556 — Hexagon Toggle Lock Nut.

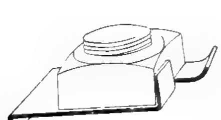


Fig. 1557—Jones Arch Bar Nut Lock.

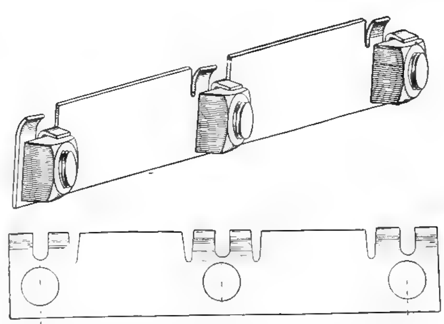


Fig. 1558—Jones Multiple Nut Lock.

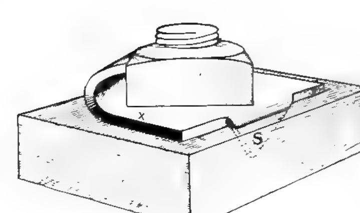
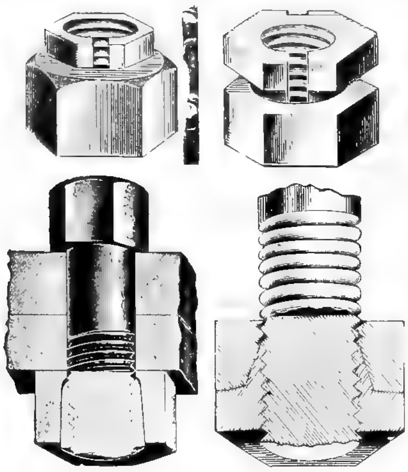


Fig. 1559—Jones Nut Lock for Application to Wood.

Jones Positive Nut Lock Company.



Original. Improved.

Fig. 1560—Columbia Lock Nuts and Application. Columbia Nut & Bolt Co., Incorporated.

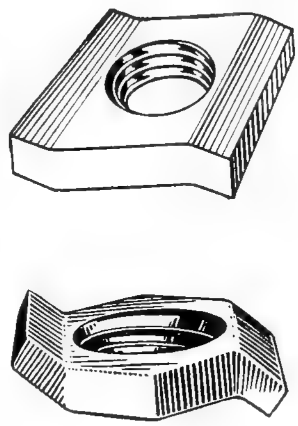


Fig. 1561—Square and Hexagon Gib Nuts. Columbia Nut & Bolt Co., Incorporated.

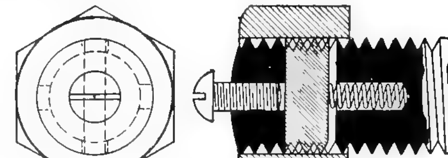


Fig. 1562—Positive Nut Lock. Schum Brothers.

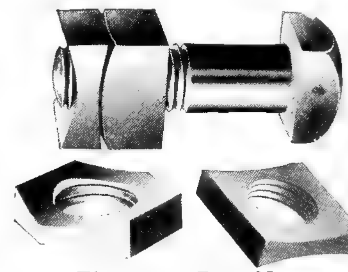


Fig. 1563—Boss Nut. Boss Nut Company.

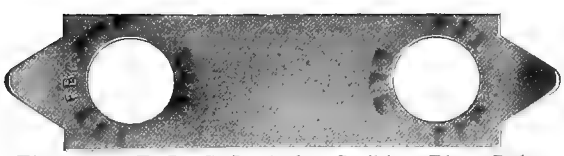


Fig. 1564—F. B. C. Lock for Striking Plate Bolts.

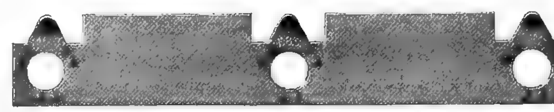


Fig. 1565—F. B. C. Continuous Lock.

Fig. 1566—F. B. C. Arch Bar Nut Lock.

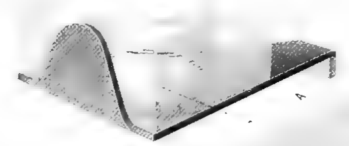


Fig. 1567—F. B. C. Arch Bar Nut Lock Applied.

Keystone Nut Lock Manufacturing Company.

Fig. 1568—Removal of Absolute Lock Nut, Showing Ordinary Nail Inserted.

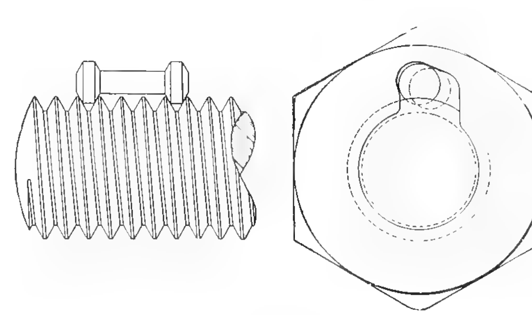


Fig. 1569—Construction of Absolute Lock Nut.

American Lock Nut Company.

Fig. 1570—Turnbuckle. Cleveland City Forge & Iron Company.

Fig. 1571—Hillman Lock Turnbuckle. U. S. Metal & Manufacturing Company.

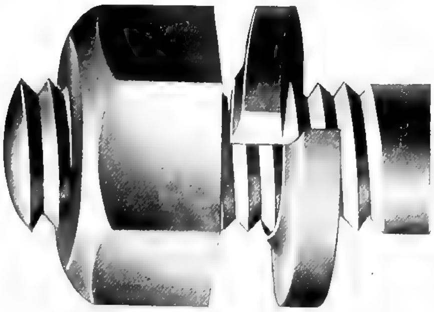


Fig. 1572—Application of National Lock Washer.
National Lock Washer Company.

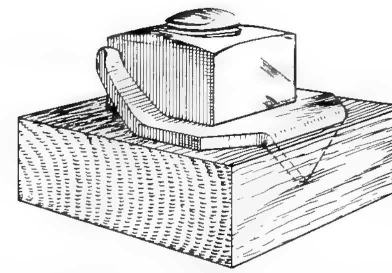
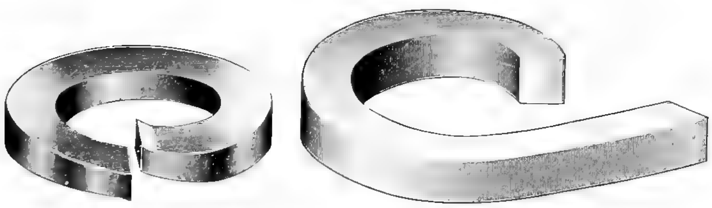
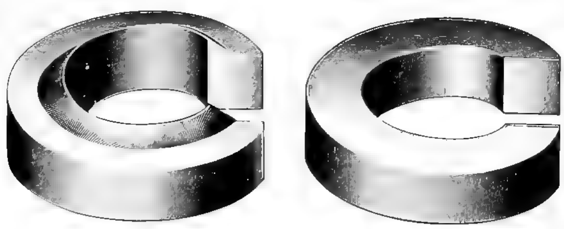


Fig. 1573—Bartley Diamond Tang Fastener for Application to Wood. American Nut & Bolt Fastener Company.



Positive Pattern. Tail Pattern.



National Pattern. Plain Pattern.

Fig. 1574—Lock Washers.

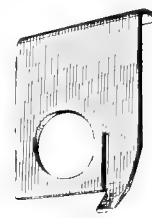


Fig. 1575 — Bartley Flange Nut Fastener.

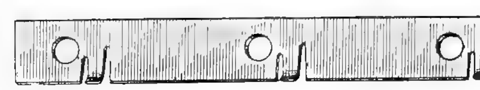


Fig. 1576—Bartley Multiple Nut Fastener.

American Nut & Bolt Fastener Company.

Fig. 1577—Roller Lock Nut, Unlocked.

Roller Lock Nut Company.

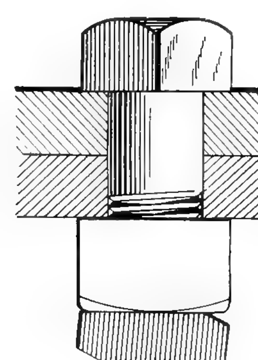


Fig. 1577A—D S Lock Nut.
Standard Safety Nut Corporation.

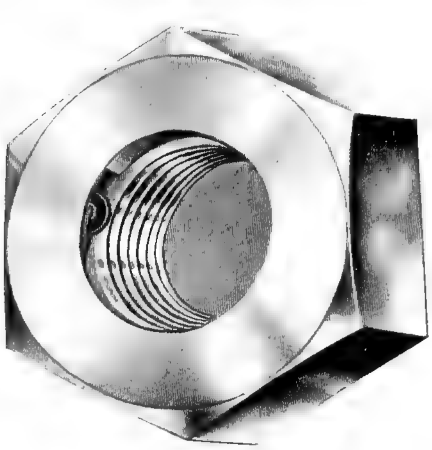


Fig. 1578—Roller Lock Nut.

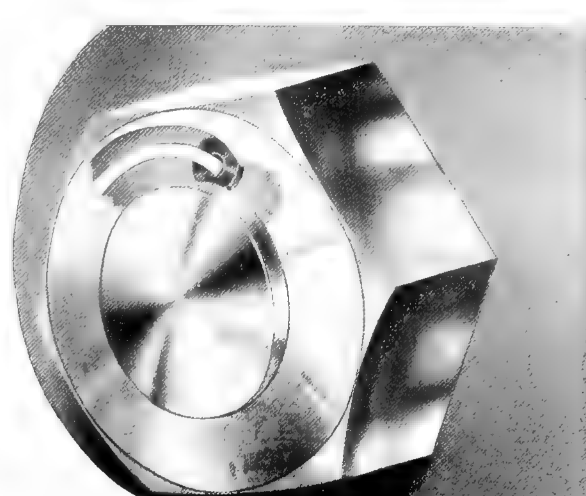


Fig. 1579—Roller Lock Nut, Locked.

Roller Lock Nut Company.

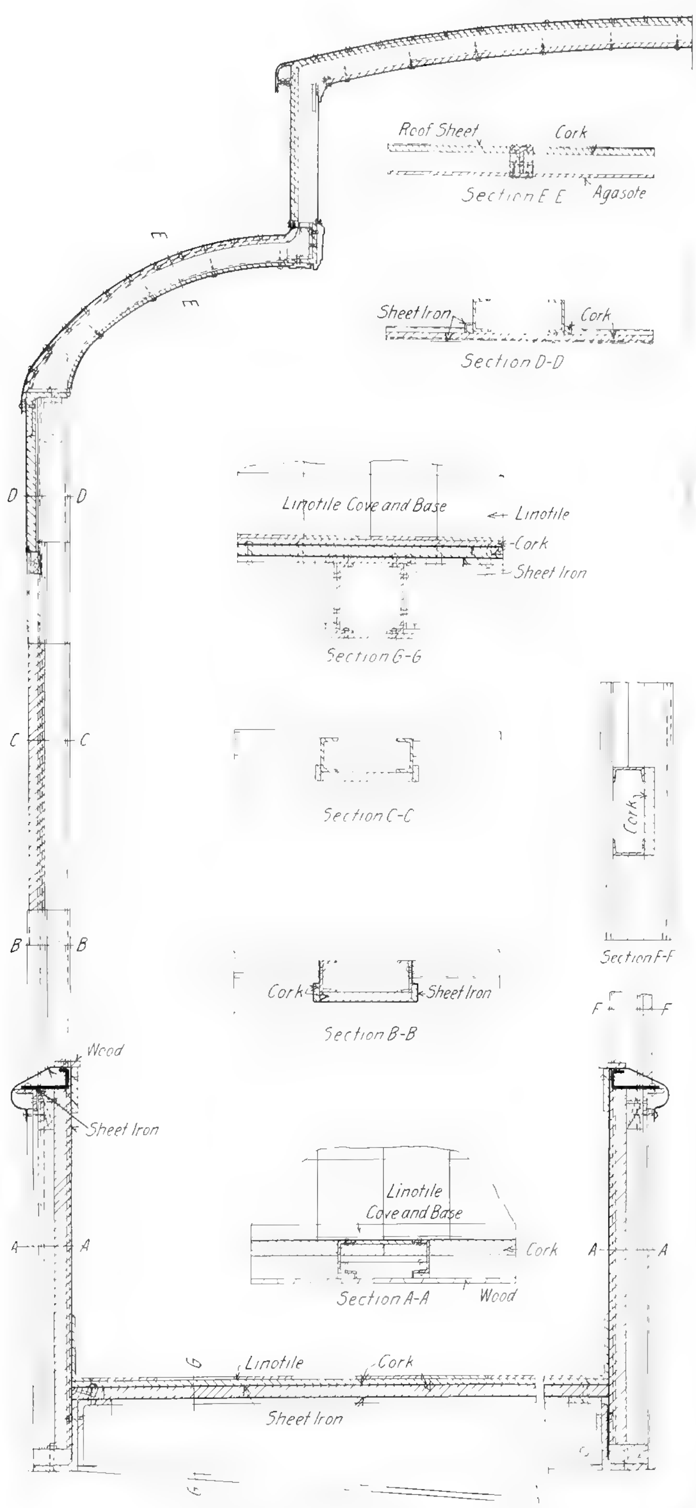


Fig. 1580—Insulation for Passenger Train Cars. Armstrong Cork Company.

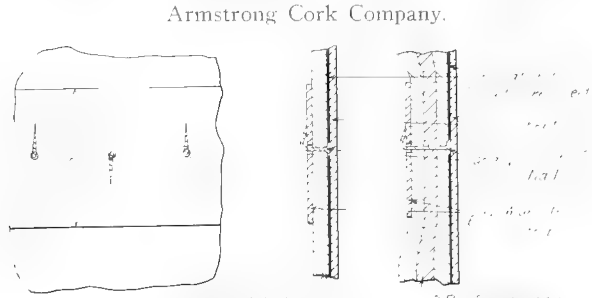


Fig. 1581—Method of Fastening Insulation by Electric Spot Welding and Clinchtite Nails. H. W. Johns-Manville Company.

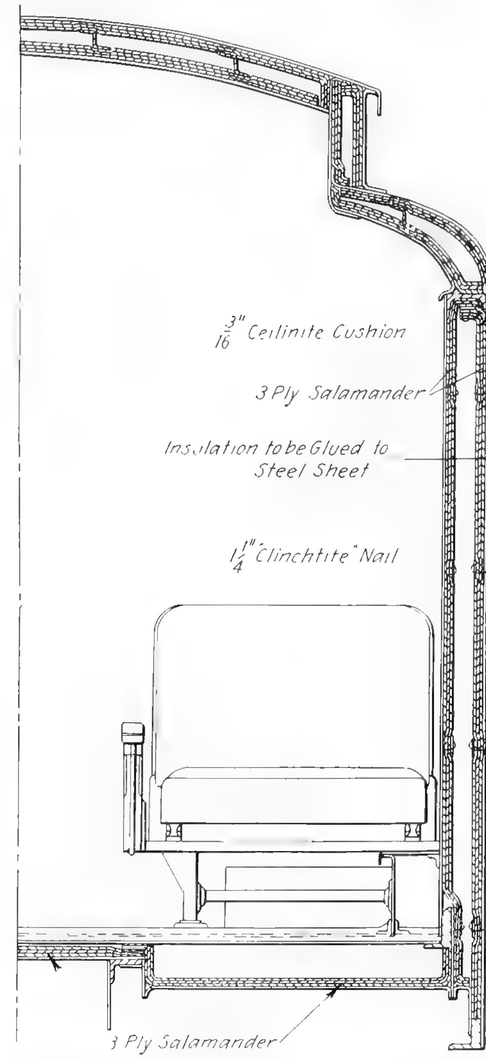


Fig. 1582—Application of Three-Ply Salamander Insulation to Steel Coach. H. W. Johns-Manville Company.

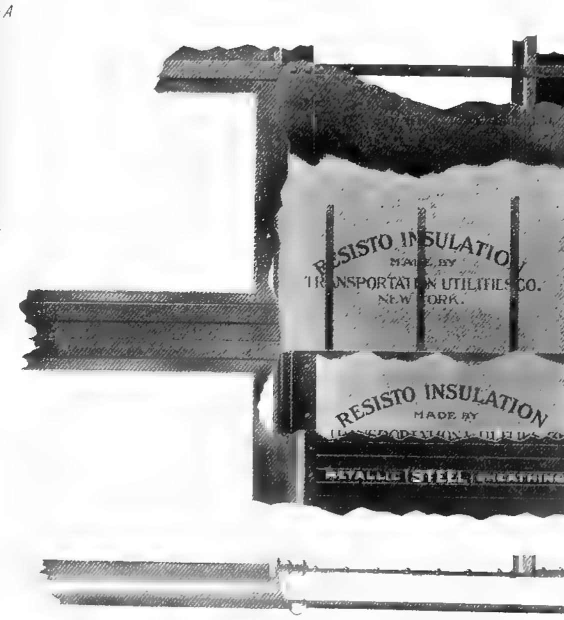


Fig. 1583 Application of Resisto Insulation. Transportation Utilities Company.

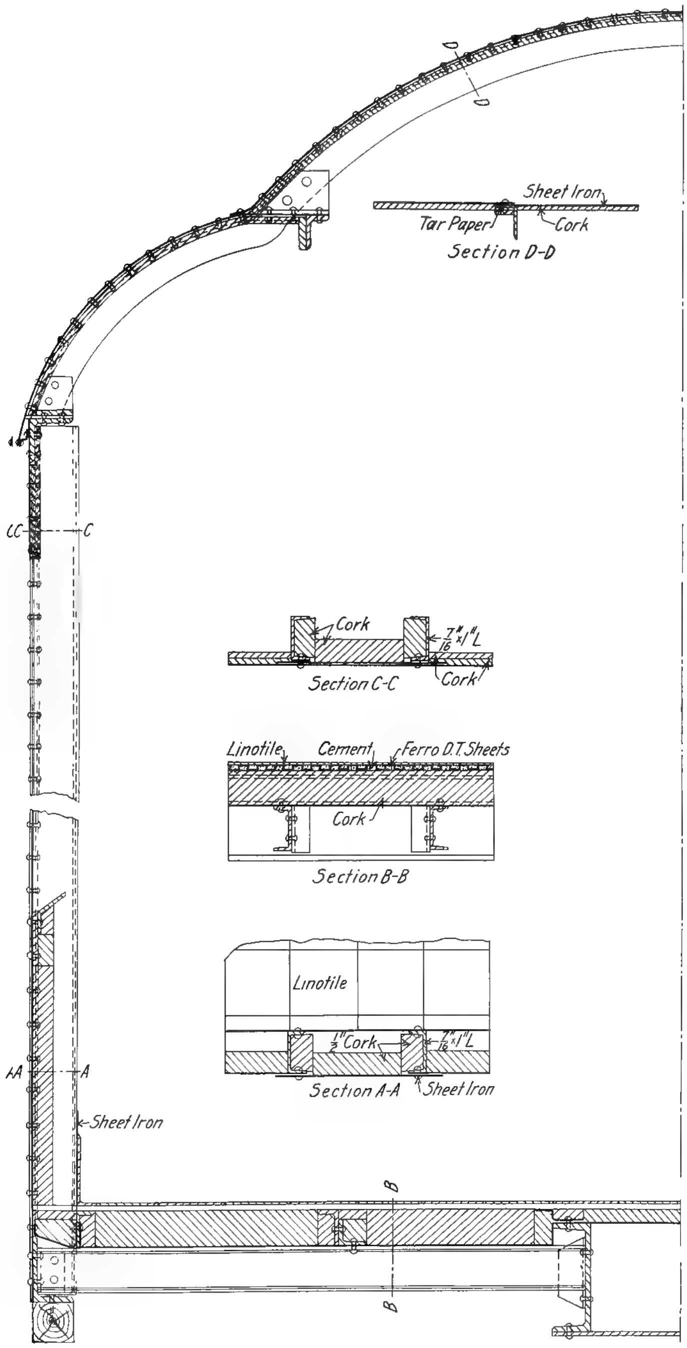


Fig. 1584—Insulation for Steel Passenger Coach. Armstrong Cork Company.

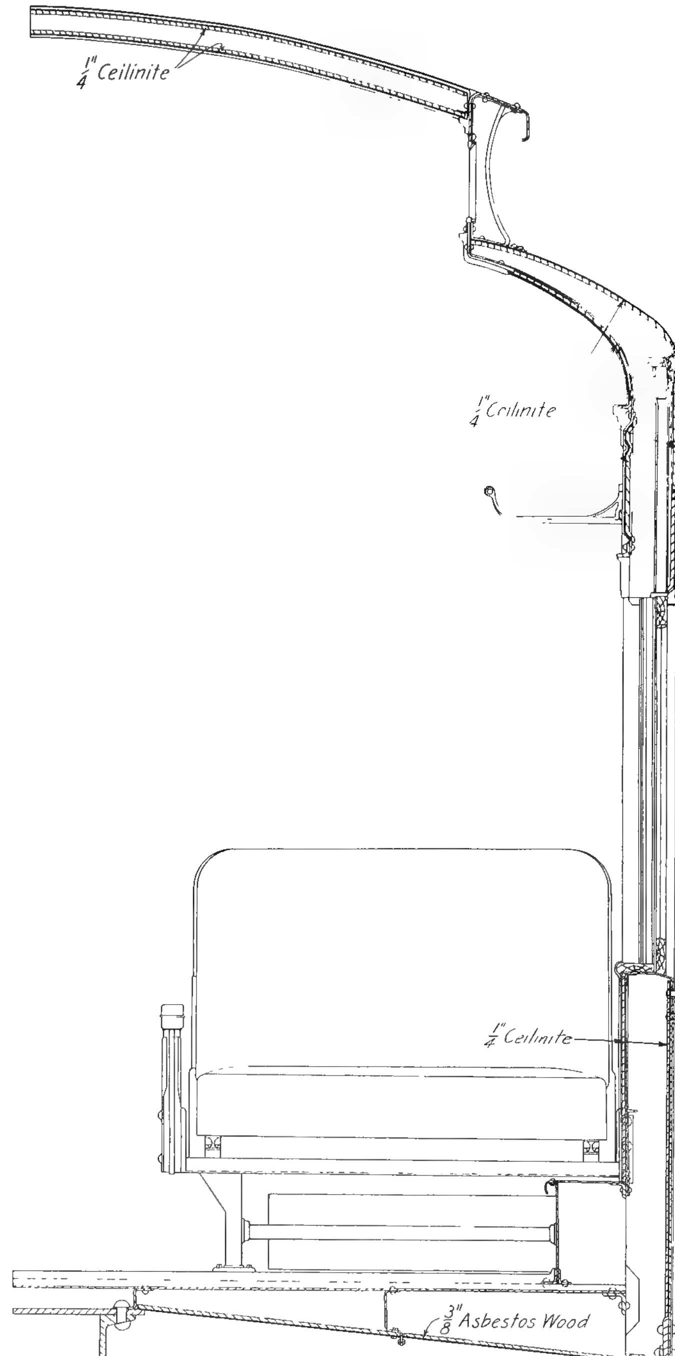


Fig. 1585—Application of J-M Ceilinite Fireproof Insulation to Passenger Coach. H. W. Johns-Manville Company.

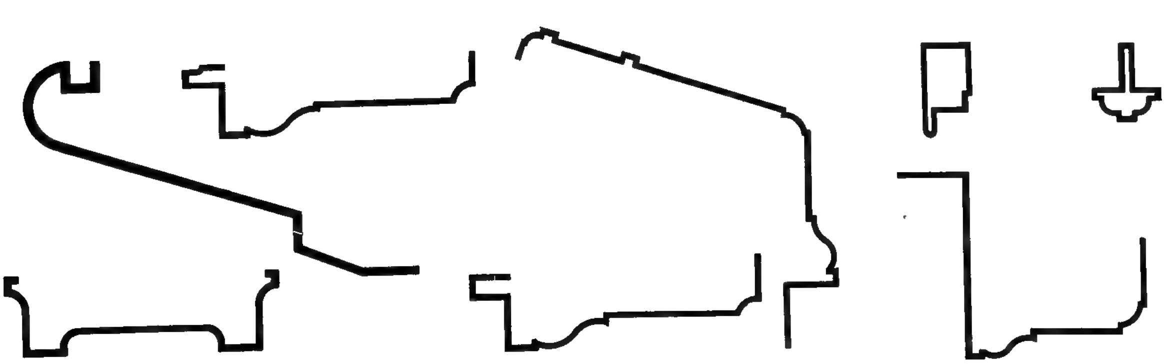


Fig. 1586—Sections of Moldings for Metal Interior Finish. Grinden Art Metal Company.

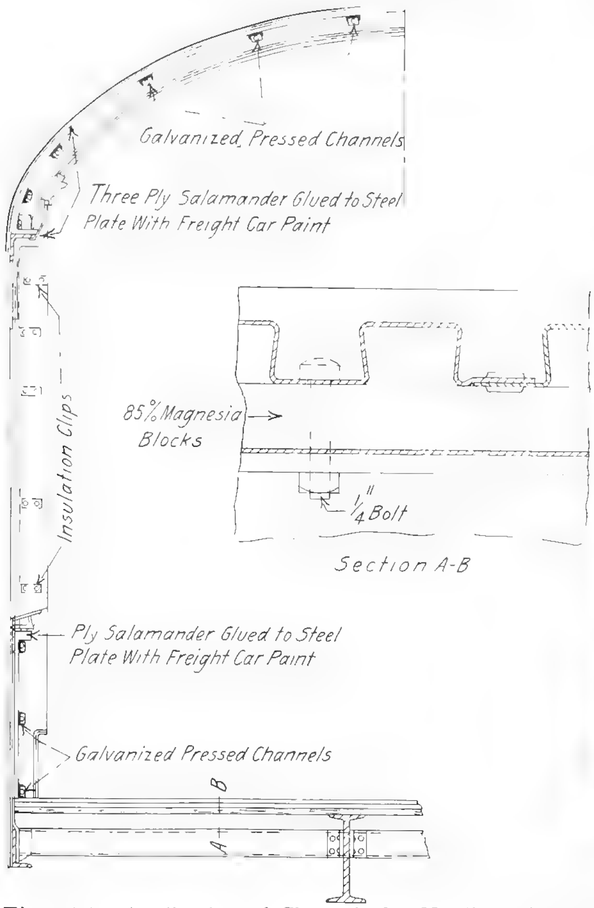


Fig. 1587—Application of Channels for Holding Three-Ply Salamander Insulation. H. W. Johns-Manville Company.

Fig. 1588—Steel Bulkhead and Saloon for Arch Roof Coach. Hale & Kilburn Co.

Fig. 1589—Interior Finish of Steel Passenger Coach. Art Metal Construction Company.

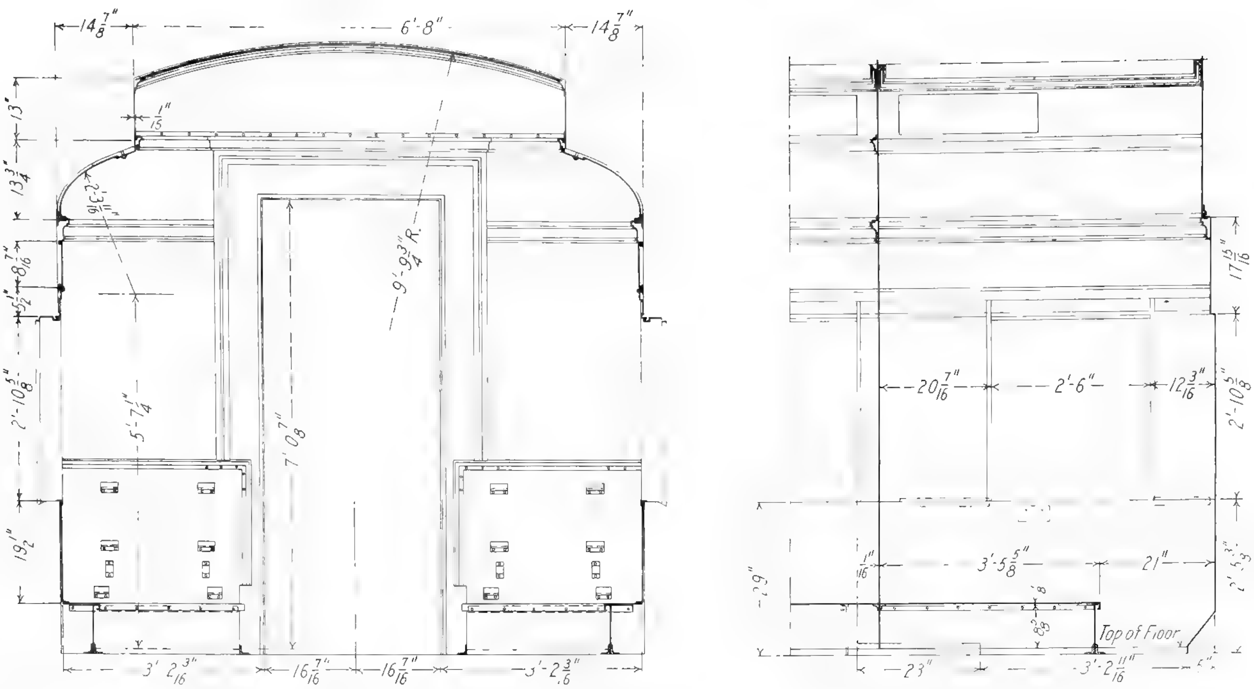


Fig. 1590—Steel Interior Finish for Passenger Coach. Art Metal Construction Company.

Fig. 1591—Steel Finish in Long Island Parlor Car.

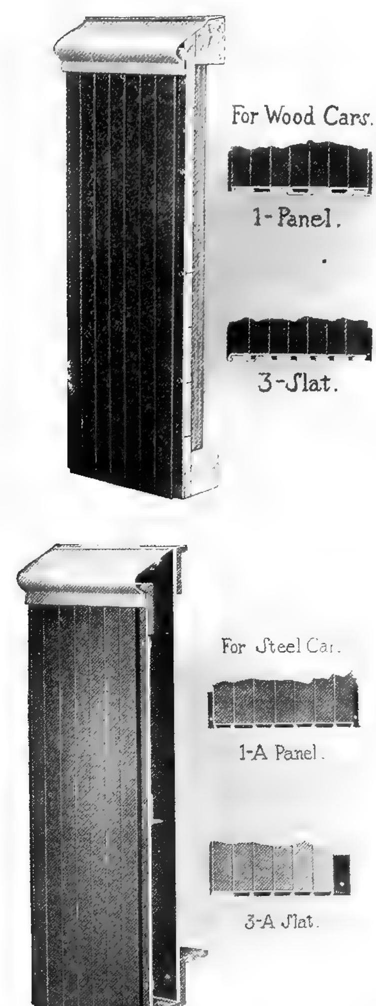


Fig. 1592—Metallic (Steel) Sheathing for Passenger Train Cars. Transportation Utilities Company.

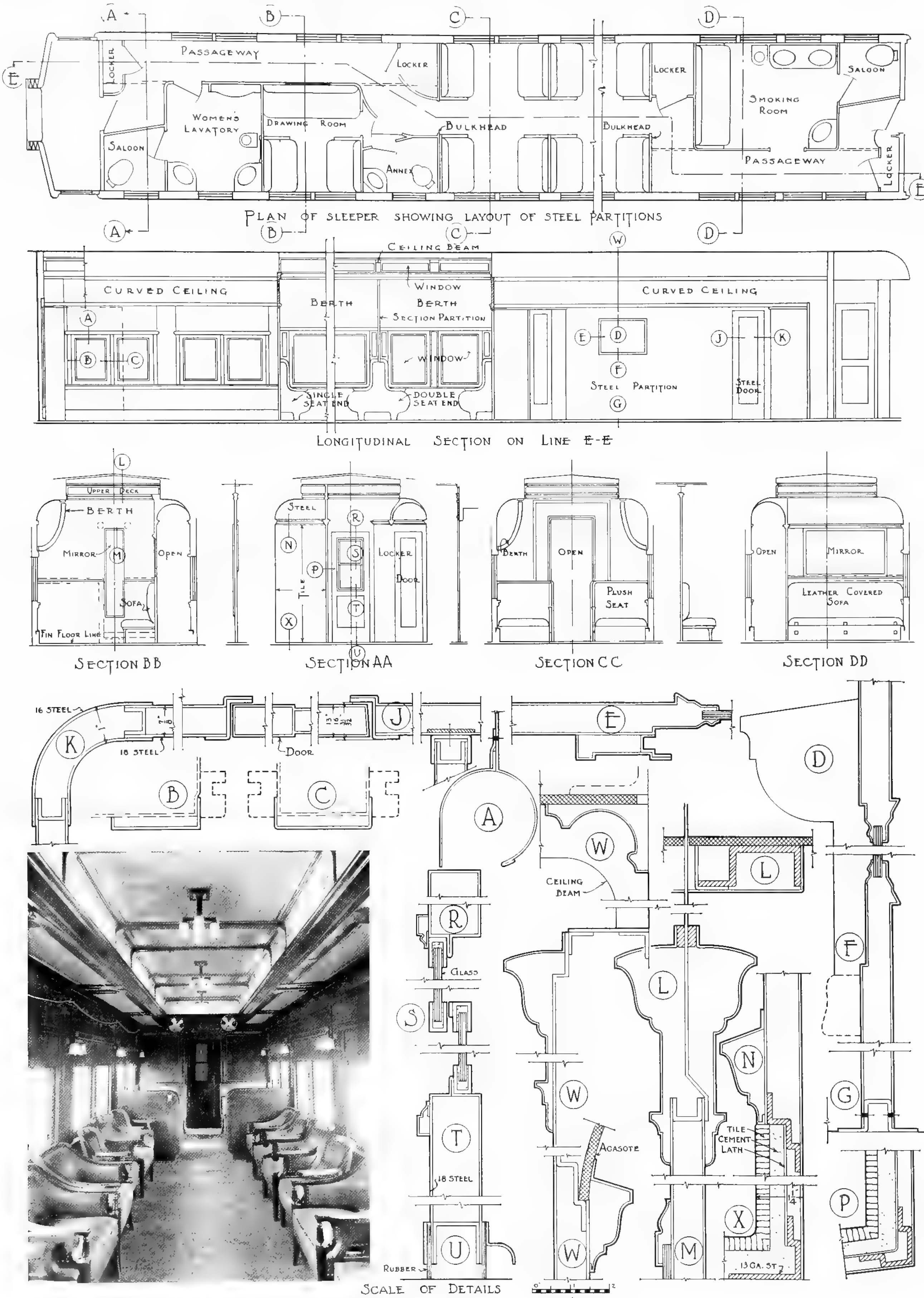


Fig. 1593—Steel Interior Finish for Passenger Train Cars. Dahlstrom Metallic Door Company.

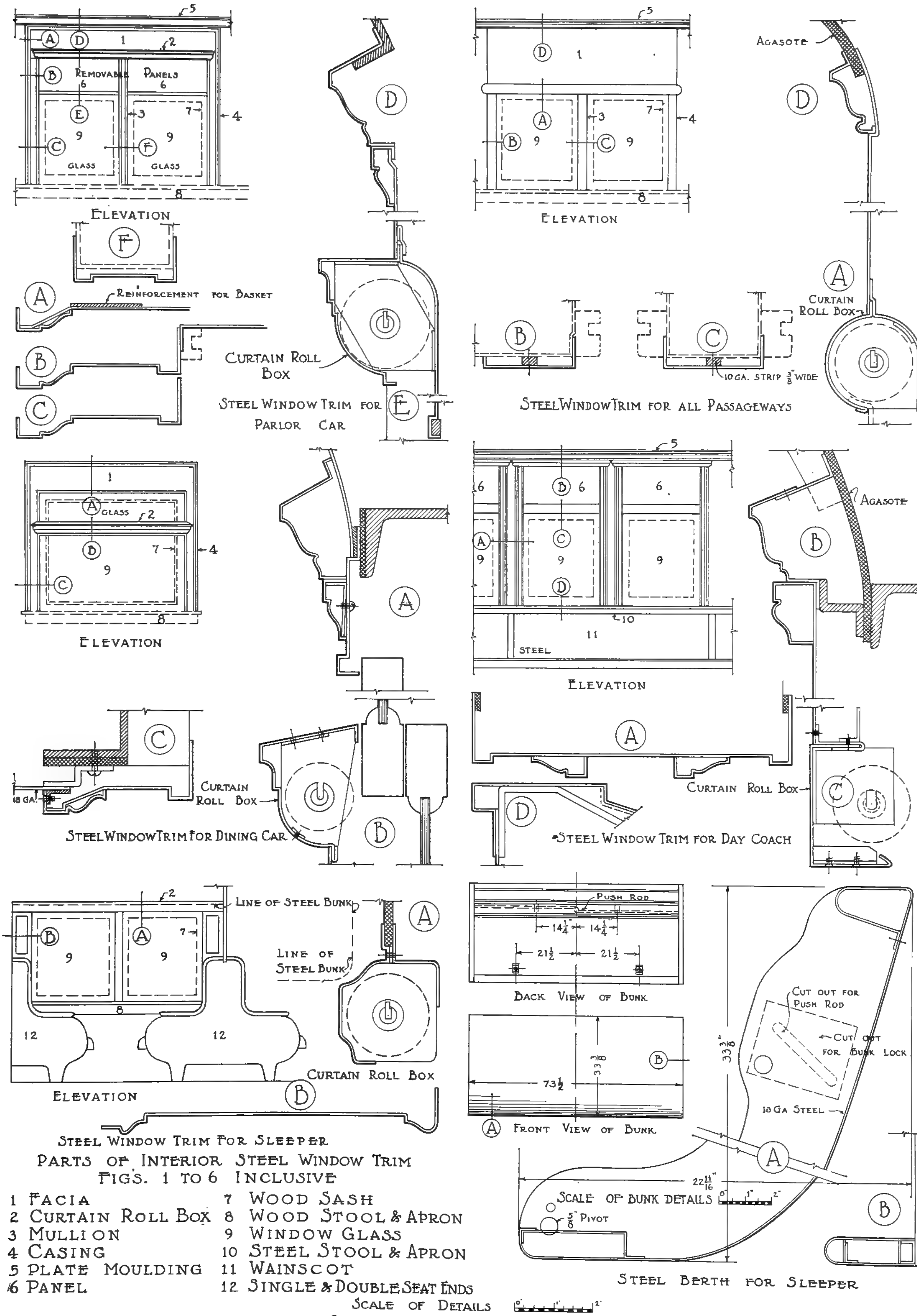


Fig. 1594—Steel Interior Finish for Passenger Train Cars. Dahlstrom Metallic Door Company.

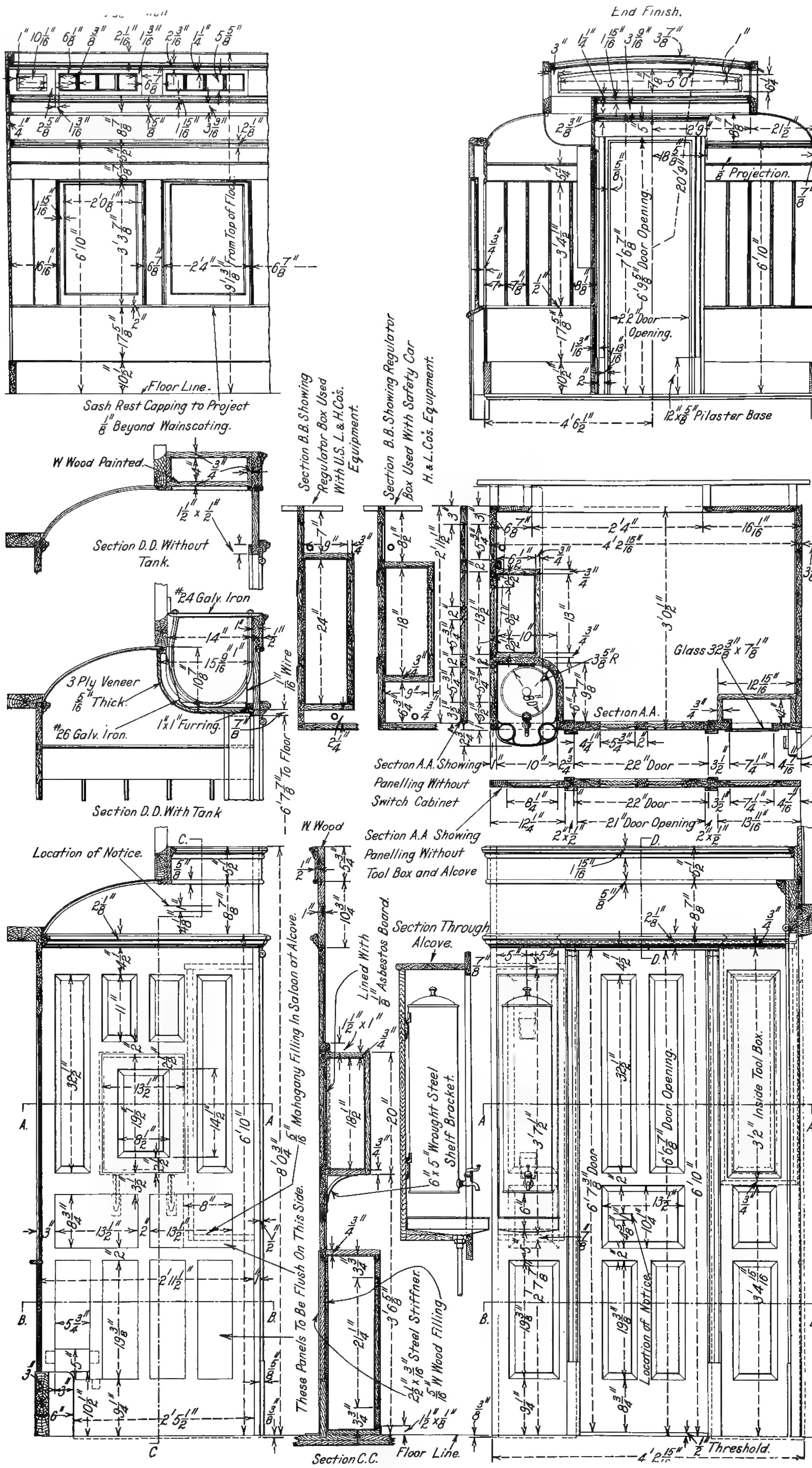


Fig. 1595—Finish on Side and End, and End of Saloon of New York, New Haven & Hartford Wooden Day Coach.

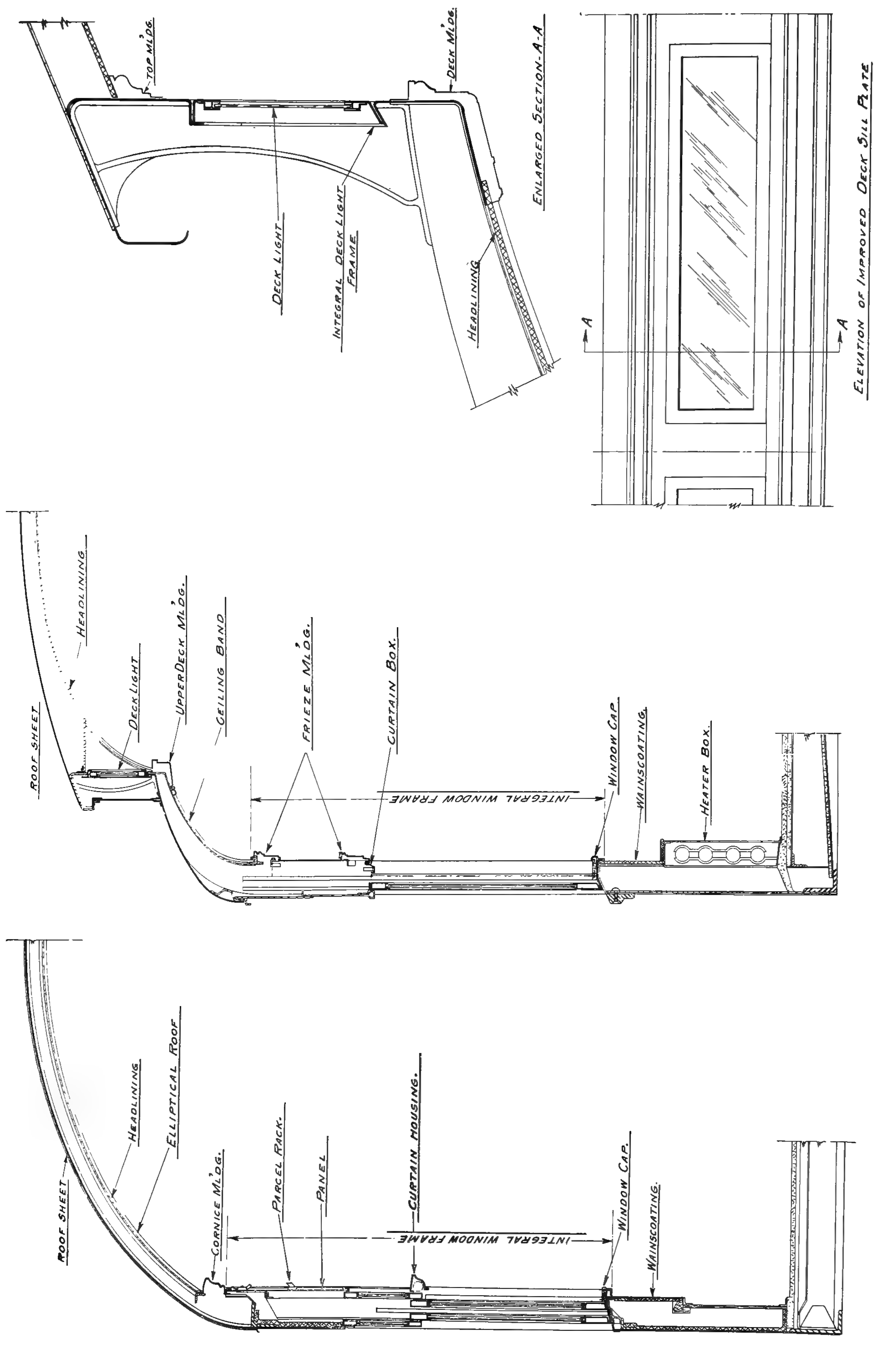


Fig. 1596—Interior Finish for Steel Passenger Train Cars. The Hale & Kilburn Company.

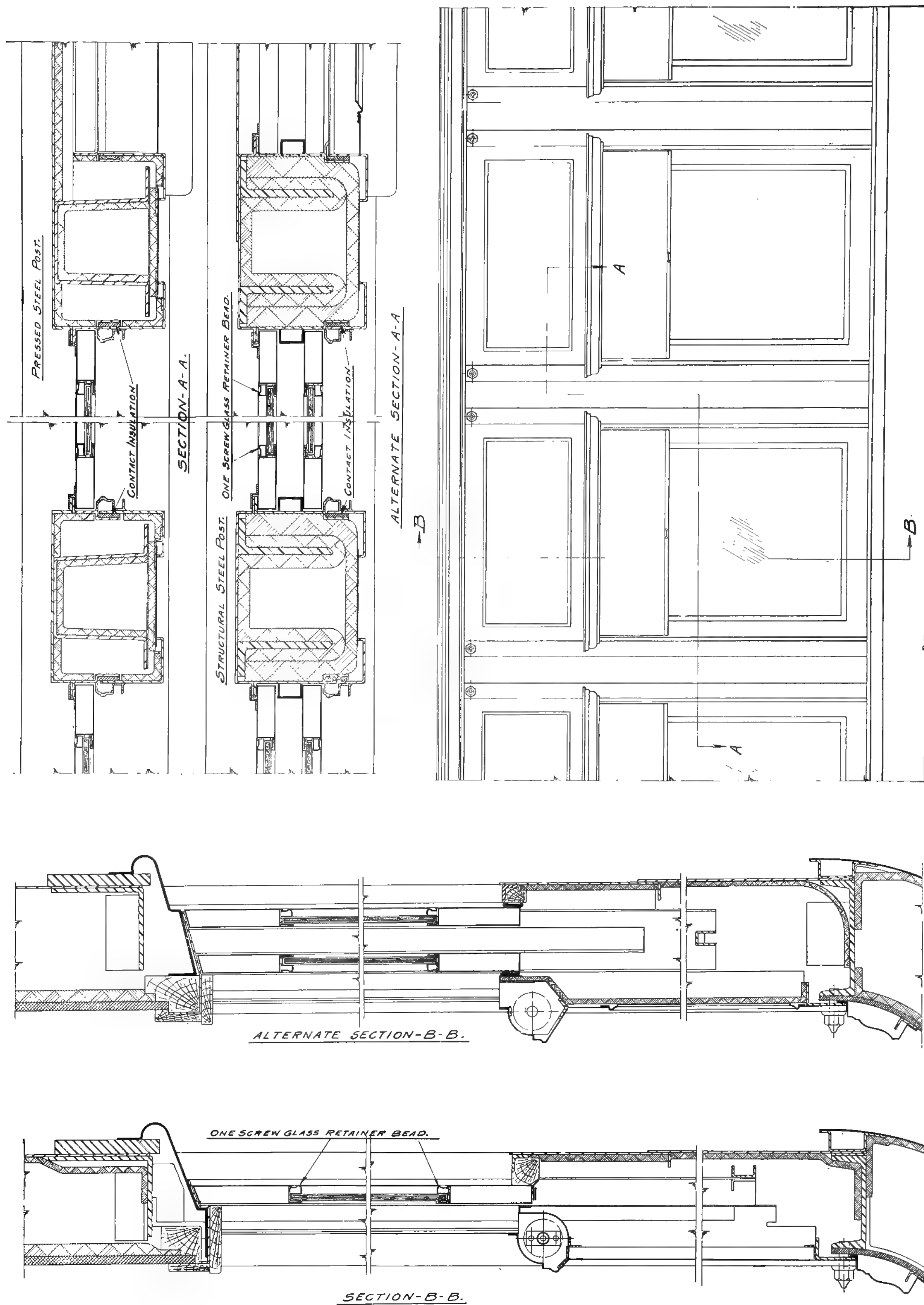


Fig. 1597—Integral Window Frames for Steel Passenger Equipment. The Hale & Kilburn Company.

Parts of Sleeping Car Sections, Figs. 1600 and 1601.

1 *Lower Berth*
2 *Upper Berth*
3 *Lower Berth Arranged as Seat*
4 *Head Board*
5 *Clothes Hammock*
6 *Berth Curtain Rod*
7 *Berth Curtain*
8 *Mirror*
9 *Berth Lamp*
10 *Berth Chain*
11 *Berth Chain Pulley*
12 *Coat Hanger*
13 *Berth Safety Rope*
14 *Upper Berth Ladder*
15 *Upper Berth Safety Straps*
16 *Head Rest, Used at Night as Clothes Rack*
17 *Window Shade*
18 *Electric Bell Push Button*
19 *Portable Table*
20 *Lower Deck Head Lining*

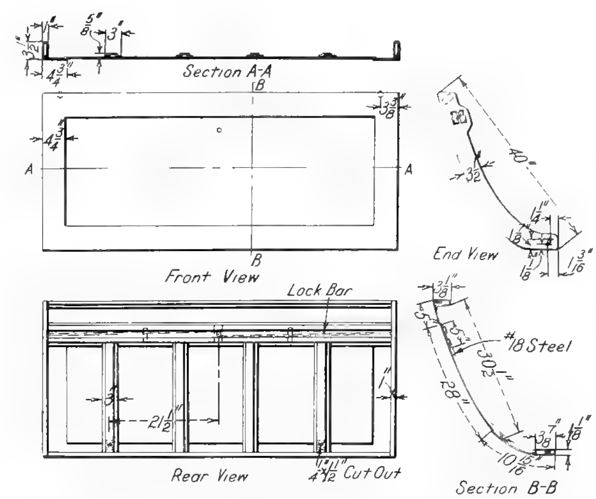


Fig. 1598—Steel Upper Berth. Dahlstrom Metallic Door Company.

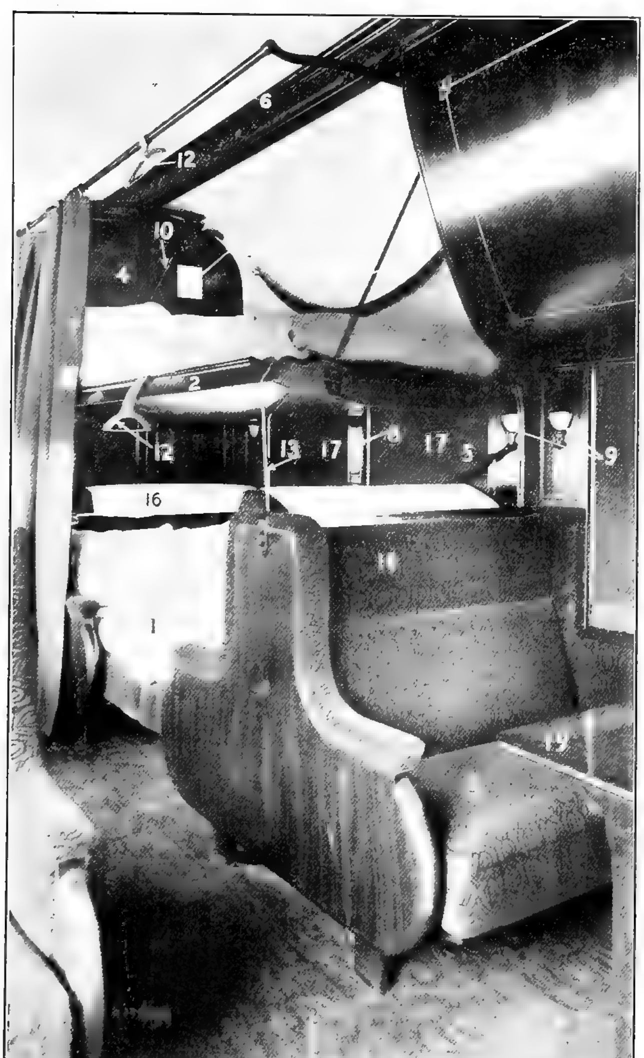


Fig. 1600—Pullman Sleeping Car Section with Upper Berth Down.

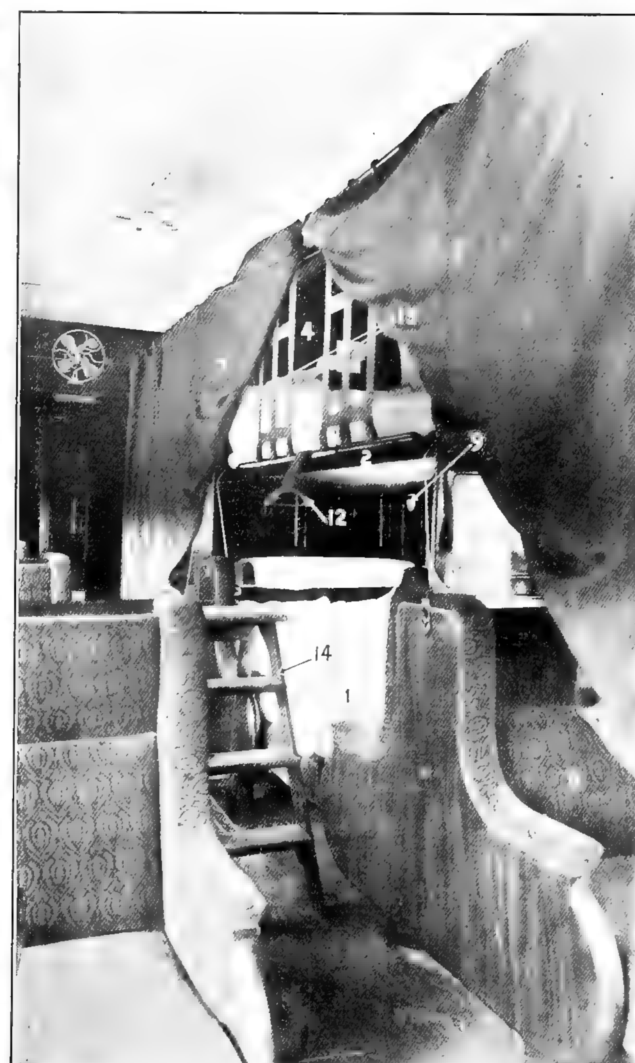


Fig. 1601—Pullman Sleeping Car Section with Curtain Drawn Back Showing Berths Made Up.

See Above for Names of Numbered Parts.

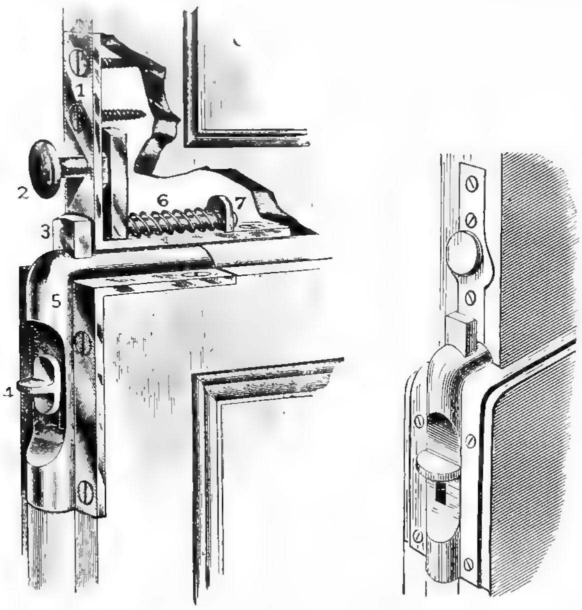


Fig. 1602—Head Board Bolt and Application Details. Dayton Manufacturing Company.

Parts of Fig. 1602.

1 *Upper Face Plate*	5 *Lower Face Plate*
2 *Knob Latch*	6 *Bolt Spring*
3 *Lower or Fixed Bolt*	7 *Upper or Spring Bolt*
4 *Slide Latch*	

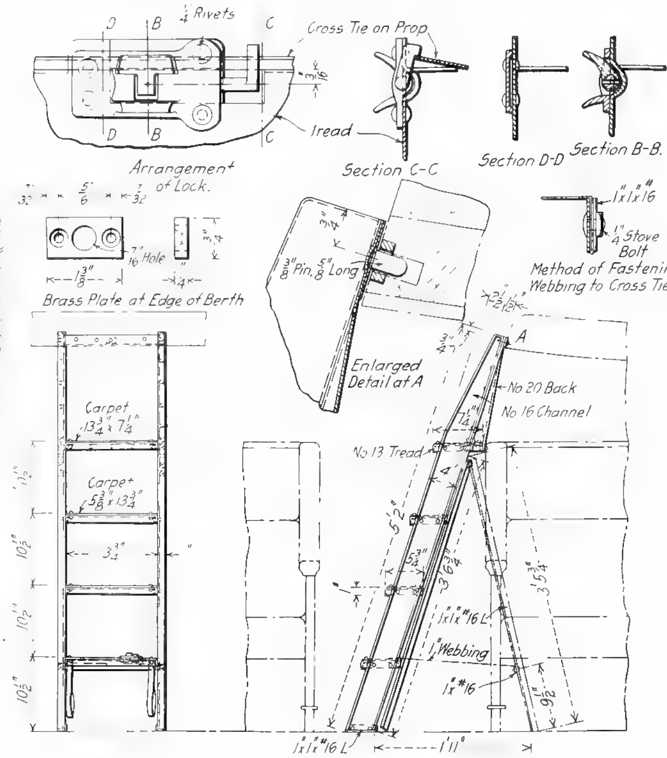
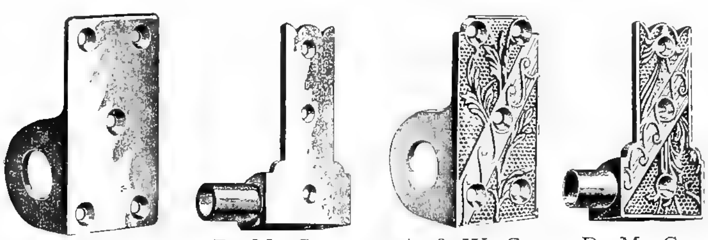


Fig. 1603—Steel Step Ladder for Sleeping Cars. Canadian Northern.



A. & W. Co. D. M. Co. A. & W. Co. D. M. Co.

Fig. 1604—Berth Hinges.

Fig. 1605—Head Board Fastener. Adams & Westlake Company.

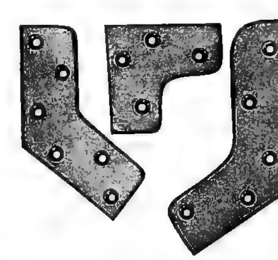


Fig. 1605A—Head Board Plates. Adams & Westlake Company.

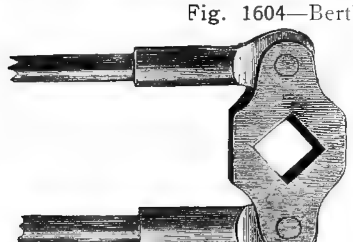


Fig. 1606—Berth Lock Rods. Dayton Manufacturing Company.

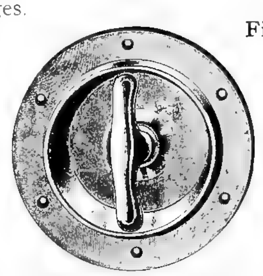


Fig. 1607—Berth Lock Handle. Adams & Westlake Company.

Fig. 1608 — Berth Curtain Hook. D. M. Co.

Fig. 1609 — Berth Safety Rope Hook. A. & W. Co.

Fig. 1610 — Berth Curtain Hook.

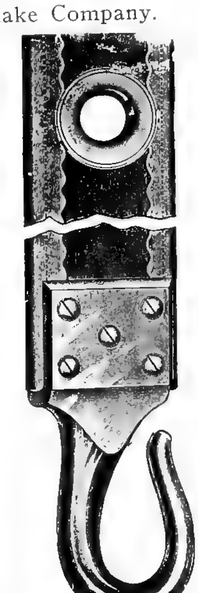
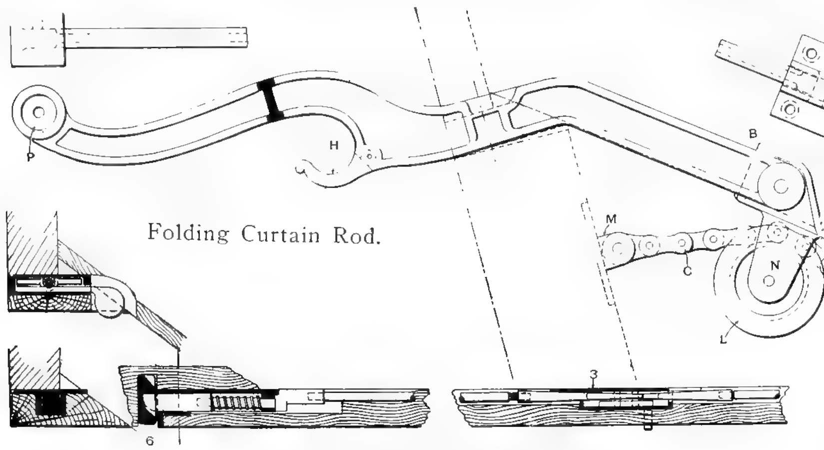


Fig. 1611 — Upper Berth Safety Strap and Hook. J. L. Howard & Co.

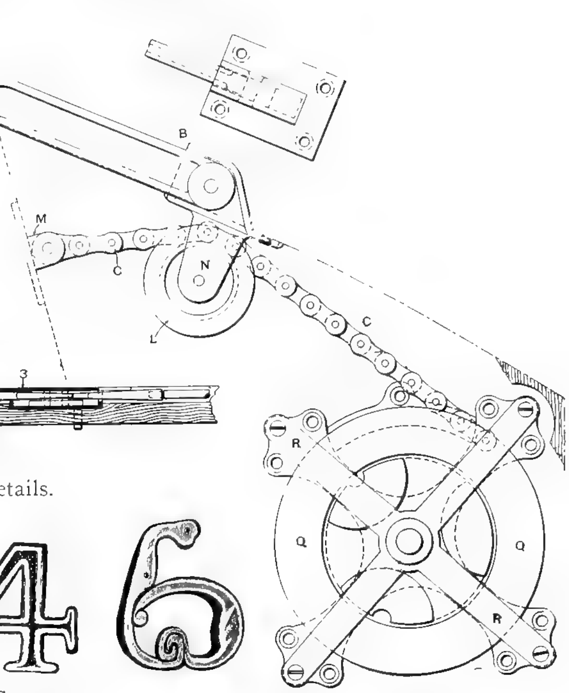
Fig. 1612 — Upper Berth Catch. A. & W. Co.



Folding Curtain Rod.

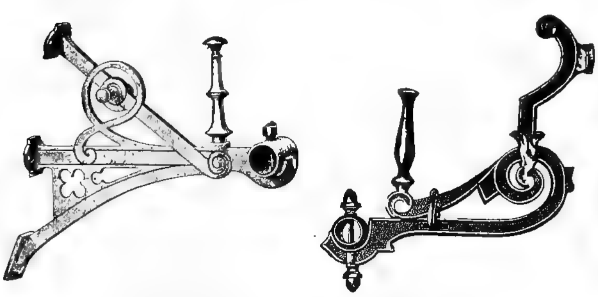
Section Through Latch.

Fig. 1613—Upper Berth Details.



Berth Spring, Chain and Pulley.

Fig. 1614—Berth Numbers. Dayton Manufacturing Company.



Jas. L. Howard & Co. Adams & Westlake Co.

Fig. 1615—Berth Curtain Rod Brackets.

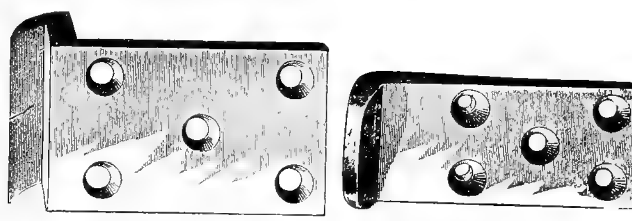


Fig. 1616—Table Hooks. Dayton Manufacturing Company.

Fig. 1617—Seat Arm Rivets. Dayton Manufacturing Company.

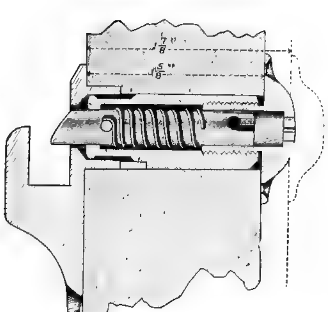


Fig. 1618—Kirby's Seat Lock for Wood Seat Ends. Dayton Manufacturing Company.

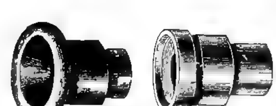


Fig. 1619 — Seat Arm Thimbles. Adams & Westlake Company.

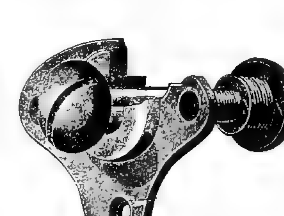


Fig. 1620 — Seat Arm Pivot Bolt. Dayton Manufacturing Company.

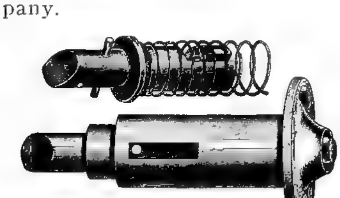


Fig. 1621—Seat Back Arm Lock, Bolt and Spring. Adams & Westlake Company.

Adams & Westlake Company. Dayton Manufacturing Company.

Fig. 1622—Seat Back Arm Locks with Escutcheons.

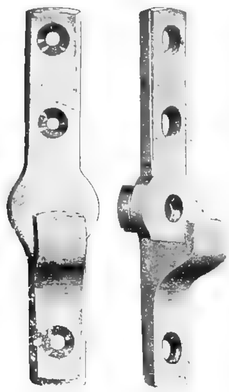
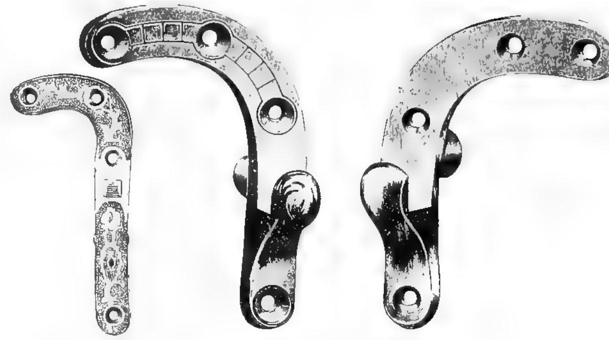


Fig. 1623 Straight Seat Arm Stops. Adams & Westlake Company.



A. & W. Co. Dayton Manufacturing Co.

Fig. 1624 Curved Seat Arm Stops

Fig. 1625 — Seat Arm Stops. D. M. Co.

Fig. 1626—Round Seat Arm Stops Which May be Fitted with Locks. Adams & Westlake Company.

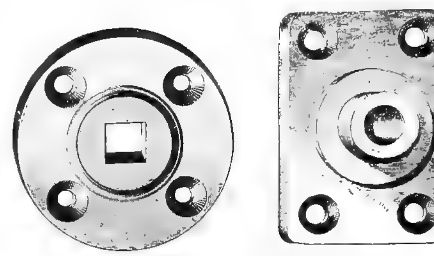


Fig. 1627—Seat Arm Pivots. Dayton Manufacturing Company.

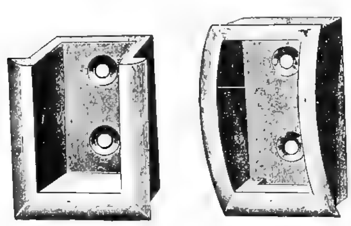


Fig. 1628—Seat Rail Sockets. A. & W. Co.

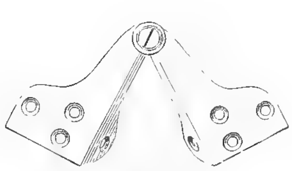


Fig. 1629 Seat Hinge. D. M. Co.

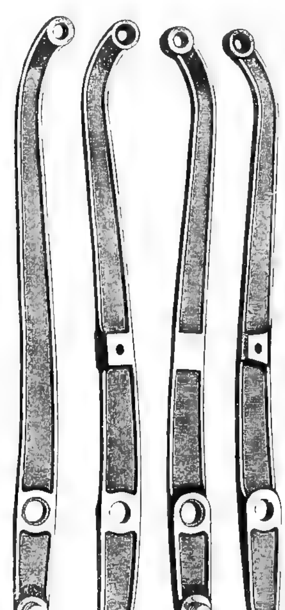


Fig. 1630—Seat Back Arms for Forney Seats.

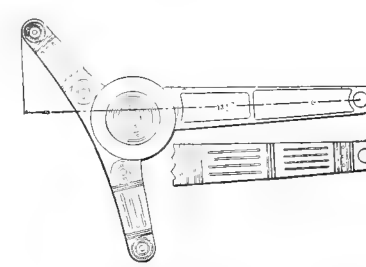


Fig. 1631—Pivoted Seat Back Arm. Dayton Manufacturing Company.

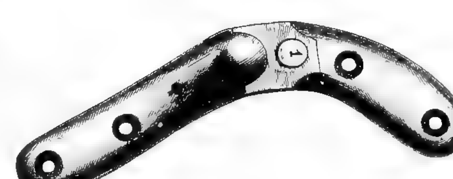


Fig. 1631A—Curved Seat Arm Stop with Lock.

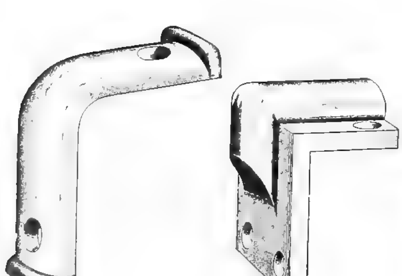


Fig. 1632—Seat Back Corners. A. & W. Co.

Fig. 1633—Chair and Sofa Casters. Adams & Westlake Co.

Fig. 1634—Seat Pull. A. & W. Co.

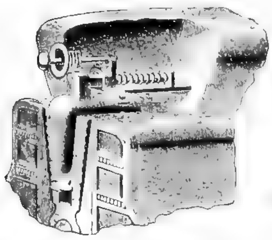


Fig. 1635—Sofa Arm Rest Bolt in Position.

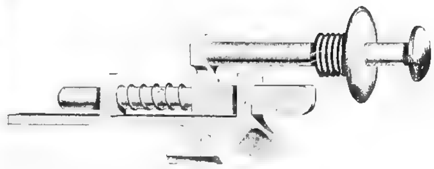


Fig. 1636—Sofa Arm Rest Bolt.

Dayton Manufacturing Company.

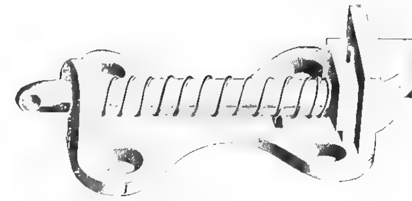


Fig. 1637—Sofa Bolt. Adams & Westlake Company.

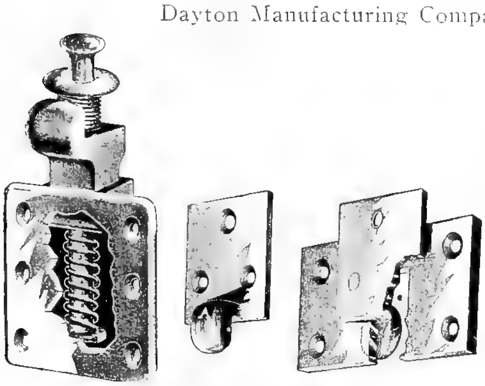


Fig. 1638—Sofa Arm Rest Fixtures. Dayton Manufacturing Company.

Fig. 1639—Spring Catch.

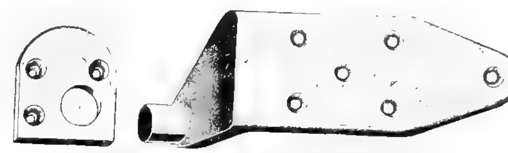


Fig. 1640—Sofa Back Pivot, Hinge and Bushing. Dayton Manufacturing Company.

Pin Bushing. Pin Plate. Catch Plate. Pin.

Fig. 1641—Sofa Arm Rest Fixtures. Dayton Manufacturing Company.

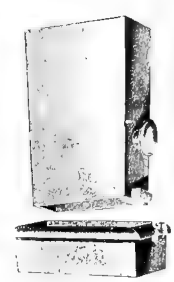


Fig. 1642—Sofa Rail End and Socket. Adams & Westlake Company.

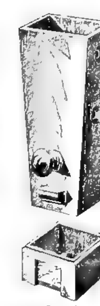


Fig. 1643—Sofa Back Leg Socket and Pocket. Dayton Manufacturing Company.

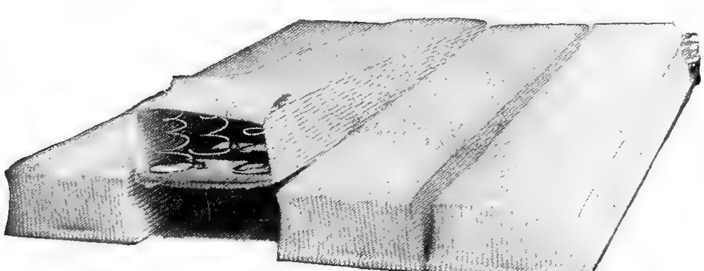


Fig. 1644—Spring Bed Sections for Private and Sleeping Cars. Hale and Kilburn Company.

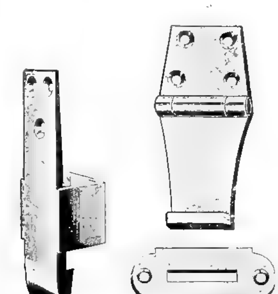


Fig. 1645—Table Leg Hook; Table Holder and Plate. Adams & Westlake Company.

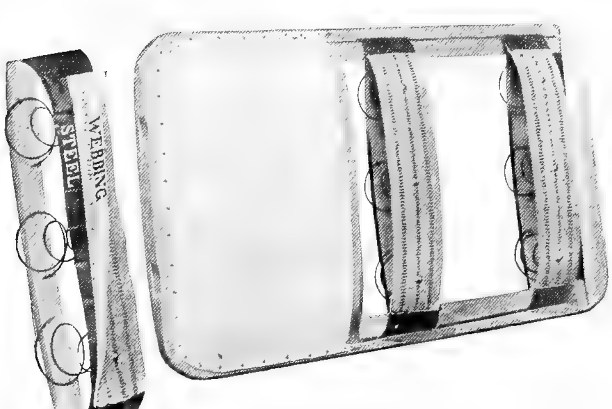


Fig. 1646—Improved Combination Spring Back, with One Section Detached.

Fig. 1647—Improved Combination Spring Cushion, with One Section Detached.

Hale & Kilburn Company.

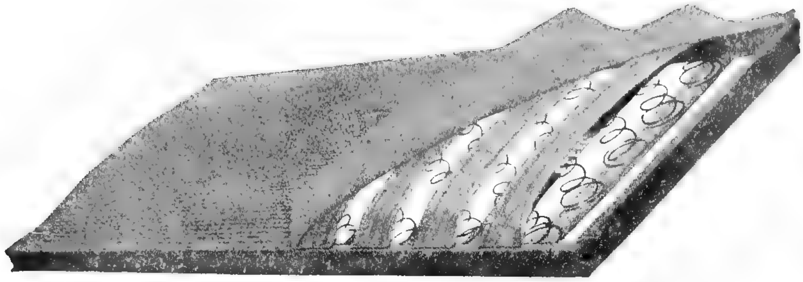


Fig. 1648—Sleeping Car Upper Berth Spring.

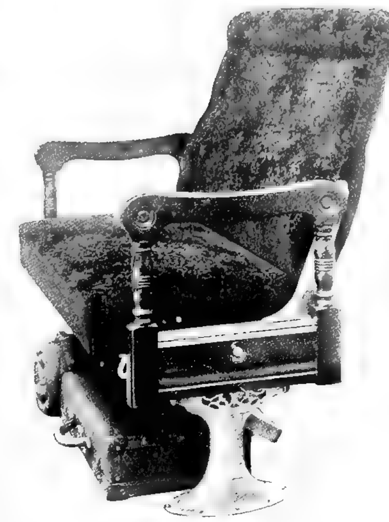


Fig. 1650—Walkover Seat No. 97 with Frieze Plush Upholstery.

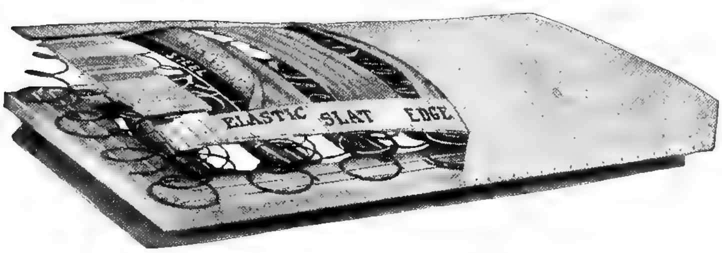


Fig. 1649—Spring Seat, Showing the Use of Slat and Webbing and the Elastic Slat Edge.

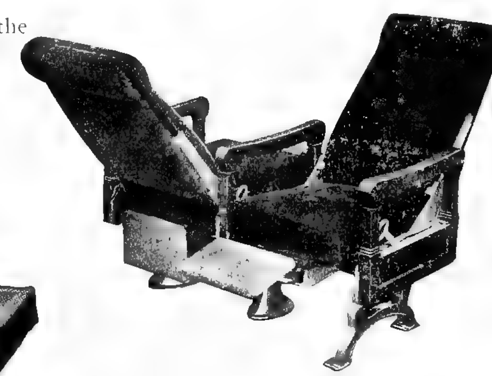


Fig. 1652—Double Reclining Chair No. 65 with Plush Upholstery.

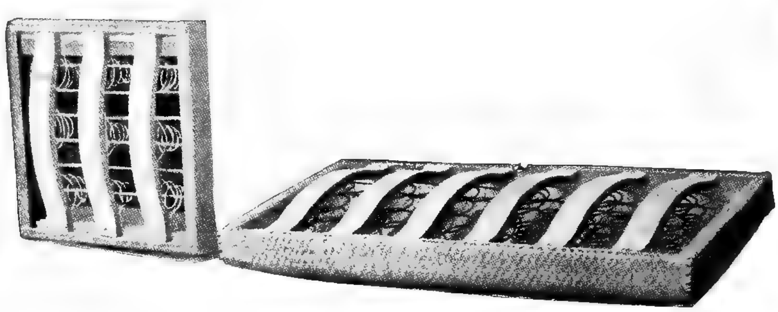


Fig. 1651—Reverse Side of Single and Double Rattan Spring Seats, Showing Construction.

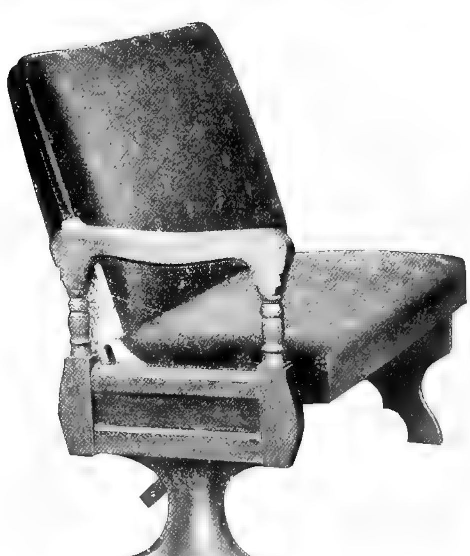


Fig. 1653—Walkover Seat No. 197 with Plain High Back and Frieze Plush Upholstery.

Fig. 1654—Walkover Seat No. 197 with Extra High Headroll Back and Plain Plush Upholstery.

Fig. 1655—Walkover Seat No. 93 with Rattan Upholstery.

Fig. 1656—Steel Walkover Seat with Plush Upholstery, for New York Central Steel Coaches

Fig. 1657—Standard All-Steel Walkover Seats. Atchison, Topeka & Santa Fe.

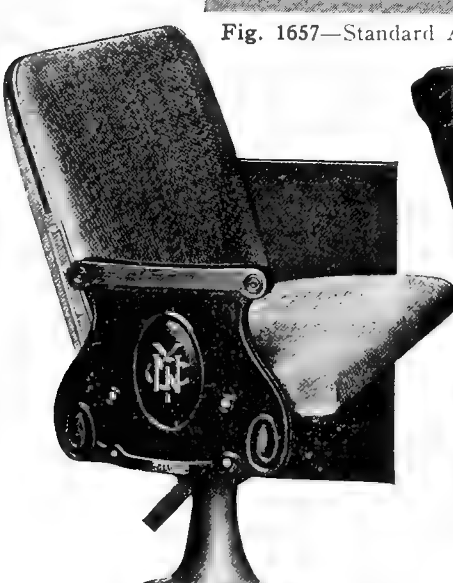


Fig. 1658—Steel Walkover Seat with Rattan Upholstery, for New York Central Suburban Cars.

Fig. 1659—Steel Walkover Seat with Plush Upholstery, for Union Pacific Steel Coaches.

Fig. 1660—Steel Walkover Seat with Frieze Plush Upholstery, for Pennsylvania Railroad Steel Coaches.

Hale & Kilburn Company.

Fig. 1661—Revolving Chair No. 37.

Fig. 1662—Revolving and Reclining Chair No. 42.

Fig. 1663—Revolving Parlor Car Chair No. 38.

Fig. 1664—Steel Walkover Seats and Steel Integral Window Construction.

Fig. 1665—Reversible Seat for New York, New Haven & Hartford Vestibuled Coaches.

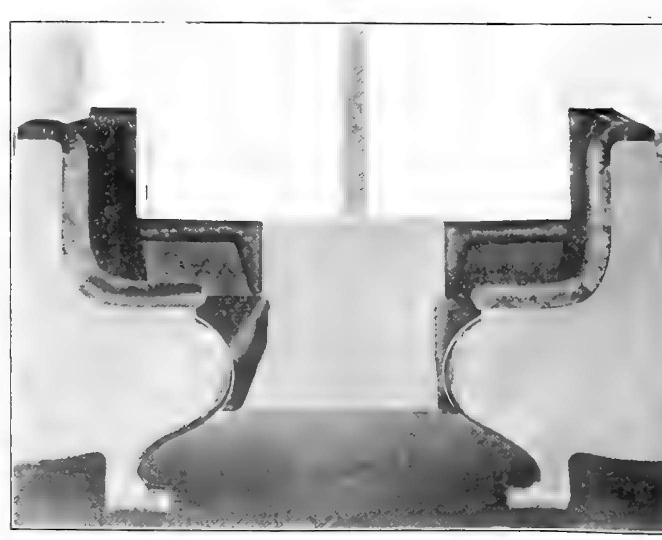


Fig. 1666—Steel Seats and Lower Berth with Plush Upholstery, for Sleeping Car.

Hale & Kilburn Company.

Fig. 1667—Reclining Parlor Car Chair No. 42.

Fig. 1668—Revolving Parlor Car Chair No. 30.

Fig. 1669—Revolving Parlor Car Chair No. 32.

Seaboard Air Line Style. New York Central Style.

Fig. 1670—Neverbreak Pressed Steel Walkover Seats.

Hale & Kilburn Company.

Fig. 1671—Revolving Parlor Car Chair, No. 41.
Hale & Kilburn Company.

Fig. 1672—Pressed Steel Car Seat.
Sheridan A. Walker Company, Incorporated.

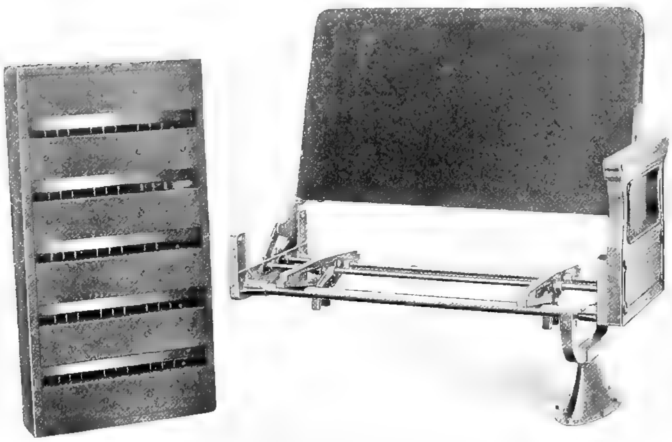


Fig. 1673 Pressed Steel Seat and One-Piece Pressed Steel Cushion Frame.

Fig. 1674—End View of Pressed Steel Car Seat.

Sheridan A. Walker Company, Incorporated.

Fig. 1675—No. 85 S. G. F. Universal Slideover Seat, Rattan Upholstery.

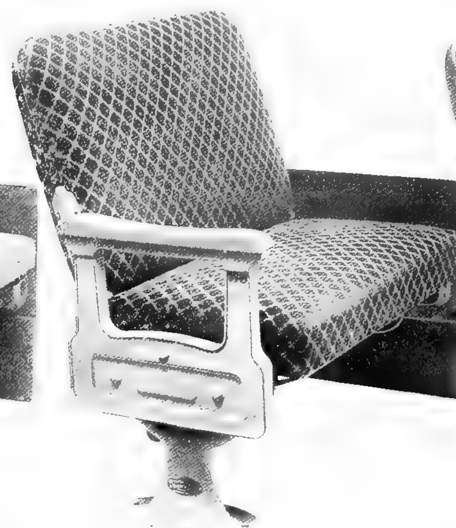


Fig. 1676—No. 85 A. C. F. Slideover Seat, Plush Upholstery; New York, New Haven & Hartford Standard.

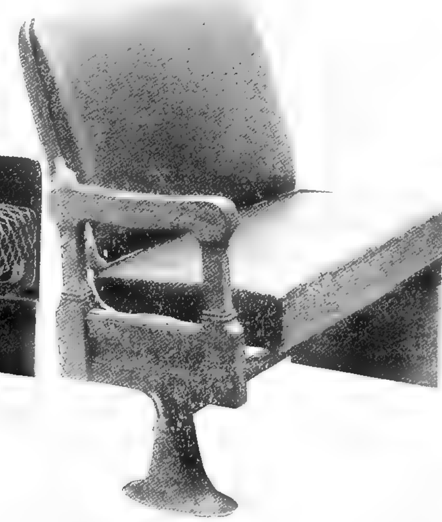


Fig. 1677—No. 350 A. C. F. Universal Slideover Seat, Leather Upholstery.

Fig. 1678—No. 302 A. C. F. Universal Turnover Seat.

Fig. 1679—No. 85 A. G. F. Universal Slideover Seat.

Fig. 1680—No. 85 S. G. F. Universal Slideover Seat.

Heywood Brothers & Wakefield Company.

Fig. 1681—Richards Panel Back Dining Car Chair, without Arms.

Fig. 1682—Richards Panel Back Double Seat.

Fig. 1683—Richards Panel Back Dining Car Chair, with Arms.

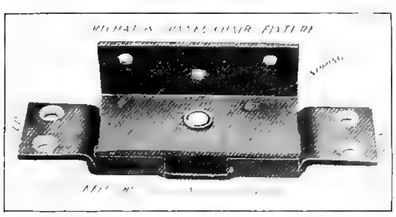


Fig. 1684—Richards Panel Chair Steel Pivot Fixture.

Fig. 1685—Richards Panel Back Fiber-Rush Chair.

Fig. 1686—Richards Panel Back Parlor Car Chair; Pullman Standard.

Fig. 1687—Richards Panel Back Revolving Chair Seat, with or without Reclining Back.

Richards Chair Panel Company.

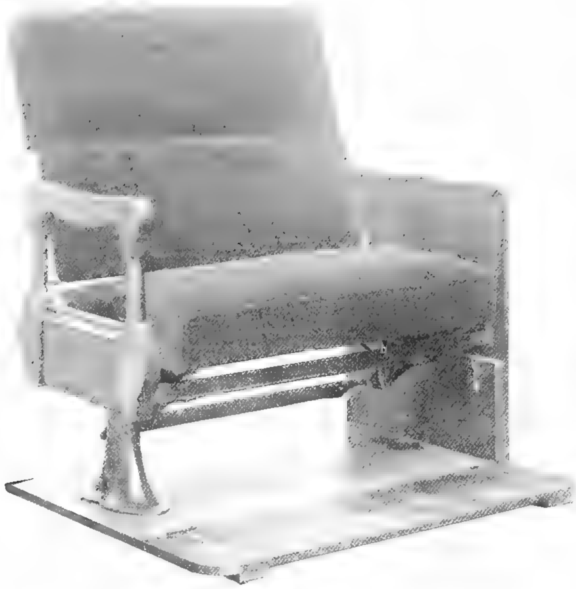


Fig. 1688—Standard Coach Seat with Plush Upholstery.

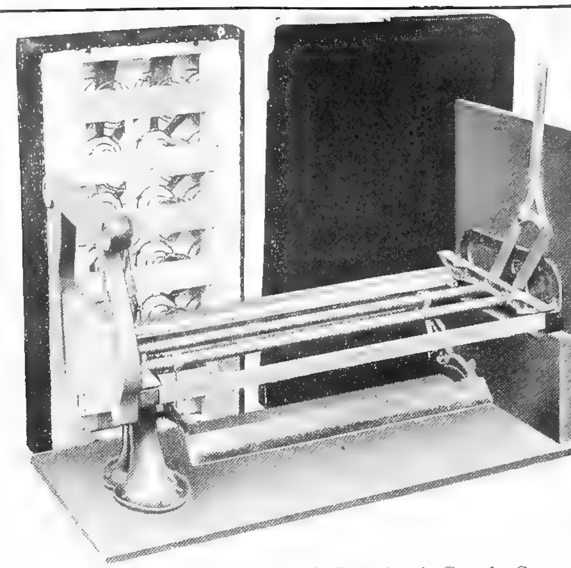


Fig. 1689—Mechanism of Standard Coach Seat.

The Barney & Smith Car Company

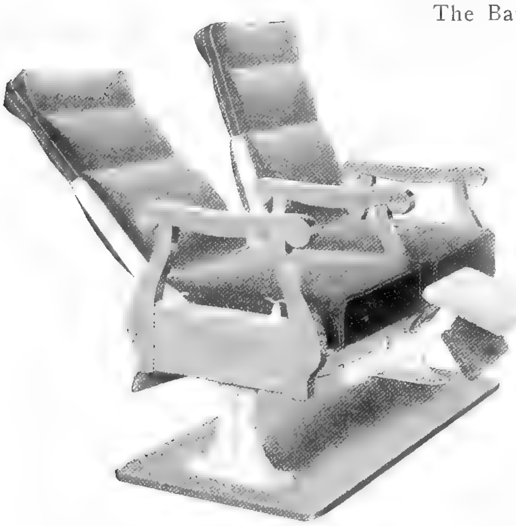


Fig. 1690 Double Reclining Chair Seat.

Fig. 1691—Mechanism of Double Reclining Chair Seat Shown in Fig. 1690. The Barney & Smith Car Company.

Fig. 1692—Coach Seat with Room Below for Suit Case. The Ford & Johnson Company.

Fig. 1693—Steel Seat. The Barney & Smith Car Company.

Fig. 1694—Reversible Seat No. 71 with Rattan Upholstery, for Narrow Gage Cars.

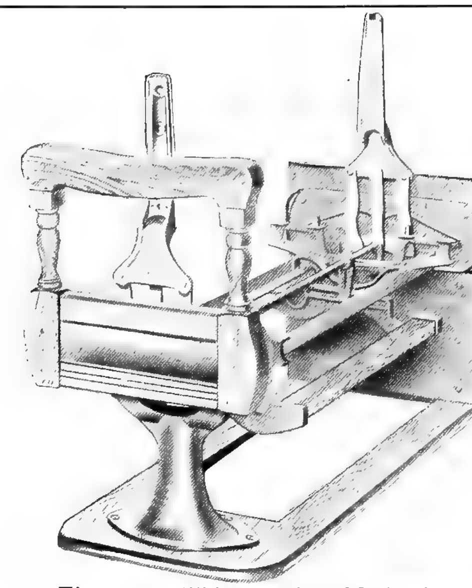


Fig. 1695—Glideover Seat Mechanism.

Fig. 1696—Coach Seat with Double Striker Arms and Grab Handle.

Fig. 1697—Parlor Car Chair with Revolving Pedestal

The Ford & Johnson Company.

Fig. 1698—Reed Chair for Parlor and Observation Cars. The Ford & Johnson Company.

Fig. 1699—Parlor Car Chair No. 1091. Scarritt-Comstock Furniture Company.

Fig. 1700—Medium Back Coach Seat No. 33

Fig. 1701—High Back Coach Seat No. 32X, Showing Construction of Frames.

Fig. 1702 -Parlor Car Chair No. 114.

Fig. 1703—Medium Back Coach Seat No. 17.

Fig. 1704—Parlor Car Chair No. 113.

Fig. 1705—Parlor Car Chair No. 115.

Scarritt-Comstock Furniture Company.

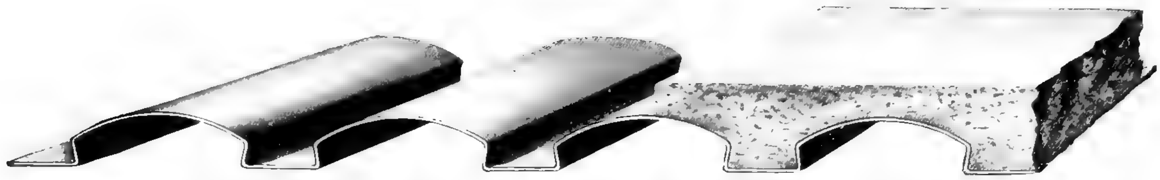


Fig. 1706—Flexolith Composition Flooring. Transportation Utilities Company.

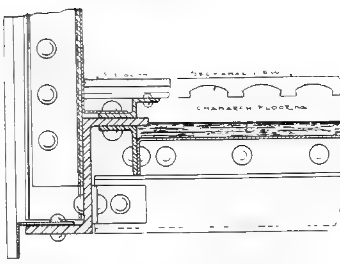


Fig. 1707—Chanarch Metal Flooring. Acme Supply Company.

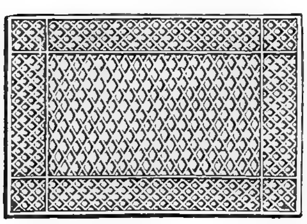


Fig. 1708 — Perforated Rubber Floor Mat.

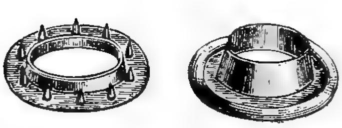


Fig. 1709—Upper and Lower Gromets for Carpet Eyelets. Adams & Westlake Company.

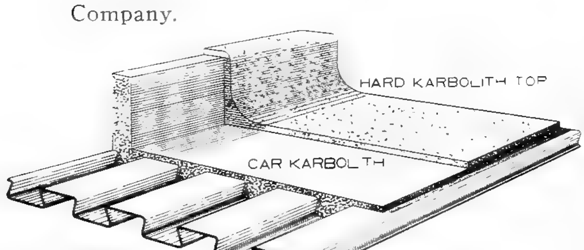


Fig. 1711—Karbolith Flooring as Applied to Pennsylvania Railroad Steel Passenger Train Cars. American Mason Safety Tread Company.

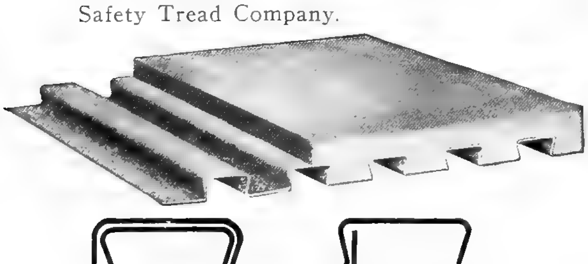


Fig. 1712—Keystone Car Flooring. Berger Manufacturing Company.

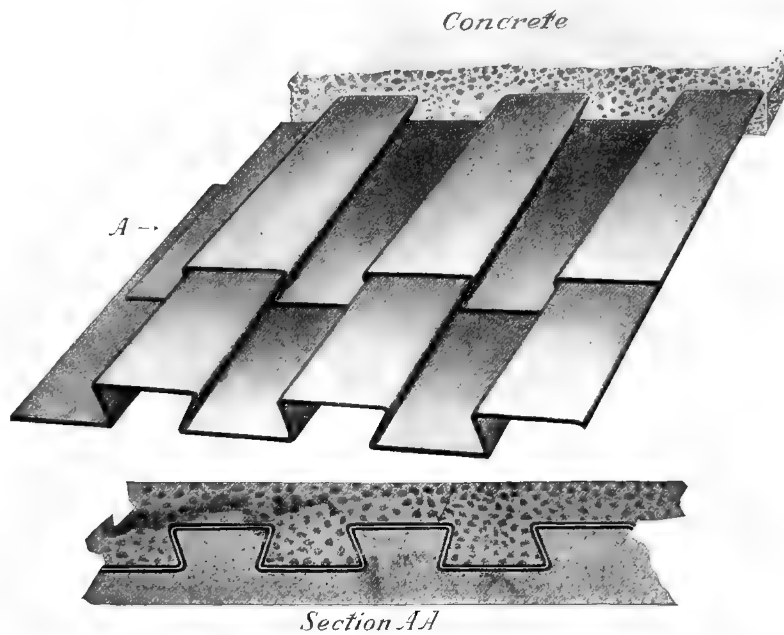


Fig. 1710—Ferroinclave Floor Covering. Brown Hoisting Machinery Company.

Fig. 1713—Application of Ferroinclave Floor Covering to Floor of Steel Car. Brown Hoisting Machinery Company.

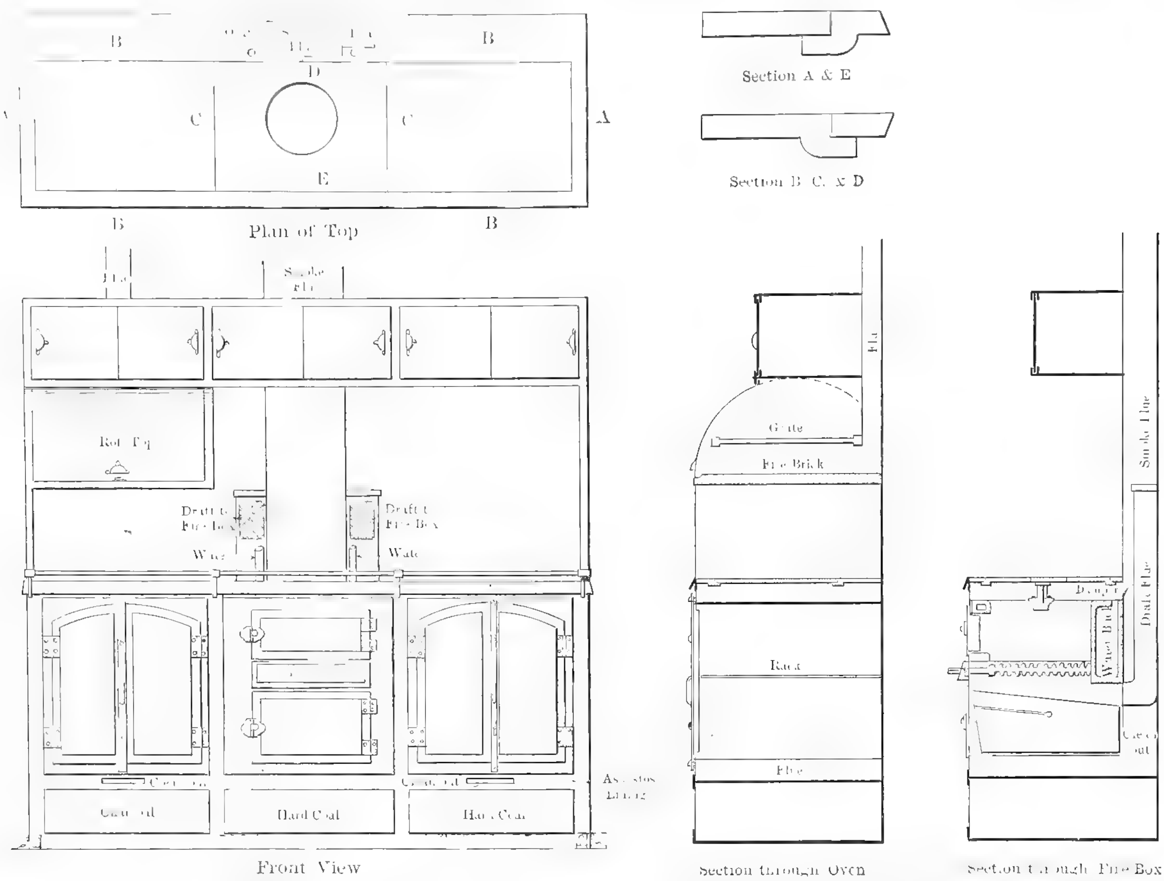


Fig. 1714—Stearns Safety Range for Dining Cars Stearns Steel Range Company.

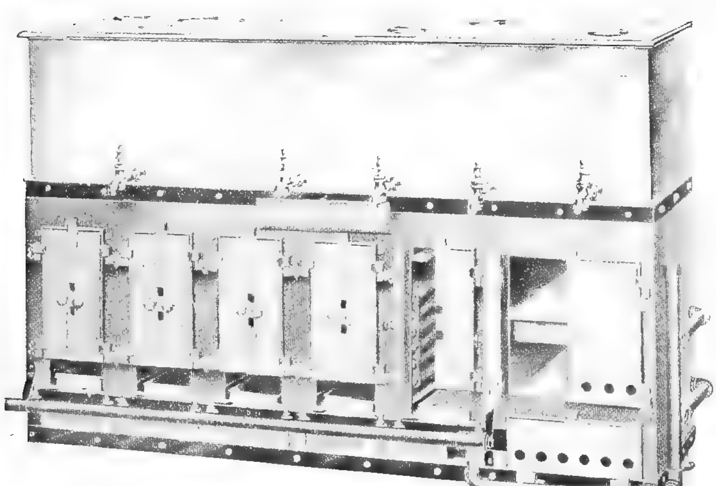


Fig. 1715—Gas Broiler and Oven No. 1507

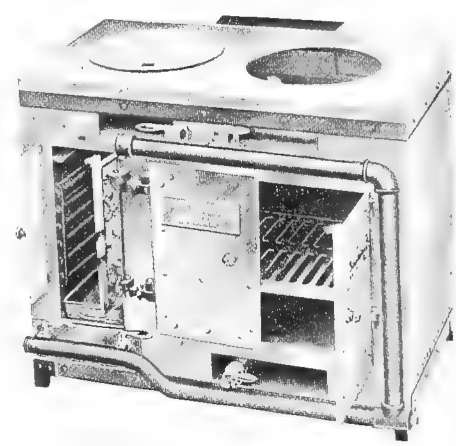


Fig. 1716—Gas Broiler and Oven No. 1501a.

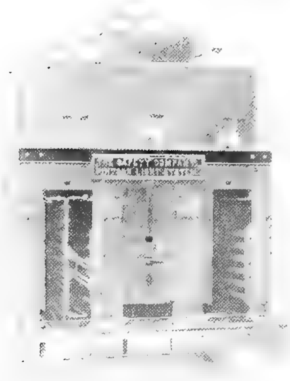


Fig. 1717—Gas Broiler No. 1500.

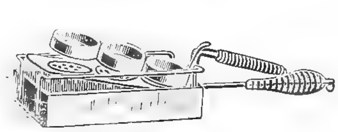


Fig. 1718—Egg Poacher No. 1504.

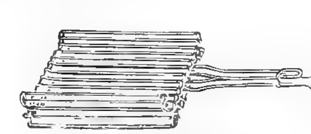


Fig. 1719—Broiling Iron No. 1502.

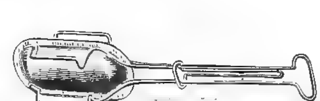


Fig. 1720—Hash Browner No. 1504.

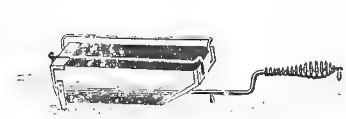
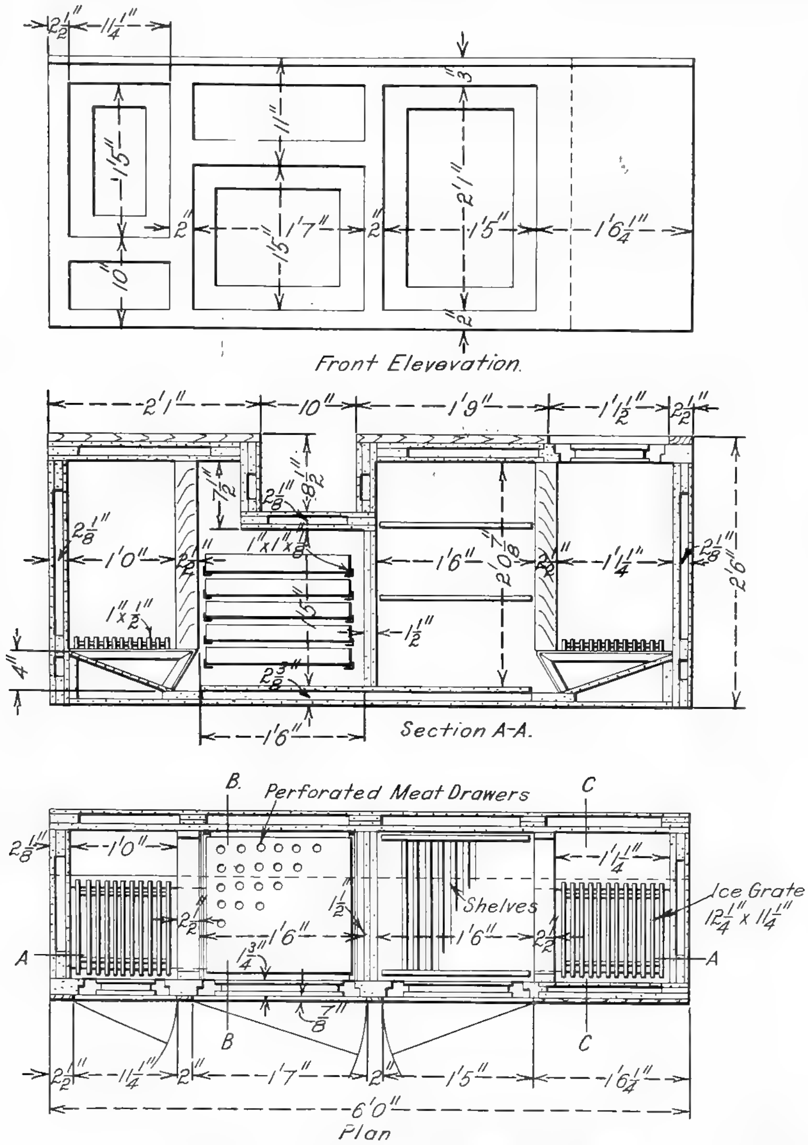


Fig. 1721—Frying Pan No. 1503.

Pintsch Gas Broilers and Utensils. The Safety Car Heating & Lighting Company.



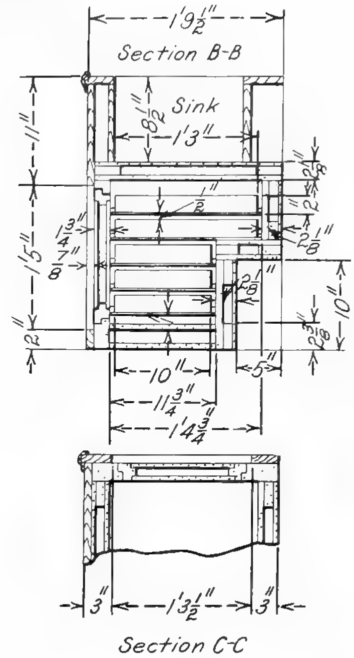


Fig. 1722—Buffet Refrigerator. White Enamel Refrigerator Company.

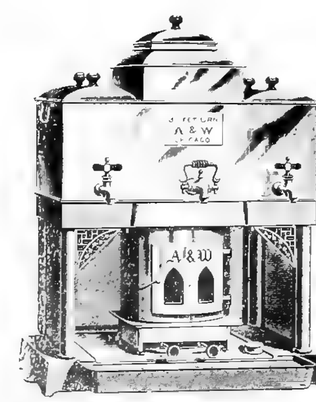


Fig. 1723—Buffet Stove and Urn. Adams & Westlake Company.

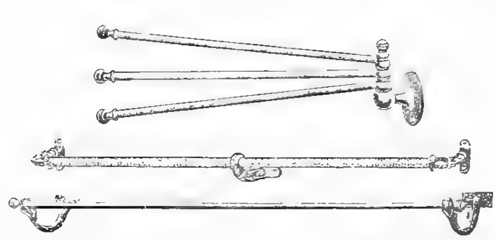


Fig. 1724—Towel Rods. Dayton Manufacturing Company.

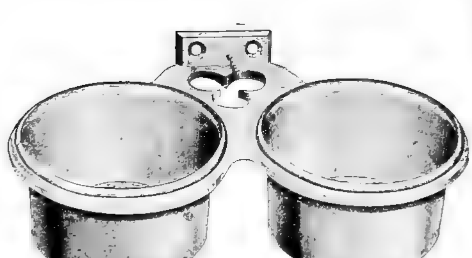


Fig. 1725—Double Tumbler Holder. Dayton Manufacturing Company.

Fig. 1726—Tumbler Holder. Adams & Westlake Company.

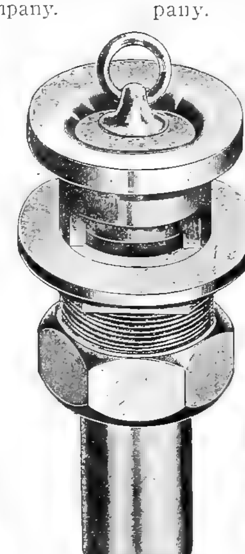


Fig. 1727 — Basin Bushing and Plug for Overflow Bowl.

Fig. 1728—Sink Bushing and Plug.

Fig. 1729 — Basin Bushing and Plug.

Adams & Westlake Company.

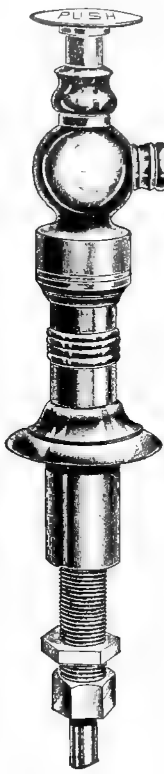


Fig. 1730 — Compression Faucet. **Fig. 1731**—Chain Post or Stay.
Adams & Westlake Company.

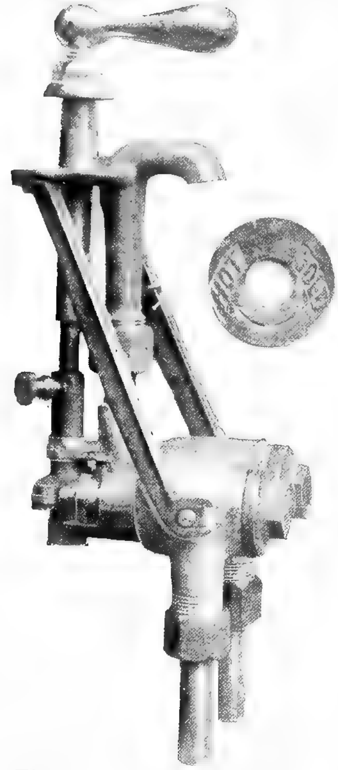


Fig. 1732—Combination Hot and Cold Water Faucet. A. & W. Co.

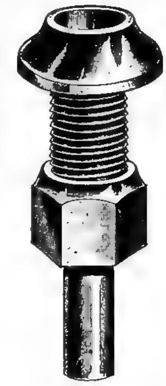


Fig. 1733 — Tail Coupling for Alcove Faucet. **Fig. 1734** — Tumbler Holder and Drip.
Adams & Westlake Company.

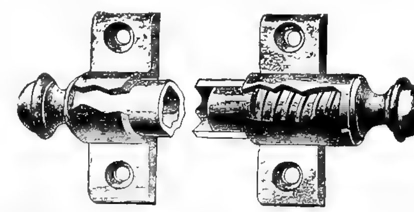


Fig. 1737—Towel Rod Bracket. Dayton Manufacturing Company.

Fig. 1735—Filler Cover. Jas. L. Howard & Company.

Fig. 1736—Soap Dish. A. & W. Co.

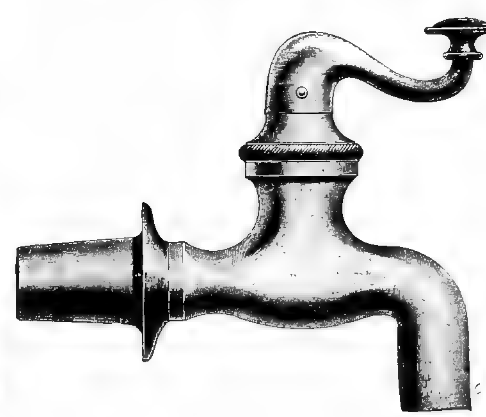


Fig. 1741—Telegraph Faucet. Dayton Manufacturing Company.

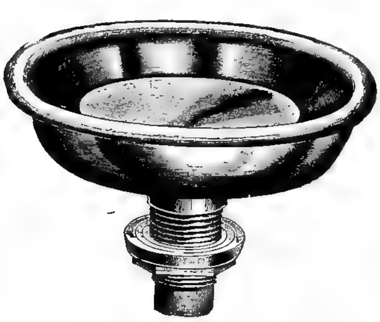
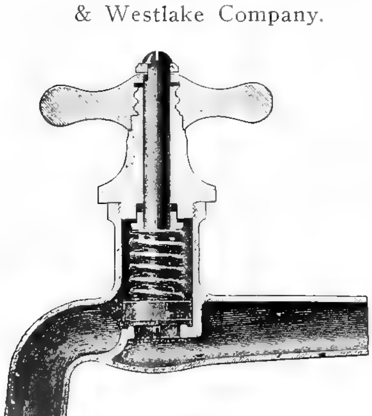


Fig. 1738—Soap Dish. Adams & Westlake Company.

Fig. 1739—Spud and Coupling. D. M. Co.

Fig. 1740—Tank Waste Cock. A. & W. Co.



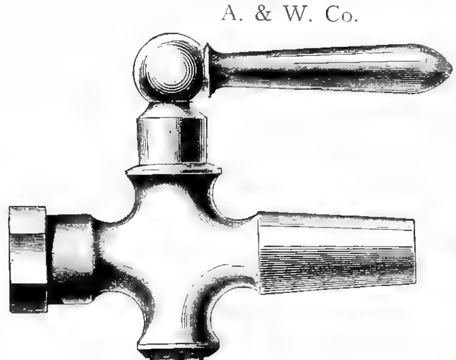


Fig. 1742—Zane's Self-Closing Bibb Cock. **Fig. 1743**—Stop Cock.
Dayton Manufacturing Company.

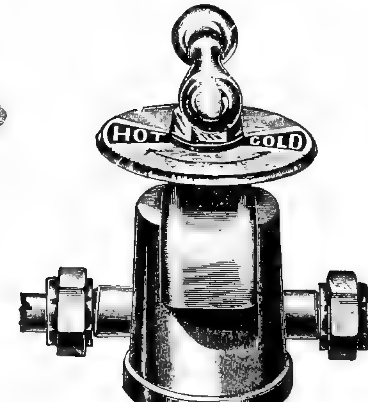


Fig. 1744—Combination Hot and Cold Water Faucets. A. & W. Co.

Fig. 1745—Toilet Rack. Adams & Westlake Company

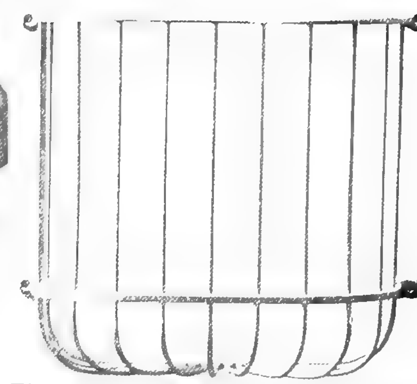


Fig. 1748—Rack for Soiled Towels. Jas. L. Howard & Company.

Fig. 1746—Dental Lavatory. Dayton Manufacturing Company.

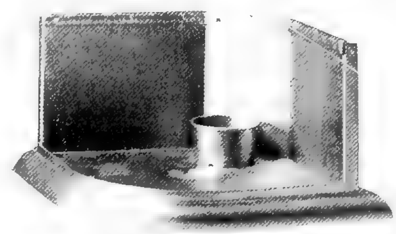


Fig. 1747—White Metal Drip Tray Jas. L. Howard & Company.

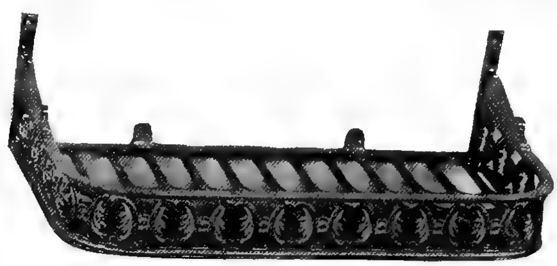


Fig. 1749—Comb and Brush Rack. Adams & Westlake Company.

Fig. 1750—Corner Toilet Rack. Adams & Westlake Company.

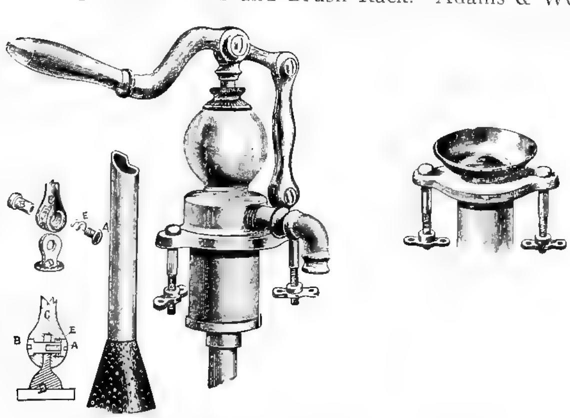


Fig. 1751—Washroom Pump and Soap Holder. Dayton Manufacturing Company.

Parts of Washroom Pump, Fig. 1752.

- **A** *Pump Body with Spout and Cylinder*
- **B** *Nut for Attaching Body to Base*
- **C** *Base*
- **D** *Screws for Attaching Base to Slab*
- **E** *Nuts for Attaching Base to Slab*
- **F** *Lever*
- **G** *Rosewood Handle*
- **H** *Handle Nut*
- **I** *Rocker Arm*
- **J** *Rocker Arm Pivot Screw, Upper*
- **K** *Rocker Arm Pivot Screw, Lower*
- **L** *Piston Rod*
- **M** *Piston Rod Pivot Screw*
- **N** *Piston Rod Shock Absorber (Leather)*
- **O** *Piston Rod Stuffing Box Nut*
- **P** *Piston Rod Stuffing Box Collar*
- **Q** *Piston and Valve*
- **R** *Piston Packing (Leather)*
- **S** *Plunger*
- **T** *Cylinder Head with Valve*
- **U** *Cylinder Head Washer (Leather)*
- **V** *Suction Pipe, with Coupling Nut and Strainer*

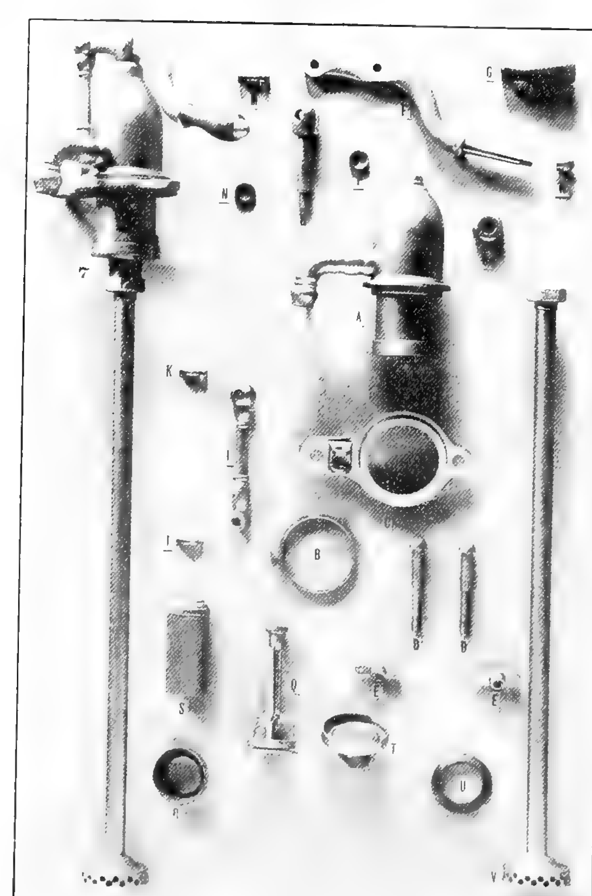


Fig. 1752—Washroom Pump and Fittings. Jas. L. Howard & Company.

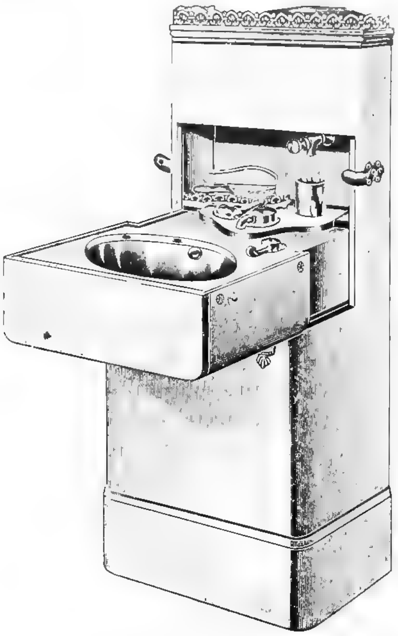


Fig. 1753—Folding Corner Lavatory. Dayton Manufacturing Company.

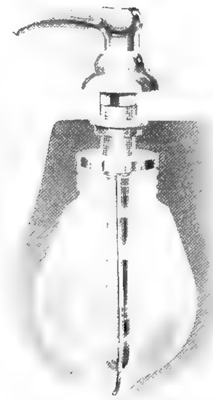


Fig. 1753A—Watrous Style V Concealed Liquid Soap Fixture. The Watrous Company

Fig. 1754—Towel Vendor. Individual Drinking Cup Company.

Fig. 1755—Drinking Cup Vendor. Individual Drinking Cup Company.

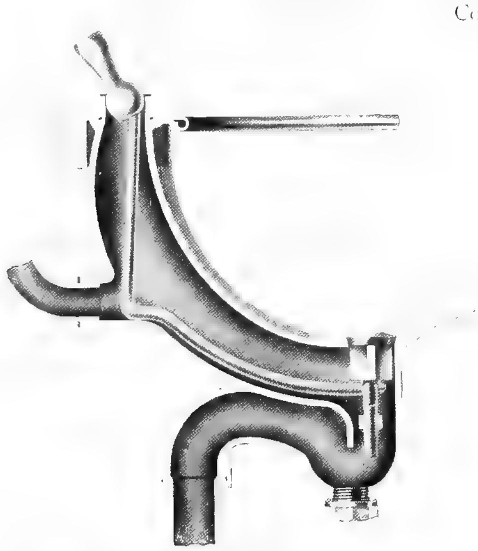


Fig. 1756—Section Through White Metal Lavatory Showing Tilting Lever Waste and Trap.

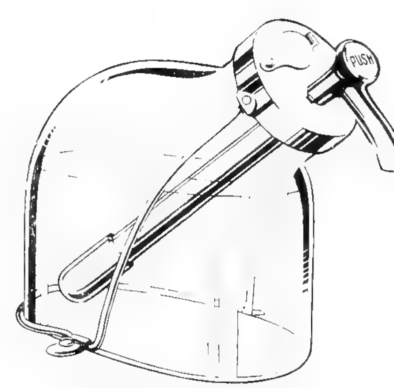


Fig. 1757—Liquid Soap Dispenser. Individual Drinking Cup Company.

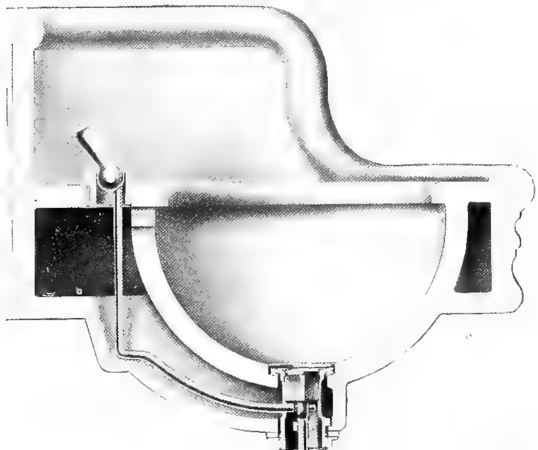


Fig. 1758—Section Through Vitreous Ware Lavatory Showing Waste Attachment. The Watrous Company.

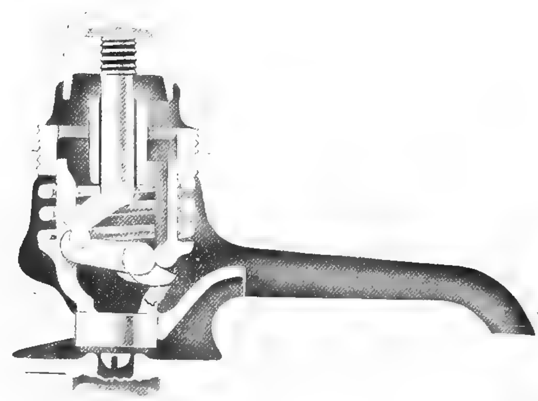


Fig. 1759—Section Through Push Button Faucet The Watrous Company.

Fig. 1760—Folding Lavatory.
Adams & Westlake Company.

Fig. 1761—Water Cooler and Lavatory Faucets.
Adams & Westlake Company.

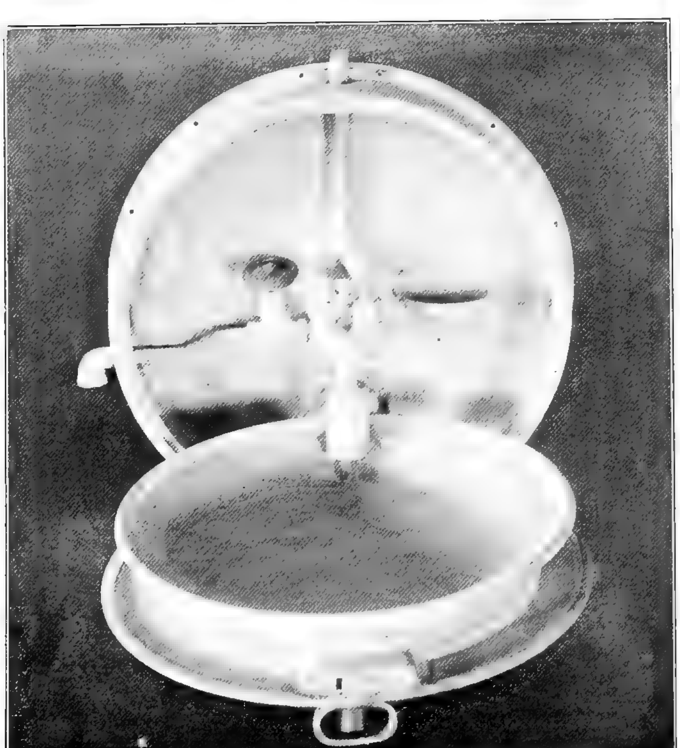


Fig. 1762—Hot and Cold Water Faucet in Folding Wash Basin. J. N. Chadwick.

Fig. 1763—North Pole Sanitary Drinking Fountain.
Henry Giessel & Co.

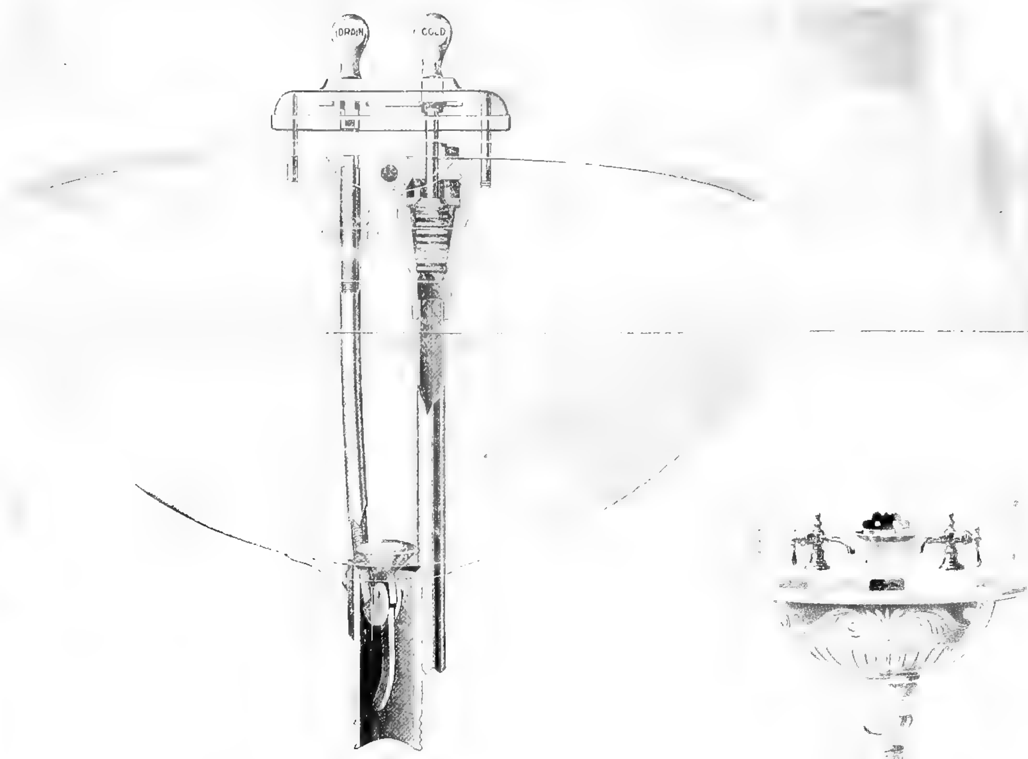


Fig. 1765—Lavatory and Faucets. Adams & West lake Company.

Fig. 1764—Postal Car Corner Washstand. Railway Supply & Curtain Company.

Fig. 1767—Postal Car Flat Back Washstand. Railway Supply & Curtain Company.

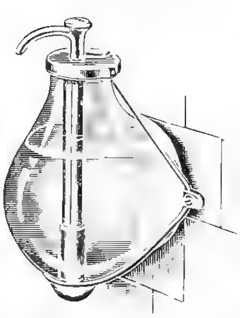


Fig. 1766—Watrous, Style M, Liquid Soap Fixture. The Watrous Company.

Fig. 1768—Water Alcove. Jas. L. Howard & Company.

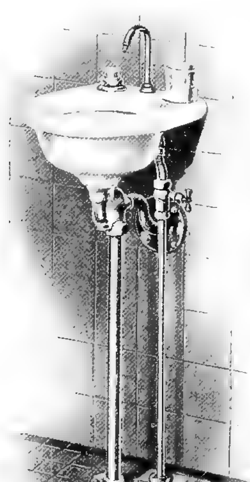


Fig. 1769—Vitreous Ware Dental Lavatory. The Watrous Company.

Fig. 1770—Folding Wash Basin. Dayton Manufacturing Company.

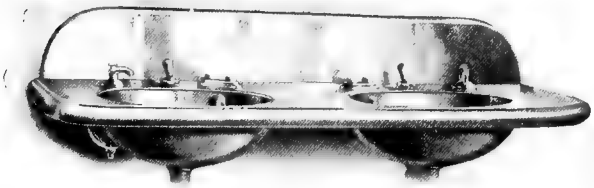


Fig. 1771—Double White Metal Lavatory.

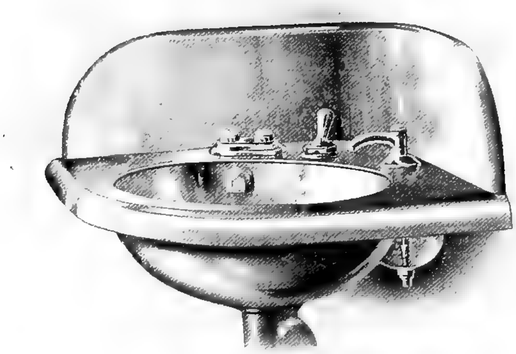


Fig. 1772—White Metal Corner Lavatory.

Fig. 1773—Vitreous Ware Corner Lavatory.

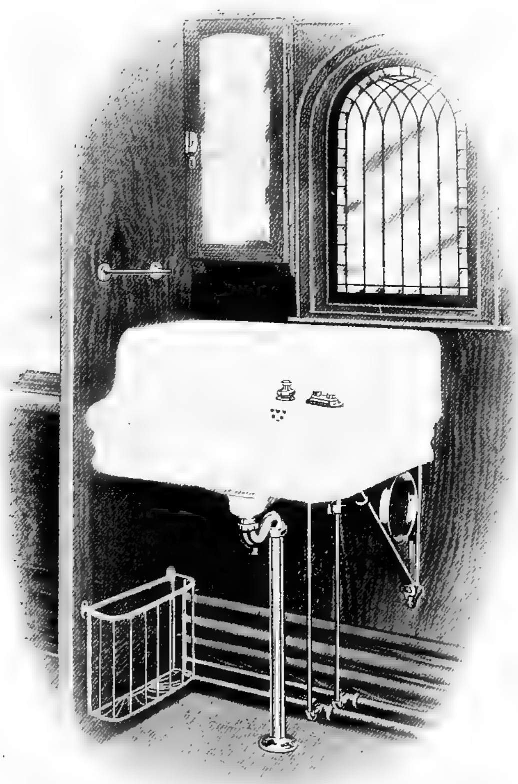


Fig. 1774—Vitreous Ware Lavatory.

Fig. 1775—Vitreous Ware Recess Lavatory.

The **Watrous Company.**

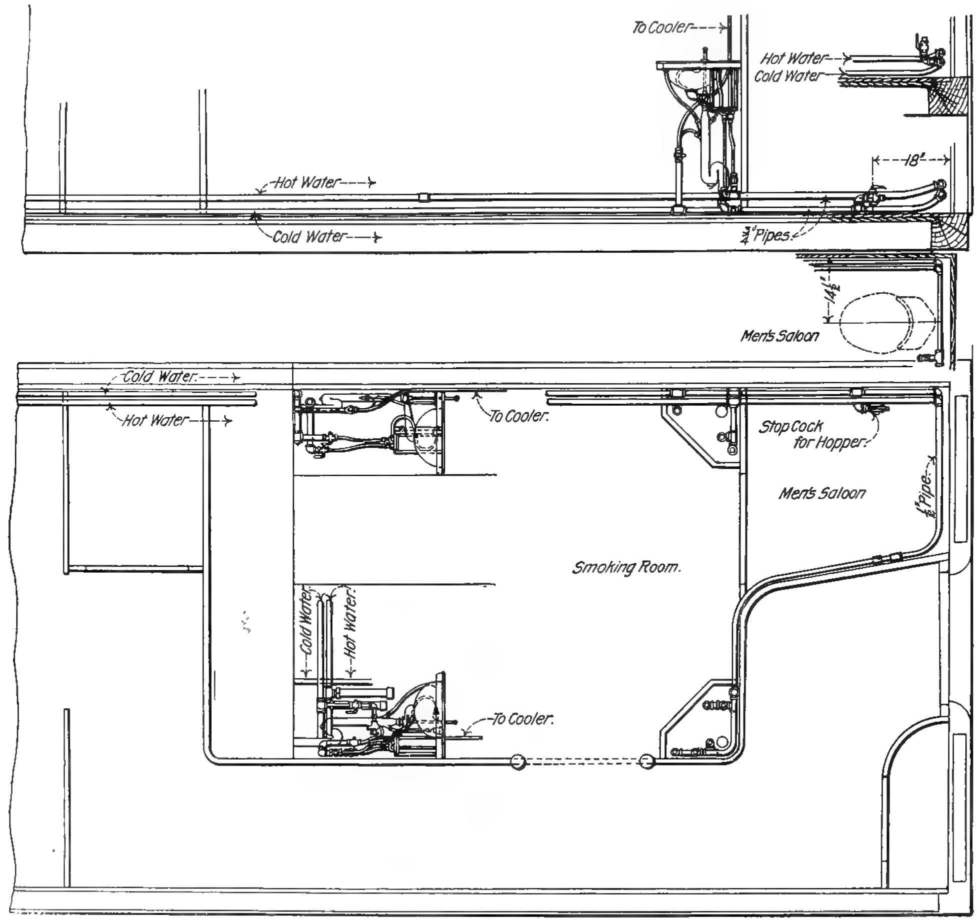


Fig. 1776—Plan of Piping for Men's Wash Room in Pullman Drawing Room Sleeping Car.

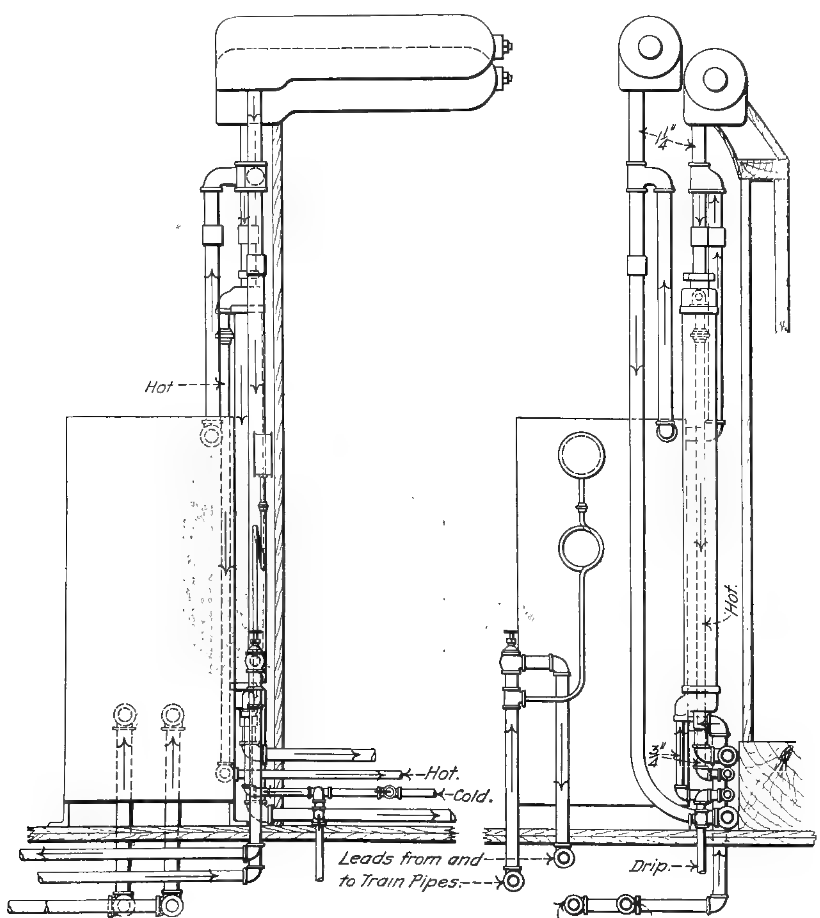


Fig. 1777—Hot and Cold Water Connections to Baker Heater in Pullman Drawing Room Sleeping Car.

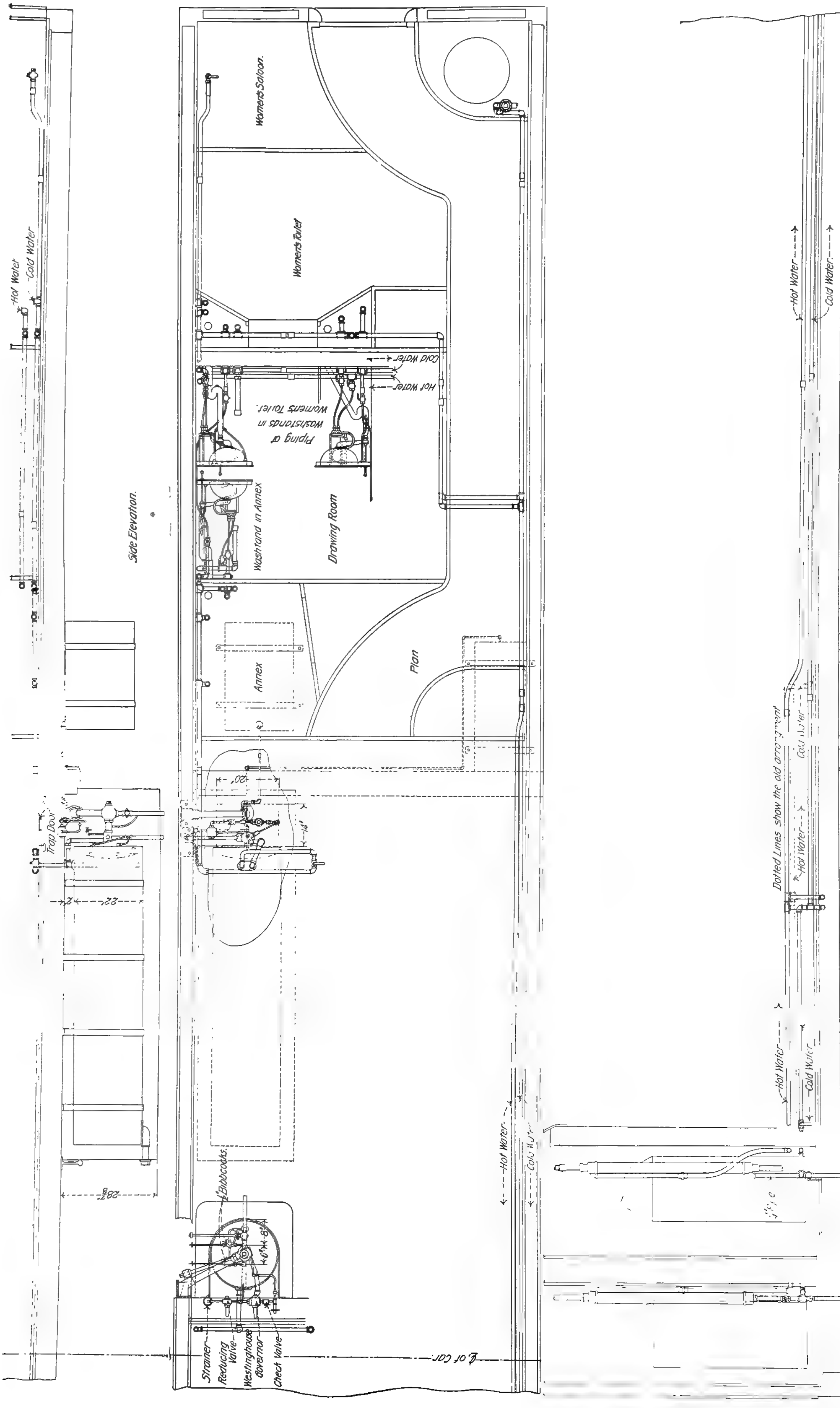


Fig. 1778—Piping and Connections for Hot and Cold Water Supply for Pullman Drawing Room Sleeping Car.

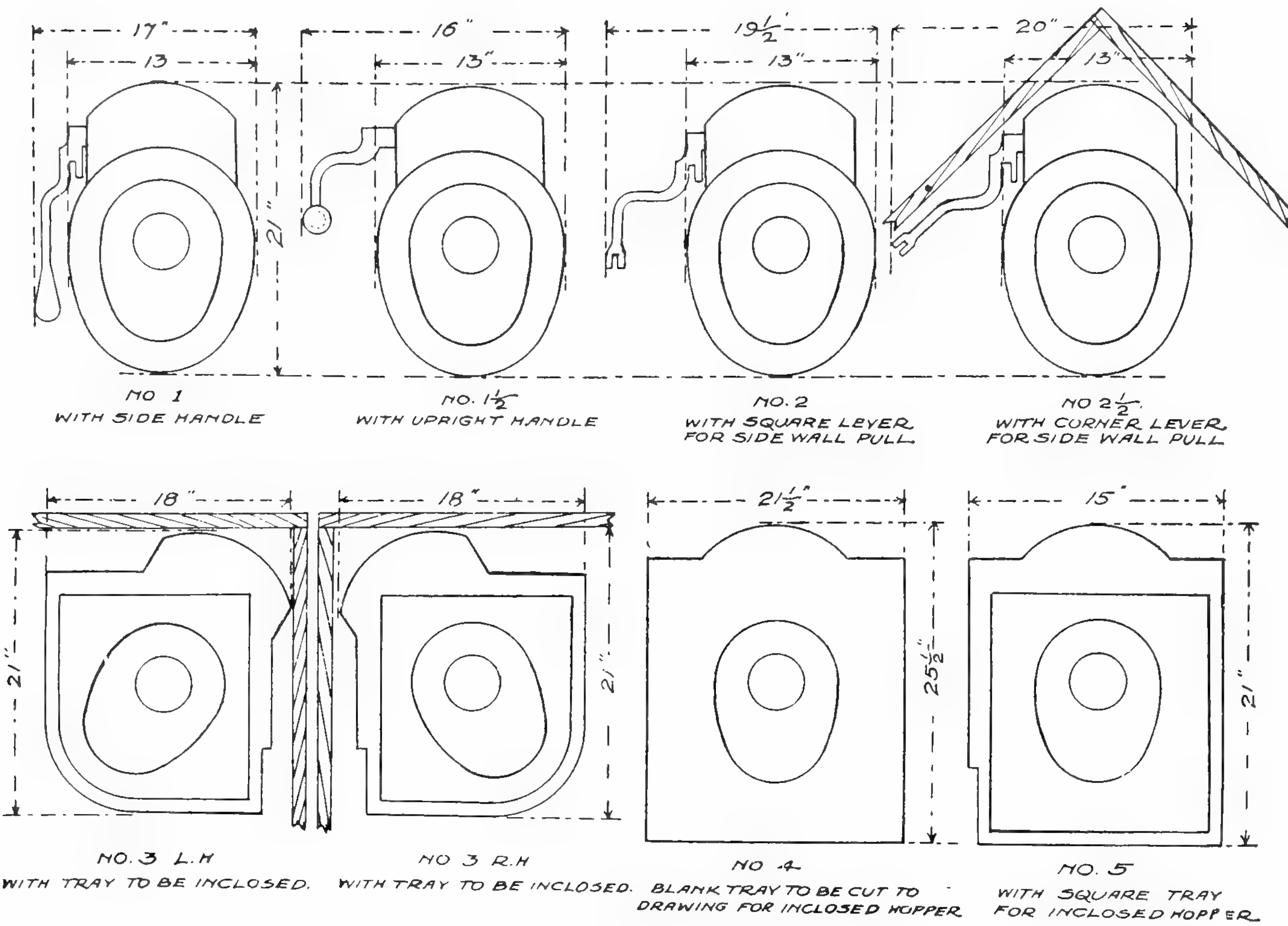


Fig. 1779 Types and Dimensions of Duner Car Closets.

Fig. 1780—Duner Enameled Iron Corner Closet No. 3 with Tray to be Inclosed.

Fig. 1781—Duner Combined Flush and Dry Closet with Side Handle.

Duner Company.

Fig. 1782—Duojet Closet, Showing Arrangement of Jets. The Watrous Company.

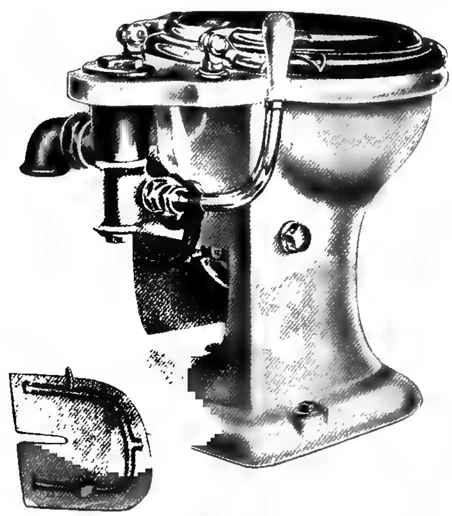


Fig. 1783—Americo Car Closet. The Watrous Company.

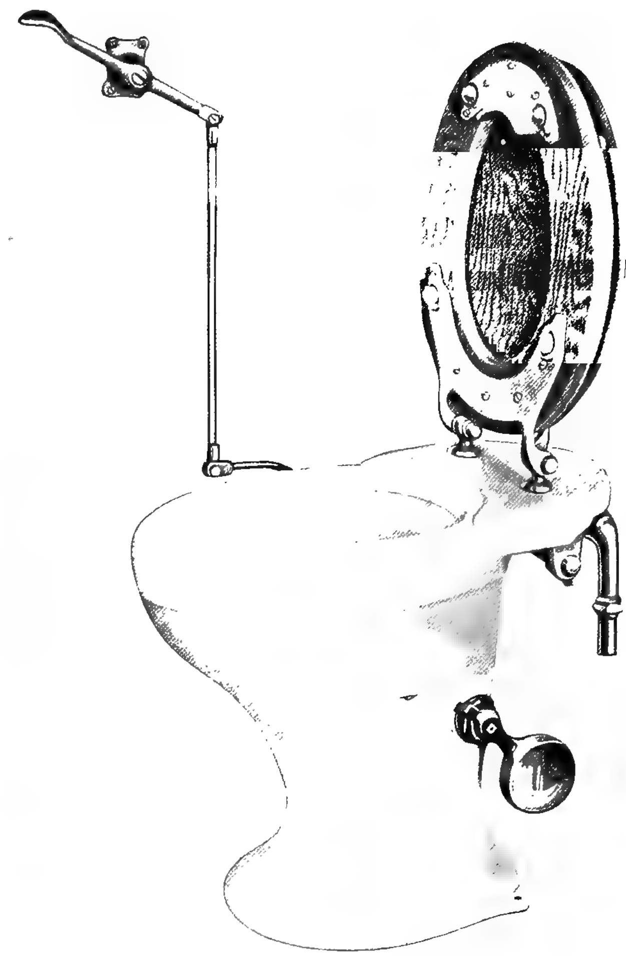


Fig. 1784—Duner Closet with Side Wall Pull. Duner Company.

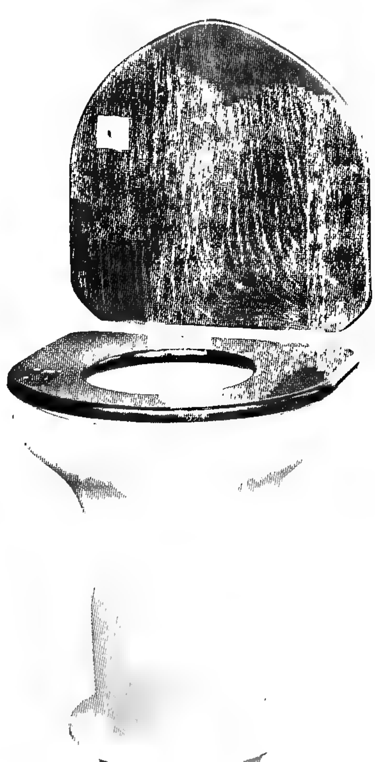


Fig. 1785—Atlas Combination Dry Closet, Hopper and Urinal with Seat-Raising Device. Railway Supply & Curtain Company.

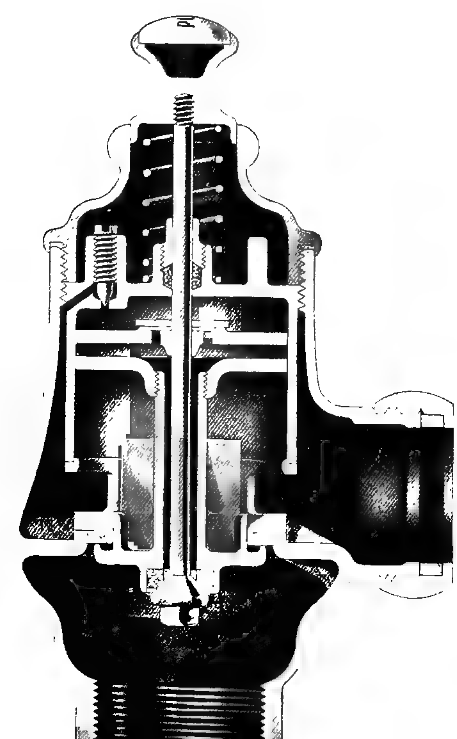


Fig. 1787—Watometer for Flushing Closets. The Watrous Company.

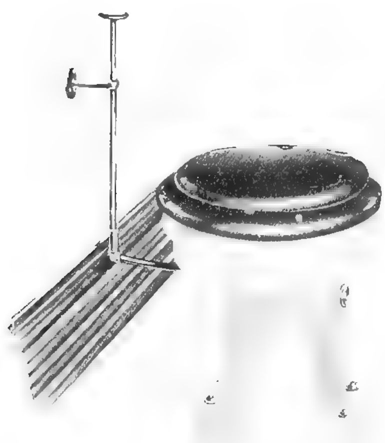


Fig. 1788—Americo Closet with Operating Lever on Side Wall. The Watrous Company.

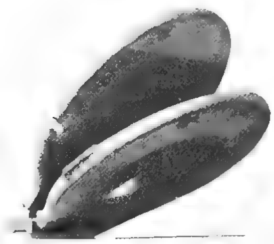


Fig. 1789 Enameled Iron Hopper with Seat Raising Attachment. Jas. L. Howard & Company.

Fig. 1790—No. 32 Hopper. Adams & Westlake Company.

Apron and Lid Partly Raised. Apron and Lid Raised.
Fig. 1791—Protection Dry Closet. Adams & Westlake Company.

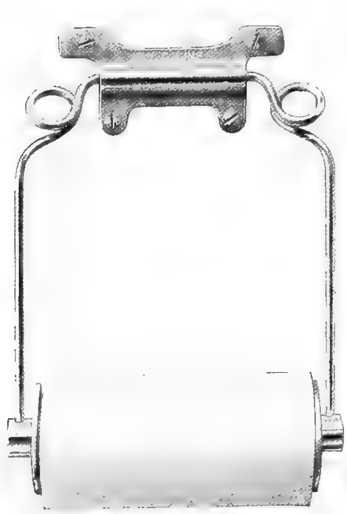


Fig. 1792—Toilet Paper Holder. Dressel Railway Lamp Works.

Fig. 1793—Closet with Valves on Side Wall. Dayton Manufacturing Company.

No. 42 Rim Night Latch.

No. 44 Rim Night Latch.

Fig. 1794—Rim Night Latches, Cylinder and Keys.

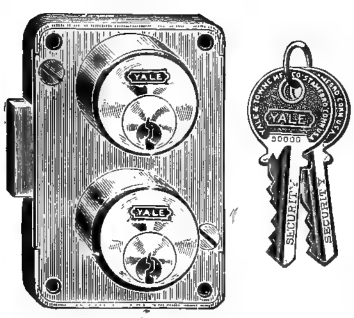


Fig. 1795—No. 6001 Cupboard Lock.

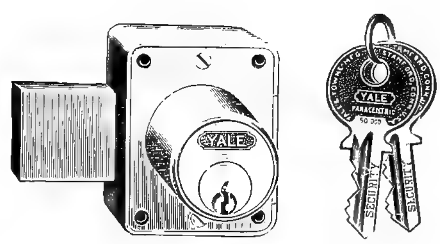


Fig. 1796—No. 611 Locker Lock.

Fig. 1797—No. 850 Padlock.

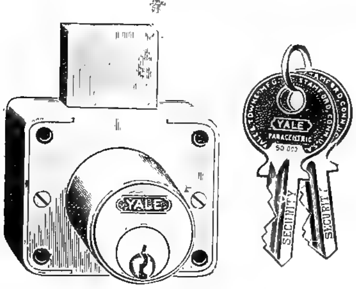


Fig. 1798—No. 519 Drawer Lock.

Fig. 1799—No. 823 Padlock.

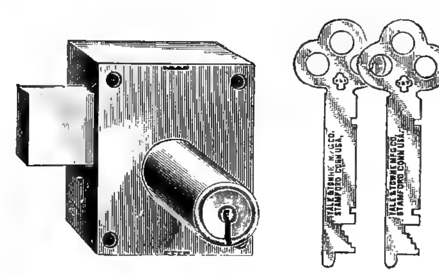


Fig. 1800—No. W120 Locker Lock.

Fig. 1801—No. 830 Padlock.

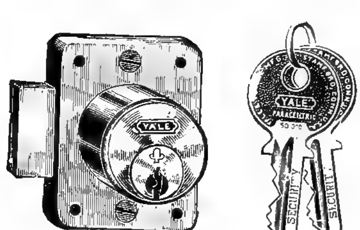


Fig. 1802—No. 511 Wardrobe Lock.

Fig. 1803—No. 563 Padlock.

Yale & Towne Manufacturing Company.

Fig. 1804—Square Door Bolt and Keeper.

Fig. 1805—Flush Door Bolt.

Fig. 1806—Barrel Door Bolt with Bent Staple Plate.

Adams & Westlake Company.

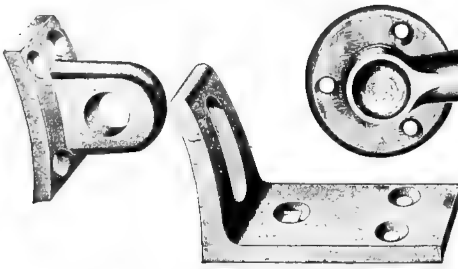


Fig. 1807—Sliding Door Hasp and Staple for Mail Car.

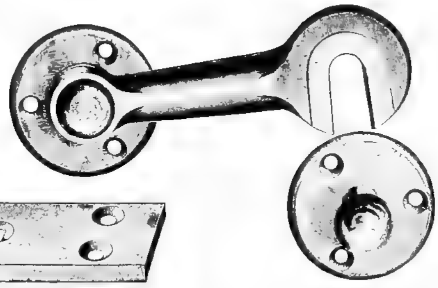


Fig. 1808—Sliding Door Hook and Button for Baggage Car.

Adams & Westlake Company.

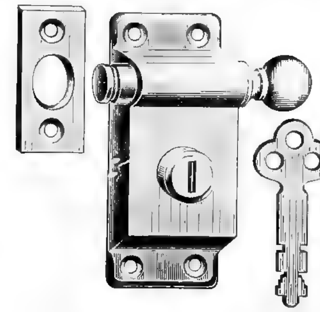


Fig. 1809—Rim Sash Lock. Russell & Erwin Manufacturing Company.

Fig. 1810—Cupboard Catches and Bolts. Adams & Westlake Company.

Fig. 1811—Refrigerator Catches. Russell & Erwin Manufacturing Company.

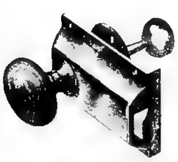


Fig. 1812 — Baggage Car Door Latch.

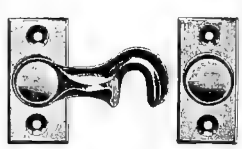


Fig. 1813—Cabin Door Hook and Button.

Adams & Westlake Company.

Fig. 1814 Door Top and Bottom Latch. James L. Howard & Company.

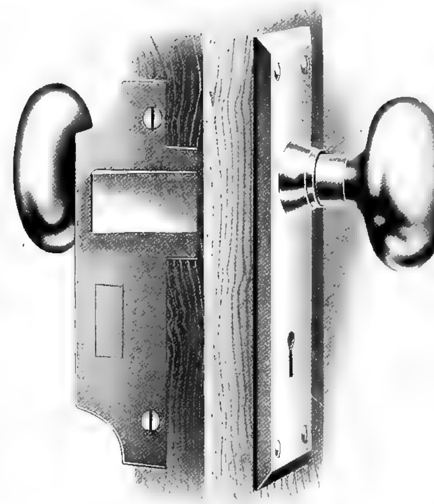


Fig. 1815—Rim Knob Lock. Russell & Erwin Manufacturing Company.

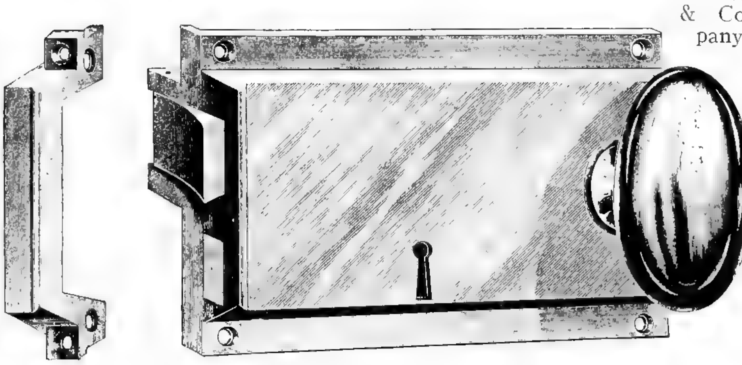


Fig. 1816 —End Door Lock. Dayton Manufacturing Company.

Fig. 1817—Sliding Door Lock (Patented).

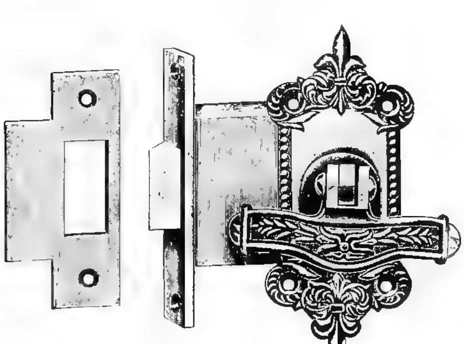


Fig. 1818—Vestibule Door Mortise Latch. Dayton Manufacturing Company.

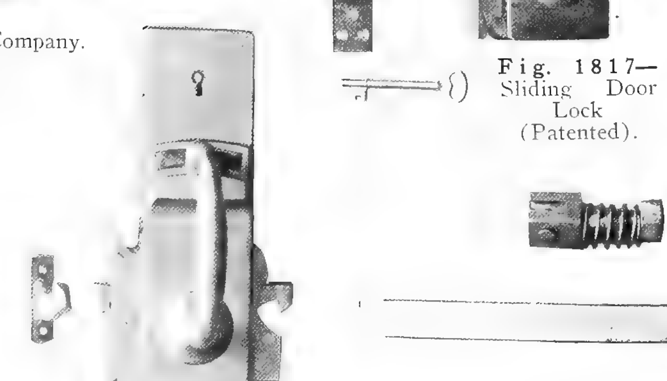


Fig. 1819—Sliding Door Lock (Patented) Which Latches Door Either Open or Closed. Jas. L. Howard & Company.

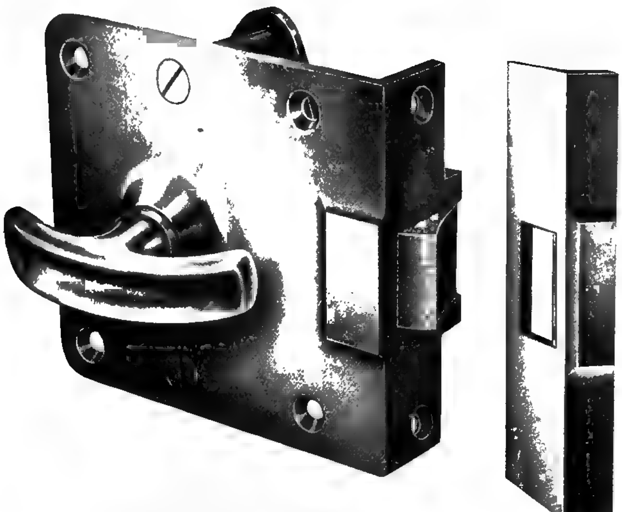


Fig. 1820—No. 696 Vestibule Door Latch and Keeper.

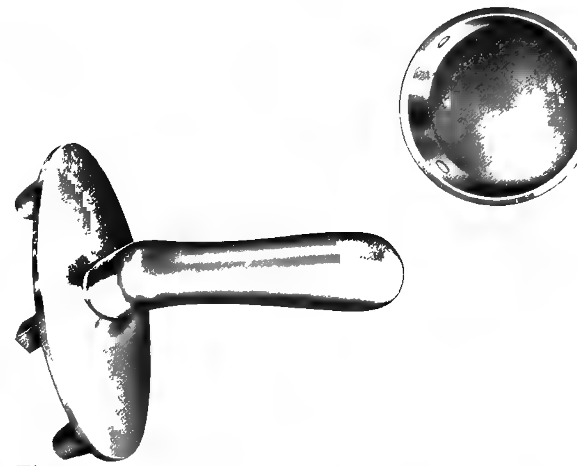


Fig. 1821—Handle and Flush Handle Receiver for No. 696 Vestibule Door Latch.

Dayton Manufacturing Company.

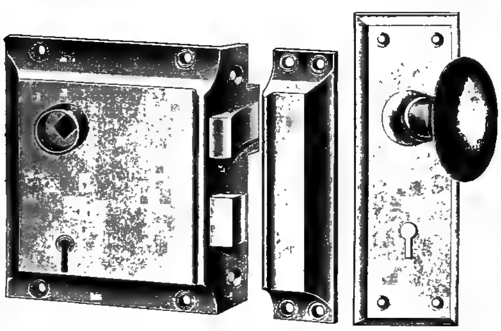


Fig. 1822—Rim Knob Lock, Keeper and Escutcheon.

Fig. 1823—Rim Knob Lock, Keeper and Escutcheon.

Russell & Erwin Manufacturing Company.

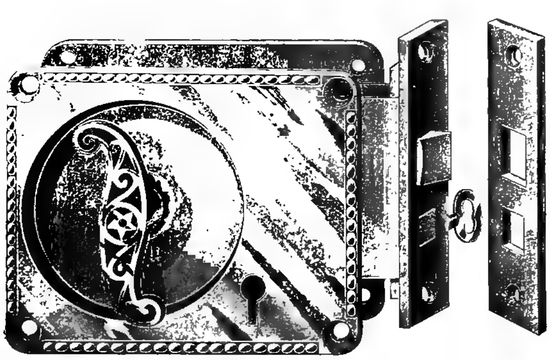


Fig. 1824—Double Flush Handle Saloon Door Mortise Lock. Dayton Manufacturing Company.

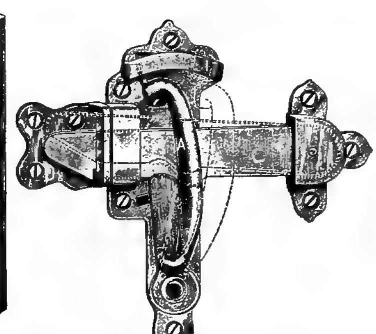


Fig. 1825—Sliding Door Latch. Dayton Manufacturing Company.

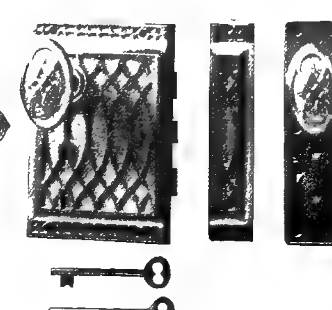


Fig. 1826—Two-Bolt Lock and Details. Jas. L. Howard & Company.

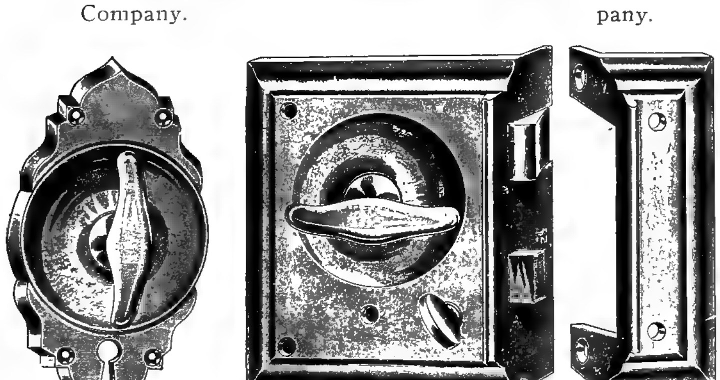


Fig. 1827—Double Flush Handle Saloon Door Lock and Keeper.

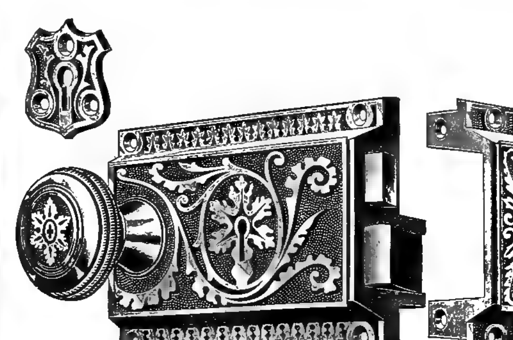


Fig. 1828—End Door Lock, Keeper and Escutcheon.

Adams & Westlake Company.

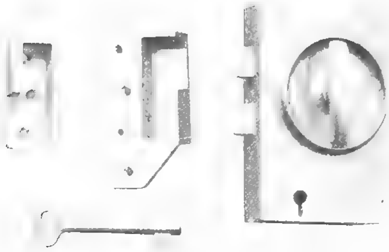


Fig. 1829 Motorman's Cab Door Lock No. 48. Jas. L. Howard & Company.

Fig. 1830—Sliding Door Latch.

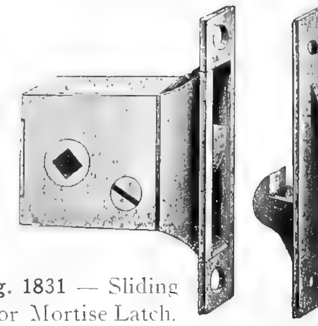


Fig. 1831 — Sliding Door Mortise Latch.

Dayton Manufacturing Company.

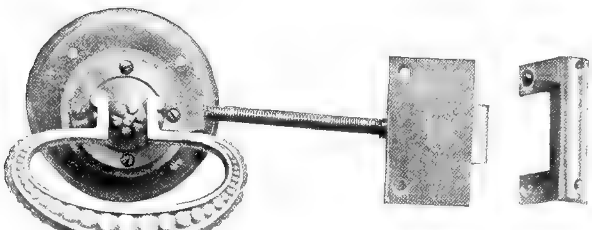


Fig. 1832—Vestibule Door Latch and Keeper.

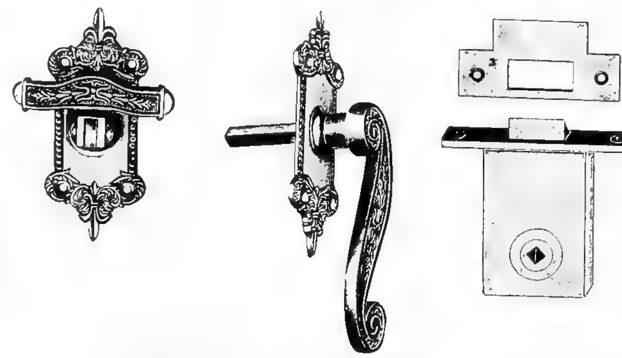


Fig. 1833 Platform Vestibule Door Latch, Handles and Keeper.

Adams & Westlake Company.

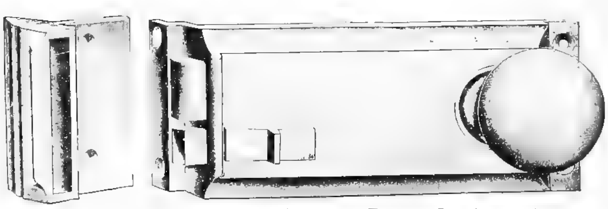


Fig. 1834—Extra Long Saloon Door Lock and Keeper. Adams & Westlake Company.

Fig. 1835—Vestibule Trap Door Latch and Pull. Dayton Manufacturing Company.

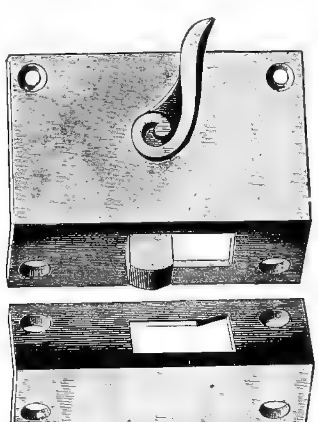


Fig. 1836—Vestibule Door Bolt. Adams & Westlake Company.

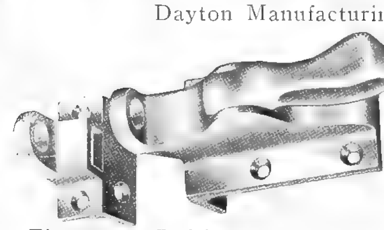


Fig. 1837—Refrigerator Door Latch. Dayton Manufacturing Company.

Fig. 1839 — Vestibule Door Mortise Latch. Dayton Manufacturing Company.

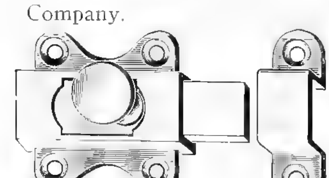


Fig. 1838—Cupboard Bolt. Russell & Erwin Manufacturing Company.

Fig. 1840—Cupboard Bolt. Russell & Erwin Manufacturing Company.

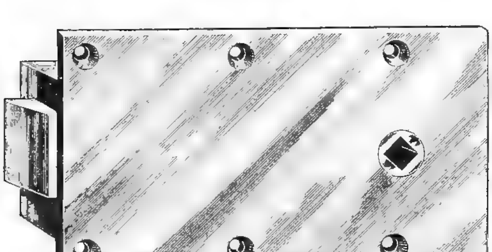


Fig. 1841—Vestibule Trap Door Latch. Dayton Manufacturing Company.

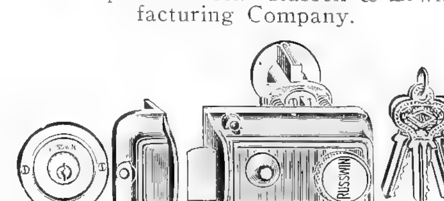


Fig. 1842—Russwin Unit Night Latch. Russell & Erwin Manufacturing Company.

Fig. 1843—Edwards, Design K, Trap Door Lock.

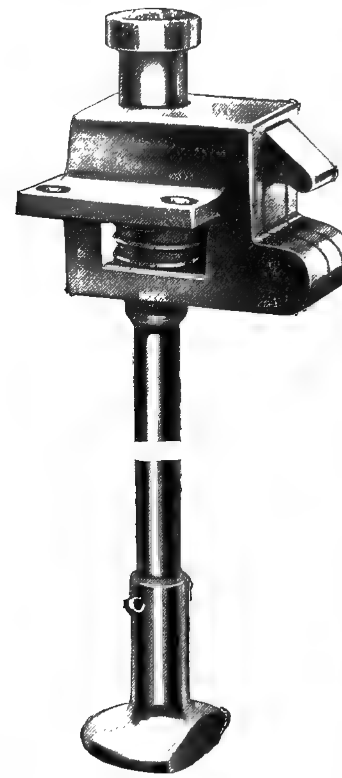


Fig. 1844—Edwards, Design B, Trap Door Lock.

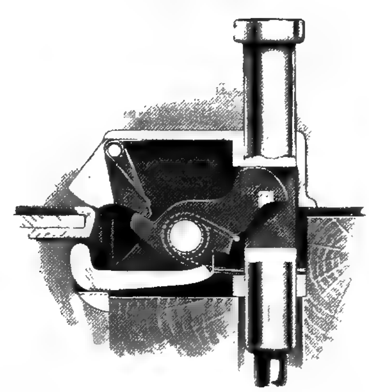


Fig. 1846—Section of Design H, Trap Door Lock, in Normal Position, With Door Locker Down.

Fig. 1845—Edwards Trap Door Lock, Design H.

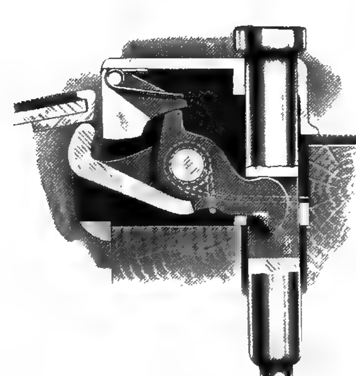


Fig. 1847—Section of Design H, Trap Door Lock, With Latch Releaser and Starting Device Forcing Door Open.

O. M. Edwards Company.

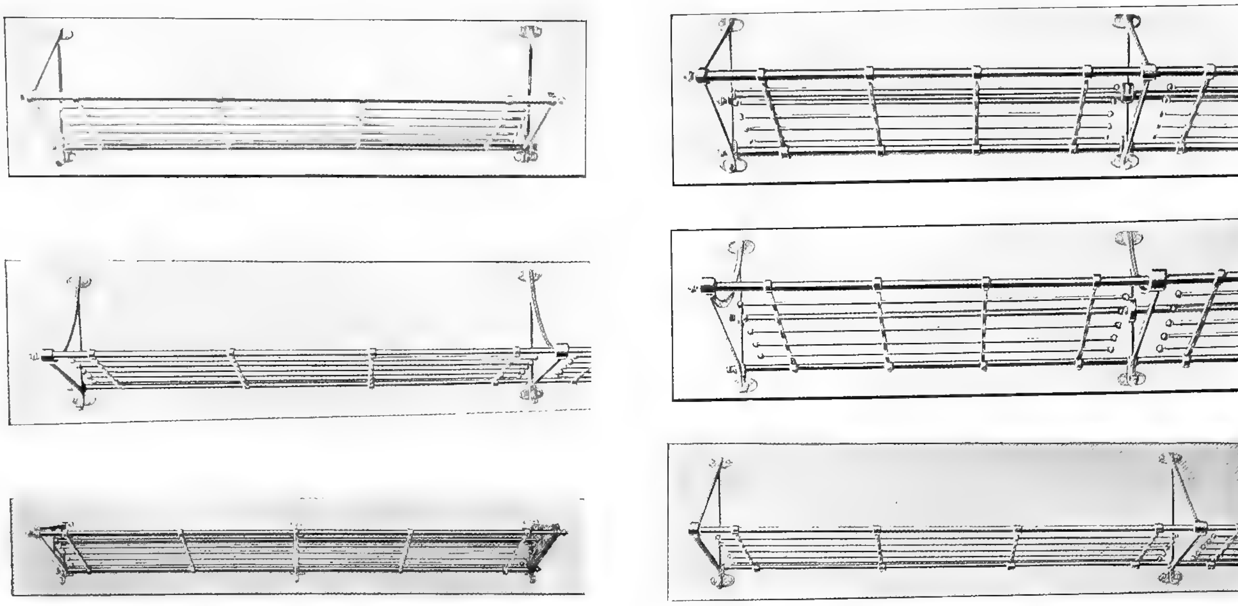


Fig. 1848—Removable Bottom Basket Racks. Adams & Westlake Company.

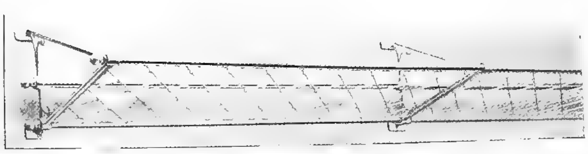


Fig. 1849 Continuous, Removable Bottom Baggage Rack No. 55. Jas. L. Howard & Company.

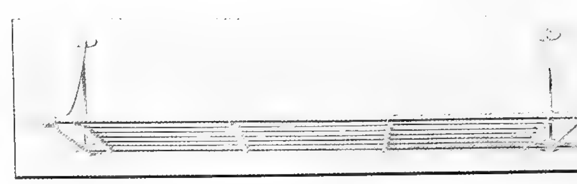


Fig. 1850—Removable Bottom Basket Rack. Adams & Westlake Company.

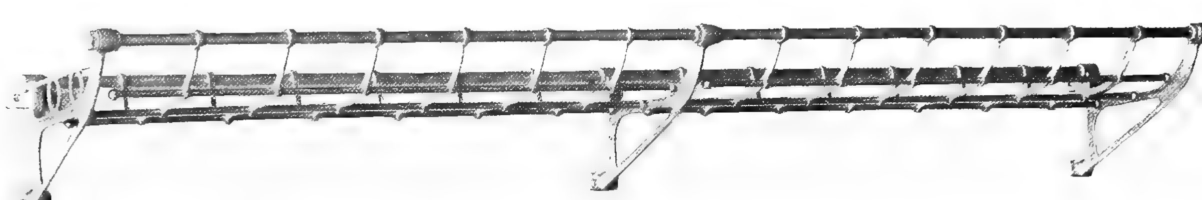


Fig. 1851—Continuous Baggage Rack No. 61. Jas. L. Howard & Company.

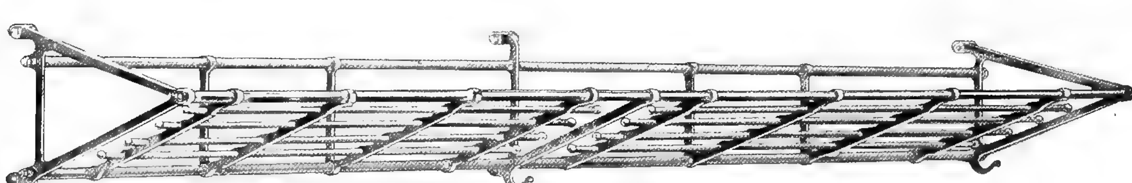


Fig. 1852—Rod Basket Rack with Fixed Bottom and Back Rod. Length, 62 in.; Width, 12¾ in. Dayton Manufacturing Company.

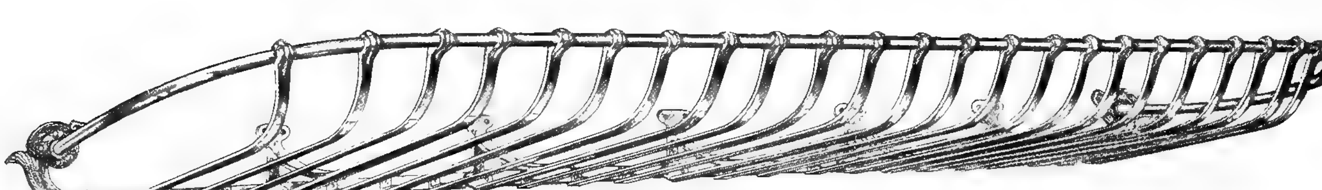


Fig. 1853—Basket Rack No. 184 for Flat Surface. Dayton Manufacturing Company.

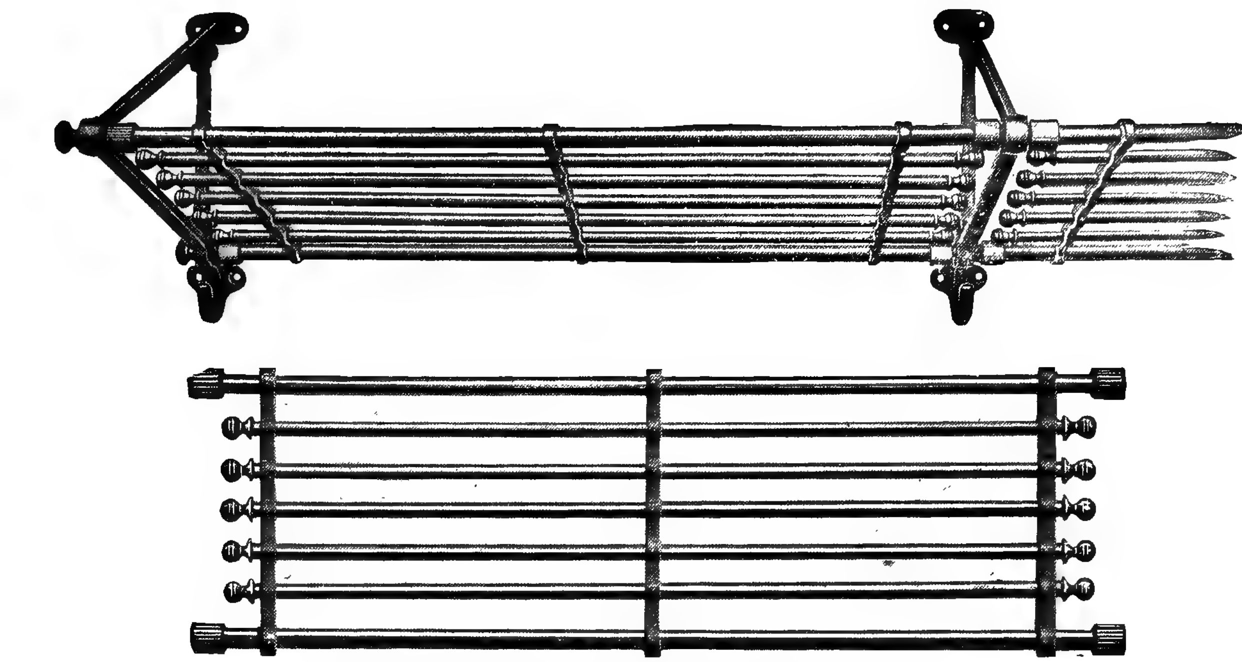


Fig. 1854—Rex Rod Basket Rack and Removable Bottom.

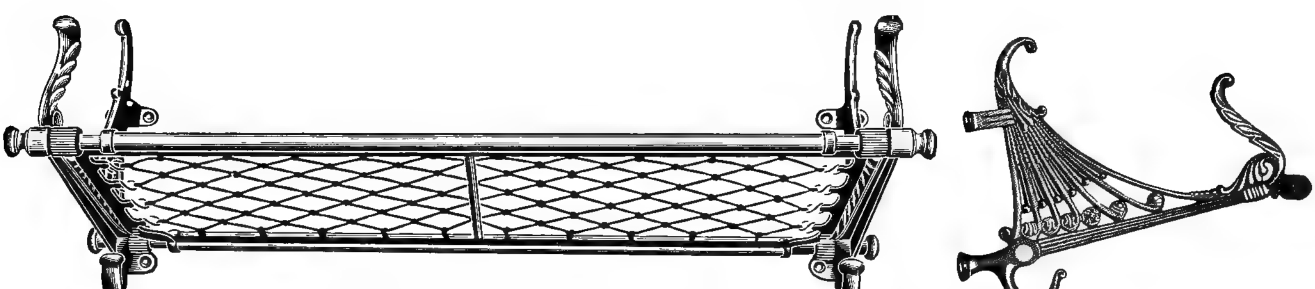


Fig. 1855—Rex Wire Cord Basket Rack with Removable Bottom. Length of Section, 36 in.; Width, 12½ in.

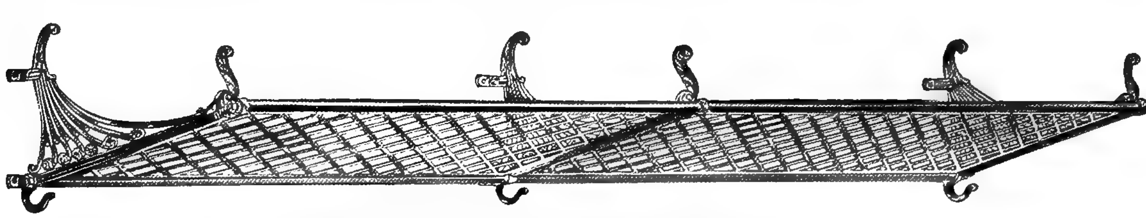


Fig. 1856—Cast Basket Rack with Fixed Bottom.

Fig. 1857—Rod Basket Rack. Length, 48½ in.; Width, 12½ in.

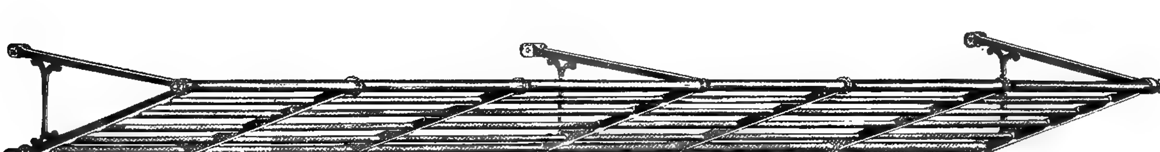
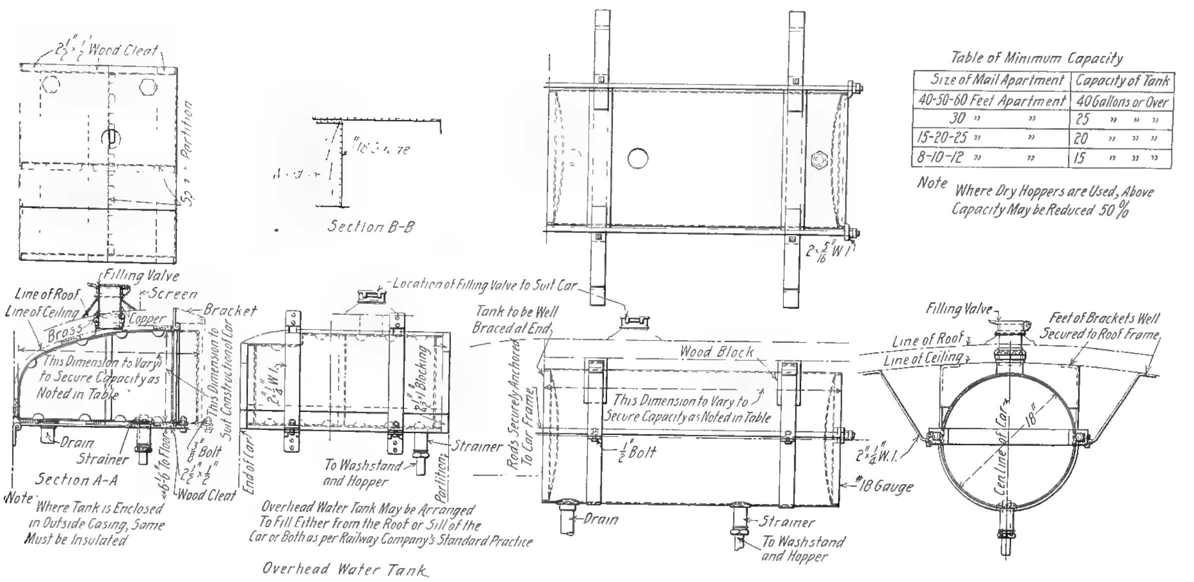


Fig. 1858—Rod Basket Rack. Length, 48 in.; Width, 11 in.

Dayton Manufacturing Company.



Size of Mail Apartment	Capacity of Tank
40-50-60 Feet Apartment	40 Gallons or Over
30 " "	25 " " "
15-20-25 " "	20 " " "
8-10-12 " "	15 " " "

Fig. 1859—Typical Construction of Overhead Water Tank.

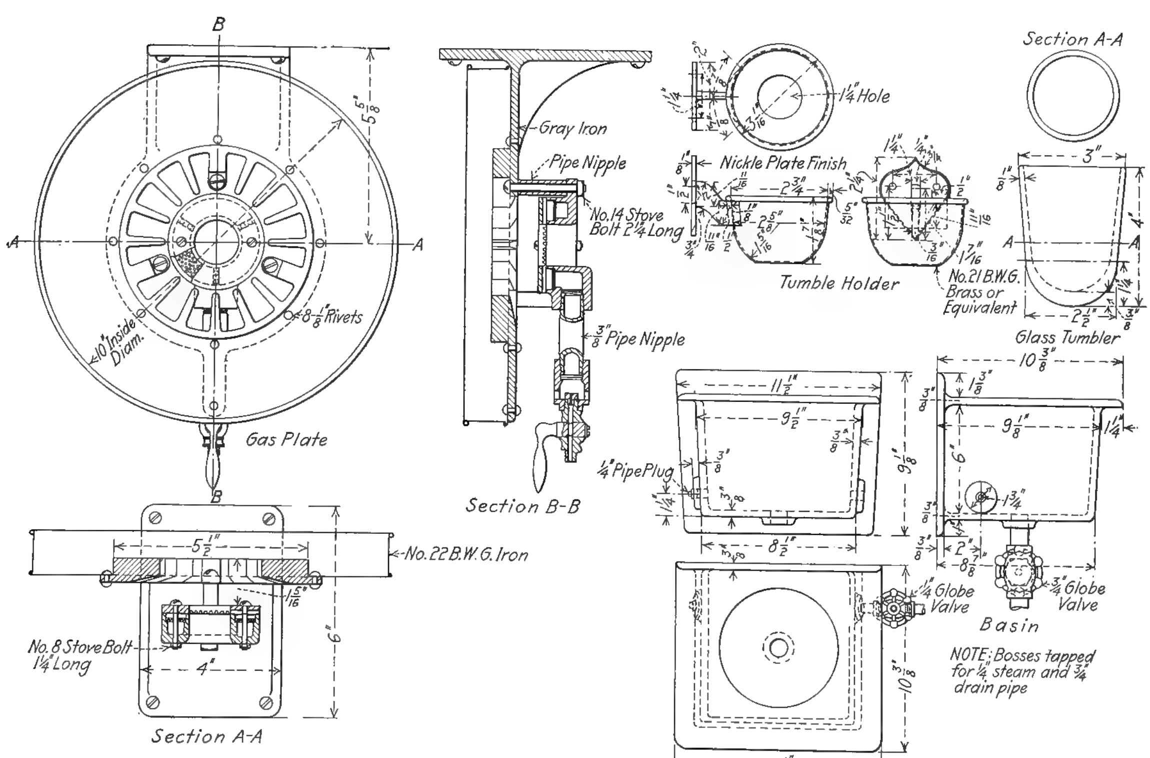


Fig. 1860—Postal Car Fittings.

United States Government Specifications for Postal Cars.

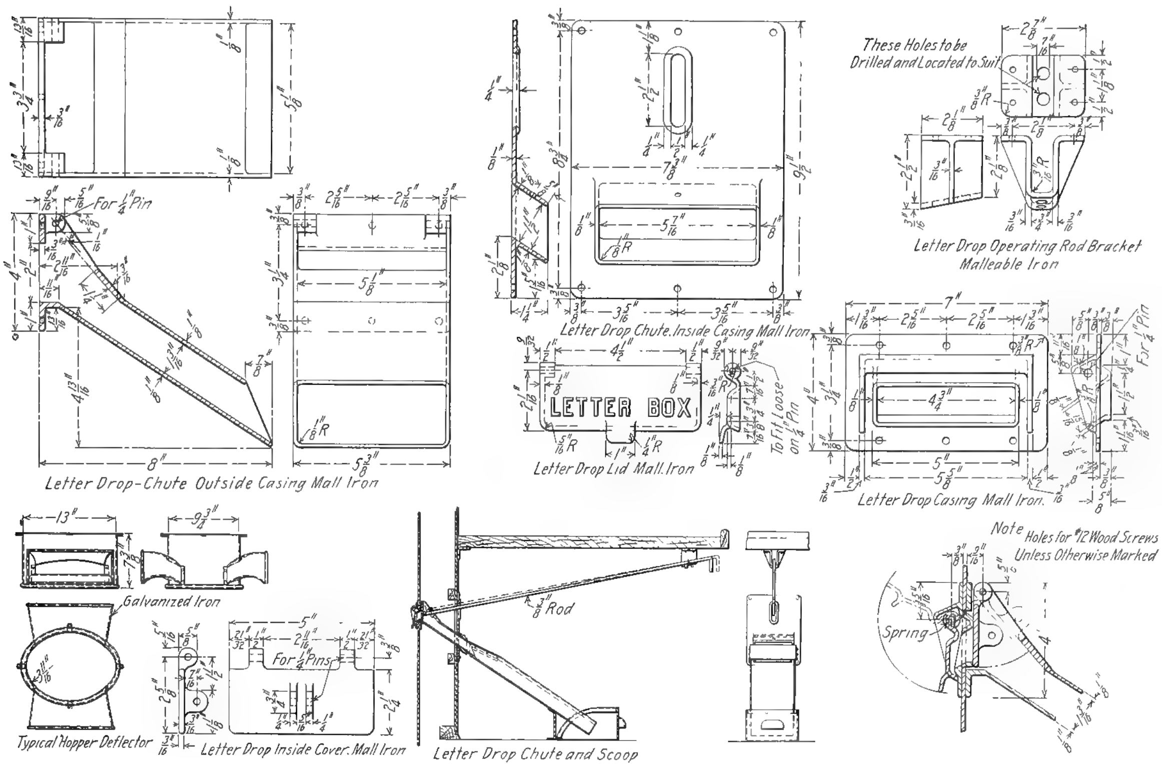


Fig. 1861—Letter Drop and Chute, and Hopper Deflector.

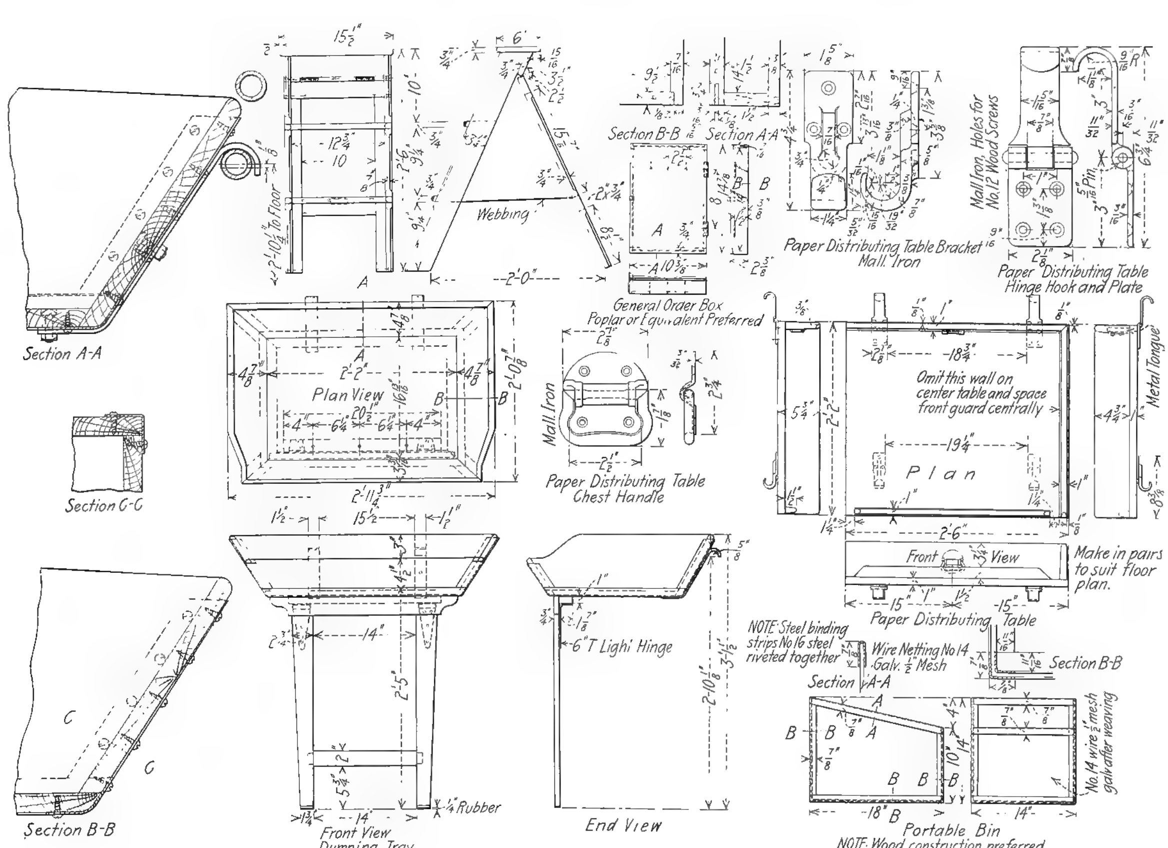


Fig. 1862—Dumping Tray, Distributing Table, Portable Bin and Step Ladder.
United States Government Specifications for Postal Cars.

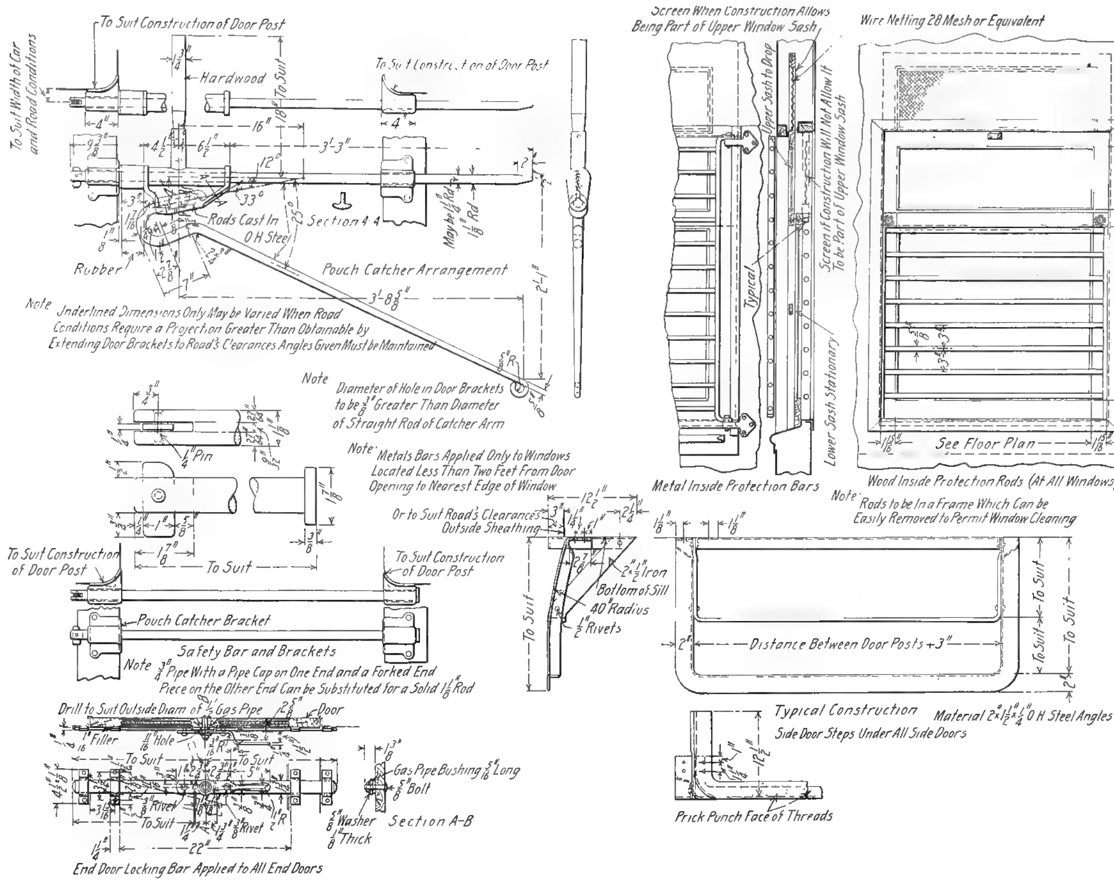


Fig. 1863—Pouch Catcher and Window Protection Bars.

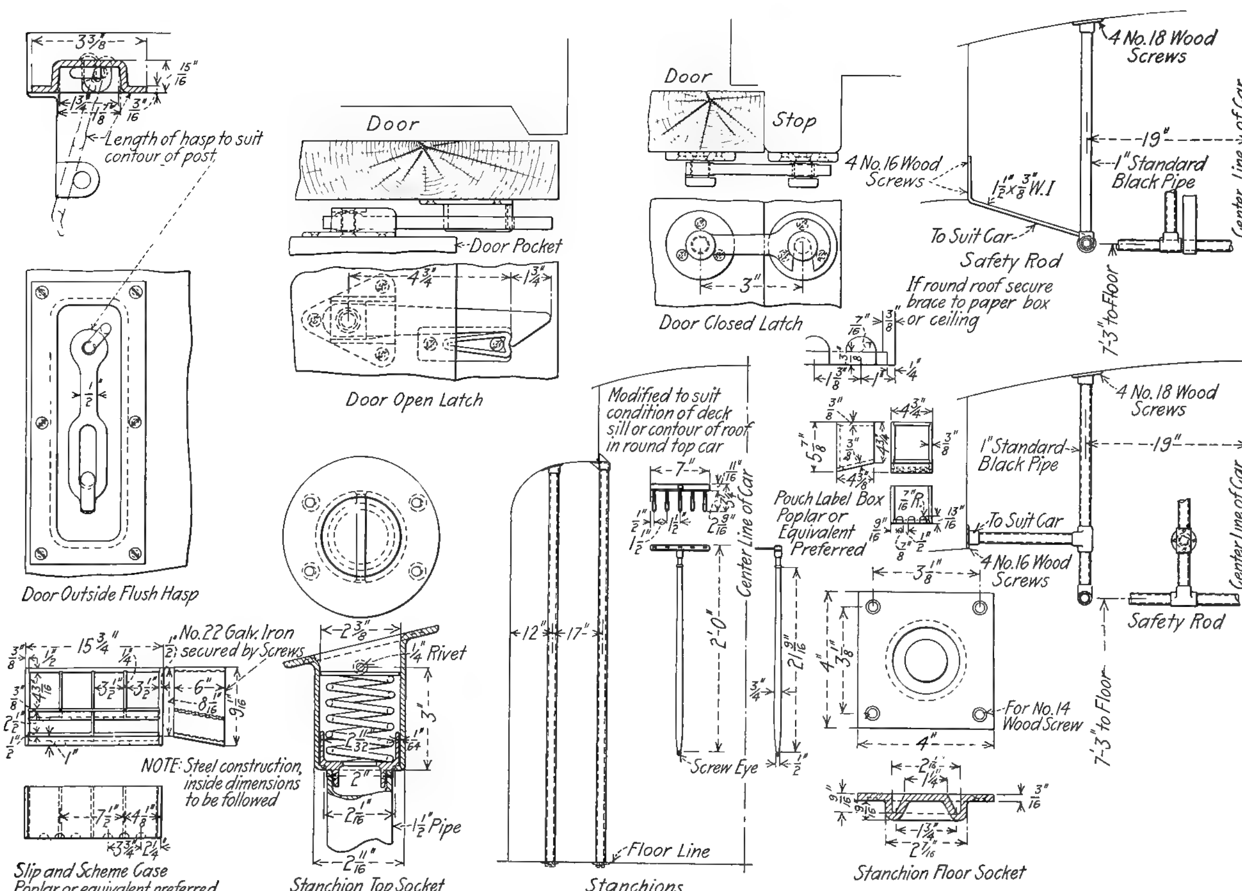


Fig. 1864—Door Hasp and Latches, Stanchions, Rake, Safety Rod, Slip Case and Label Box. United States Government Specifications for Postal Cars.

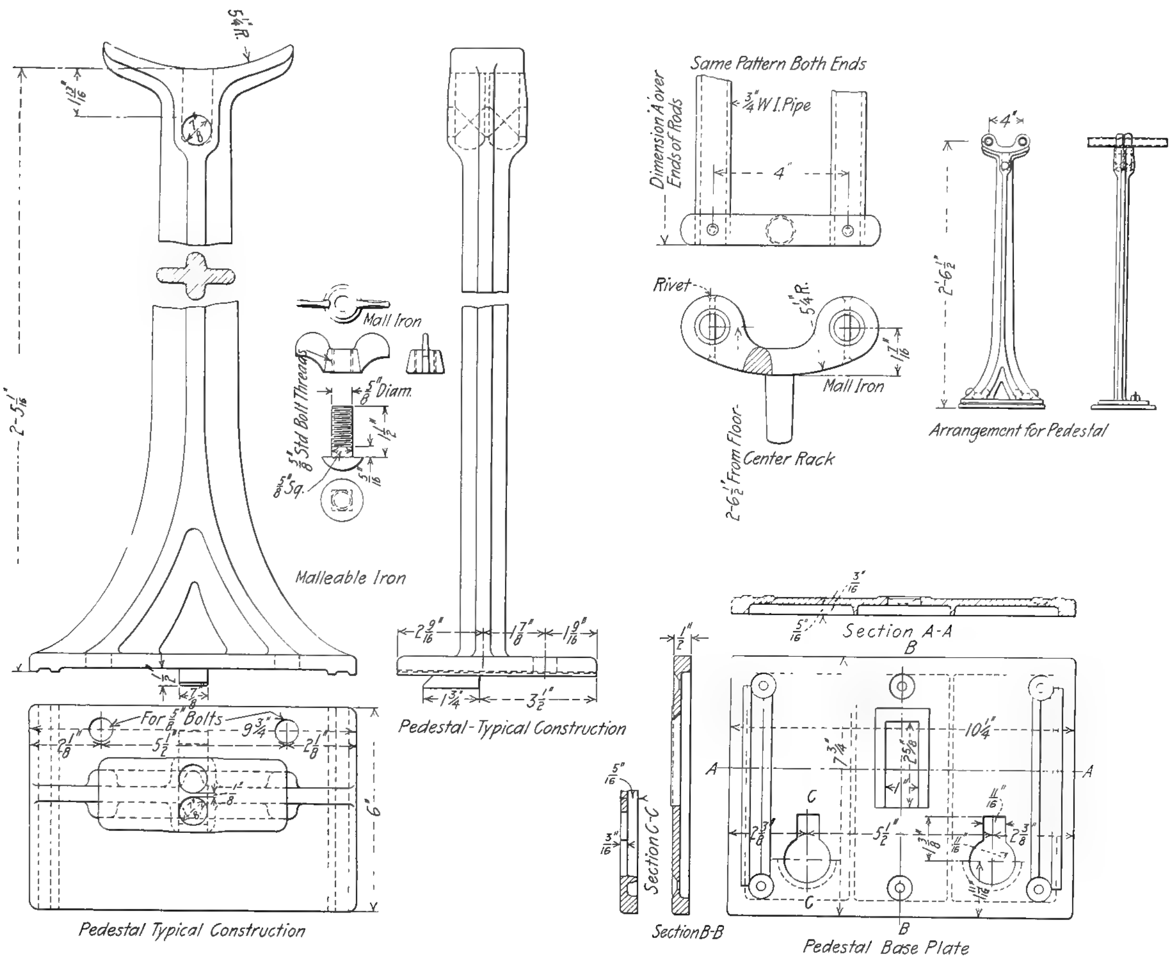


Fig. 1865—Pedestal, Center Rack and Details.

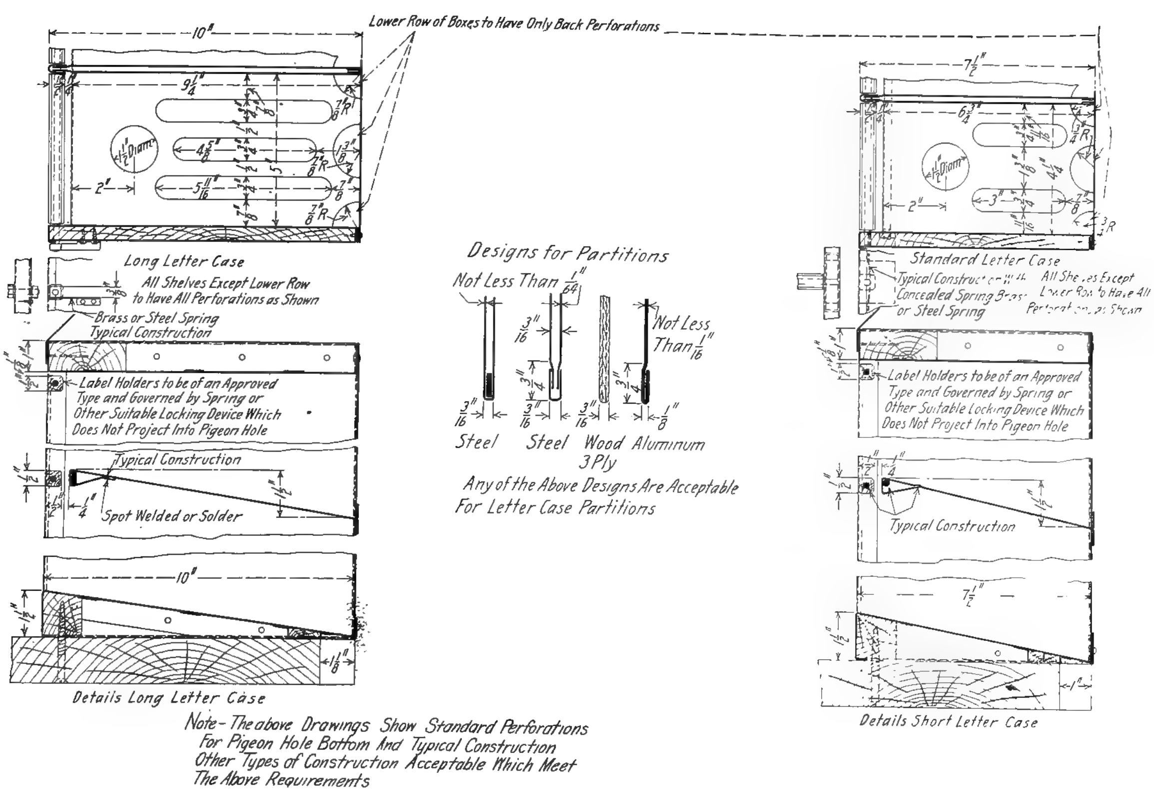


Fig. 1866—Letter Cases and Details.
United States Government Specifications for Postal Cars.

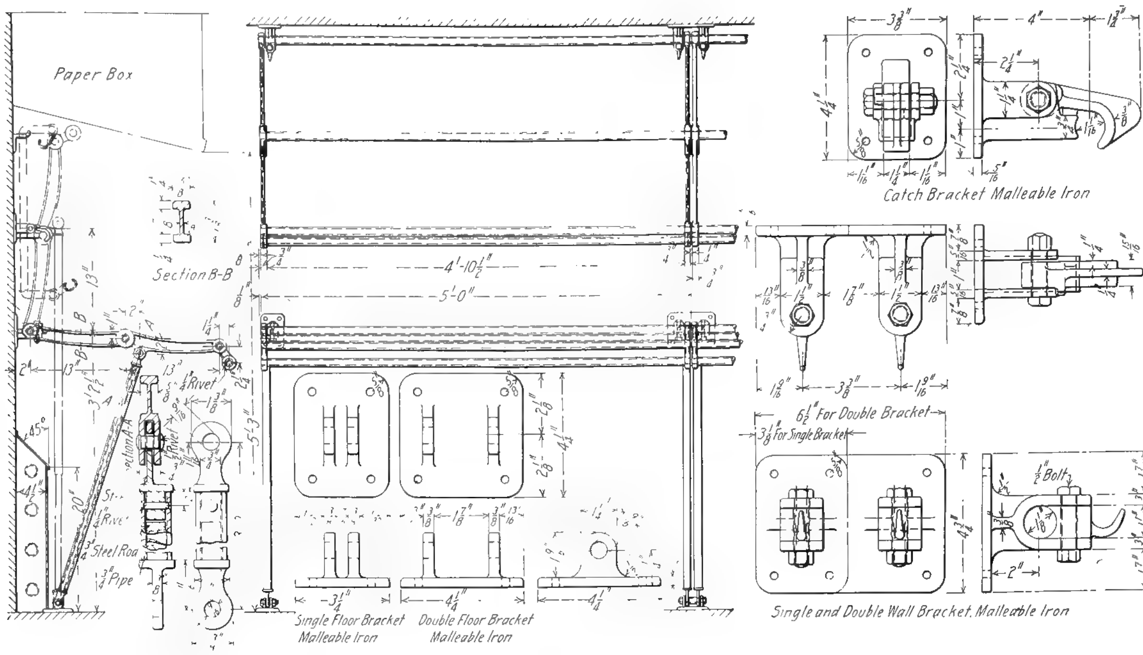


Fig. 1867—Mail Bag Rack and Details.

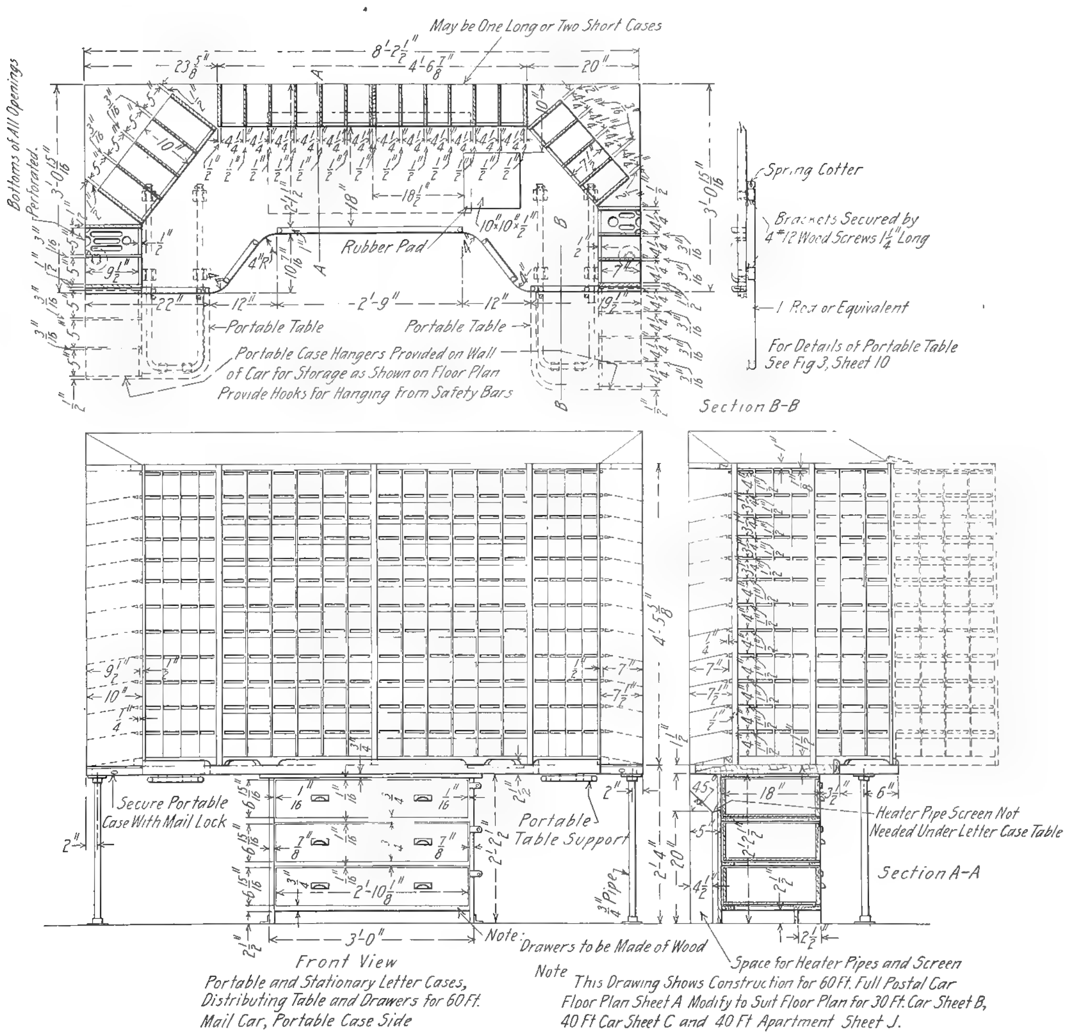


Fig. 1868—Letter Cases and Bins for Portable Case Side of 60-ft. Car.
United States Government Specifications for Postal Cars.

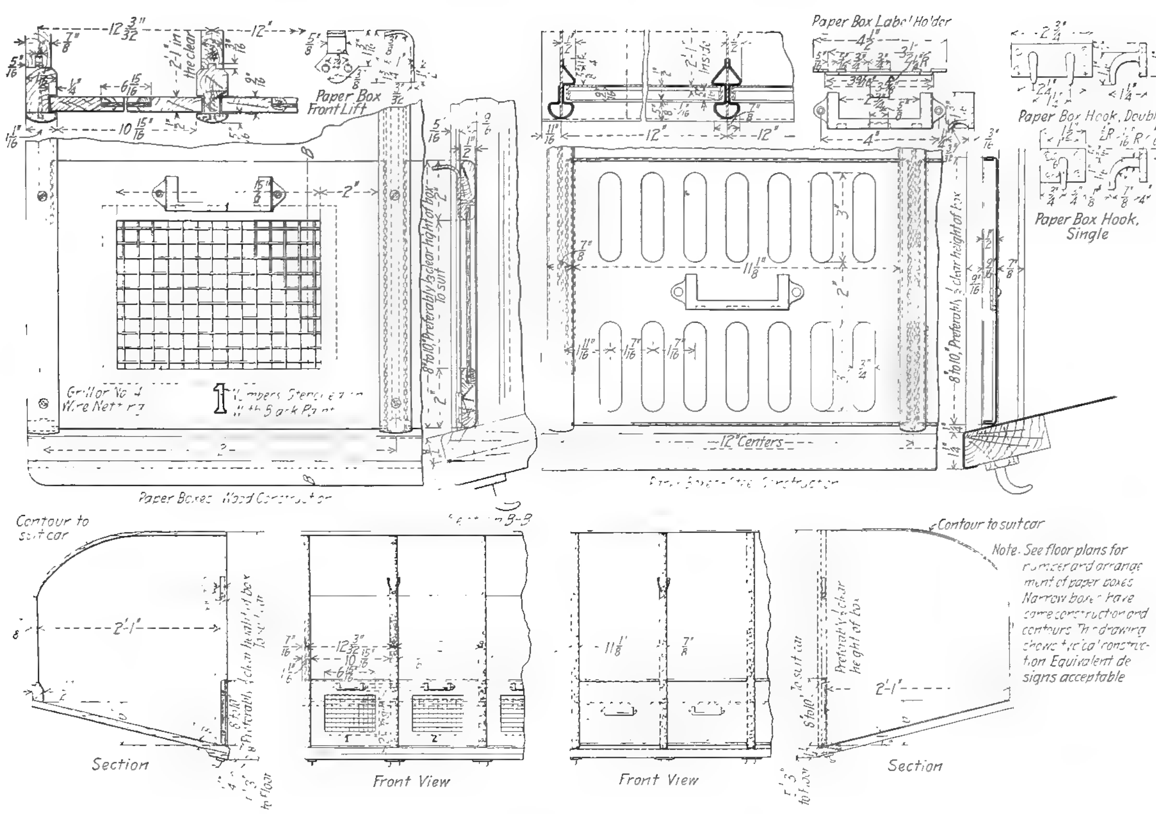


Fig. 1869—Construction of Paper Boxes.

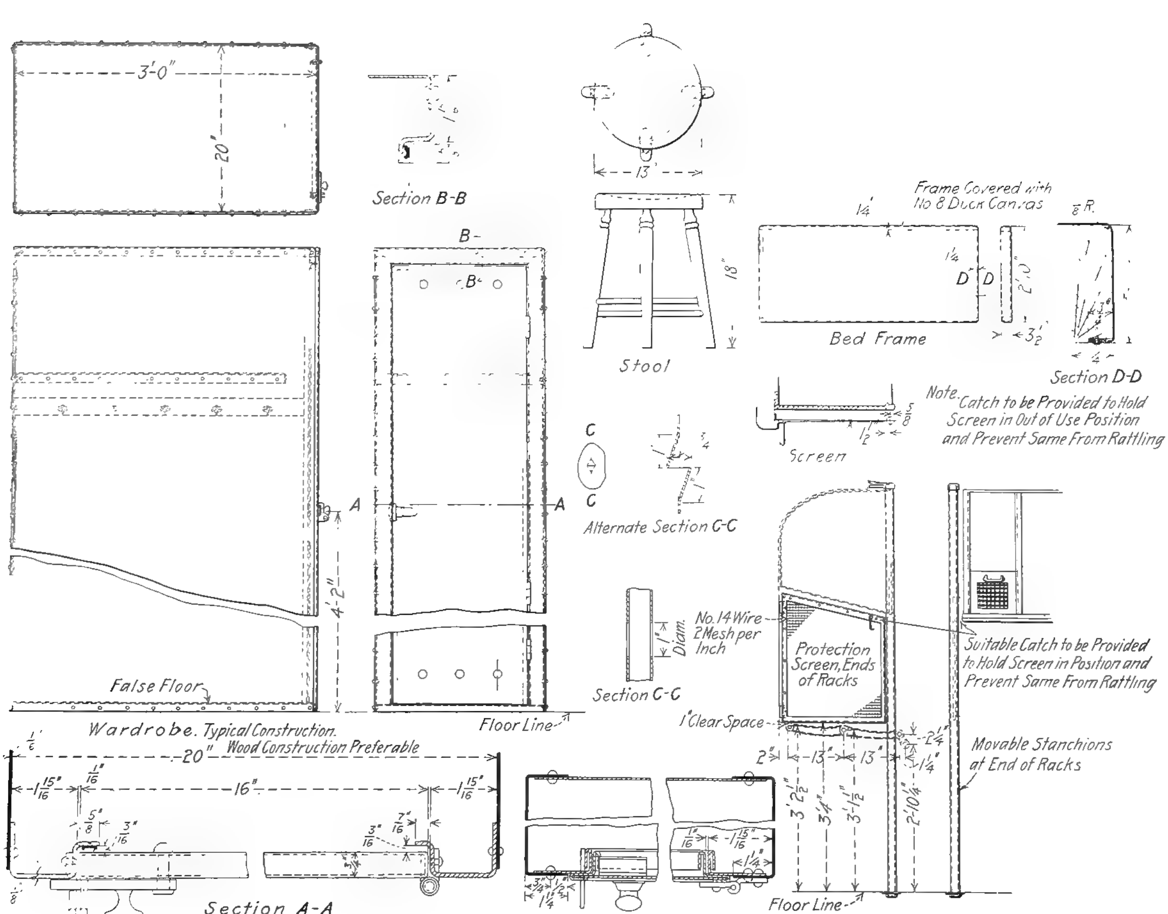


Fig. 1870—Wardrobe and Miscellaneous Details.
United States Government Specifications for Postal Cars.

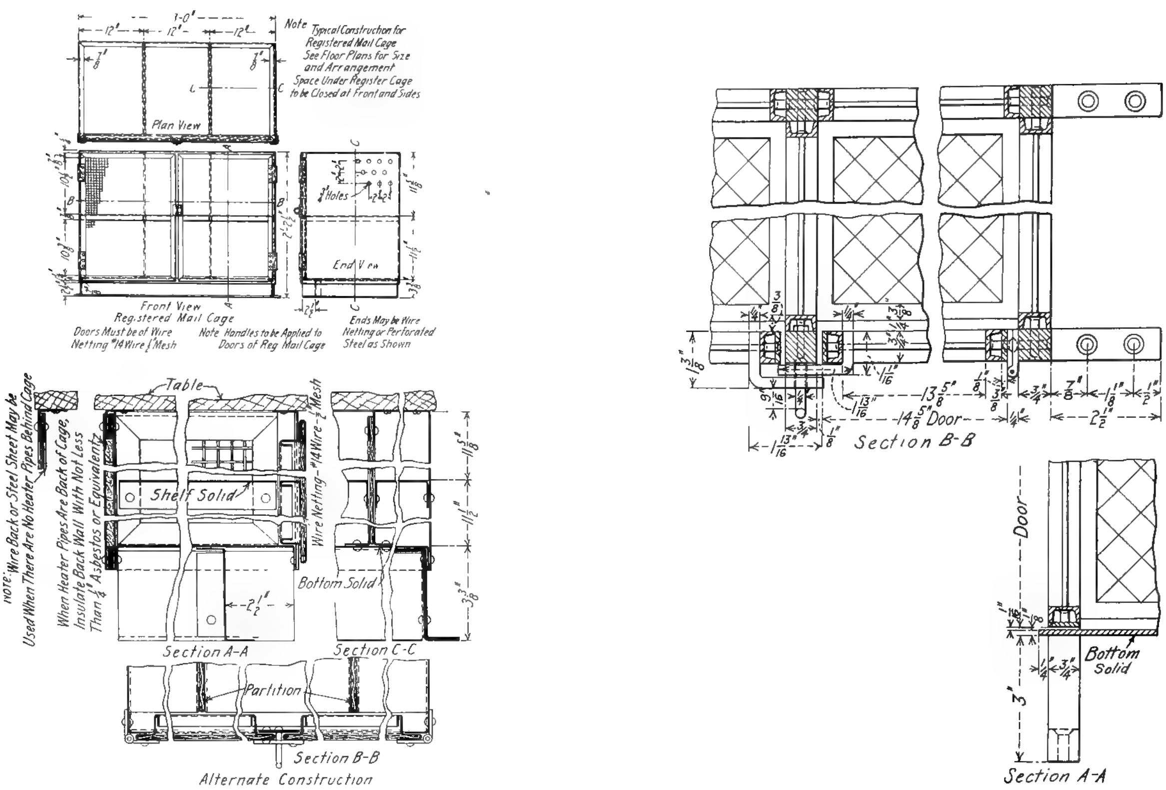


Fig. 1871—Construction Details of Registered Mail Cage.

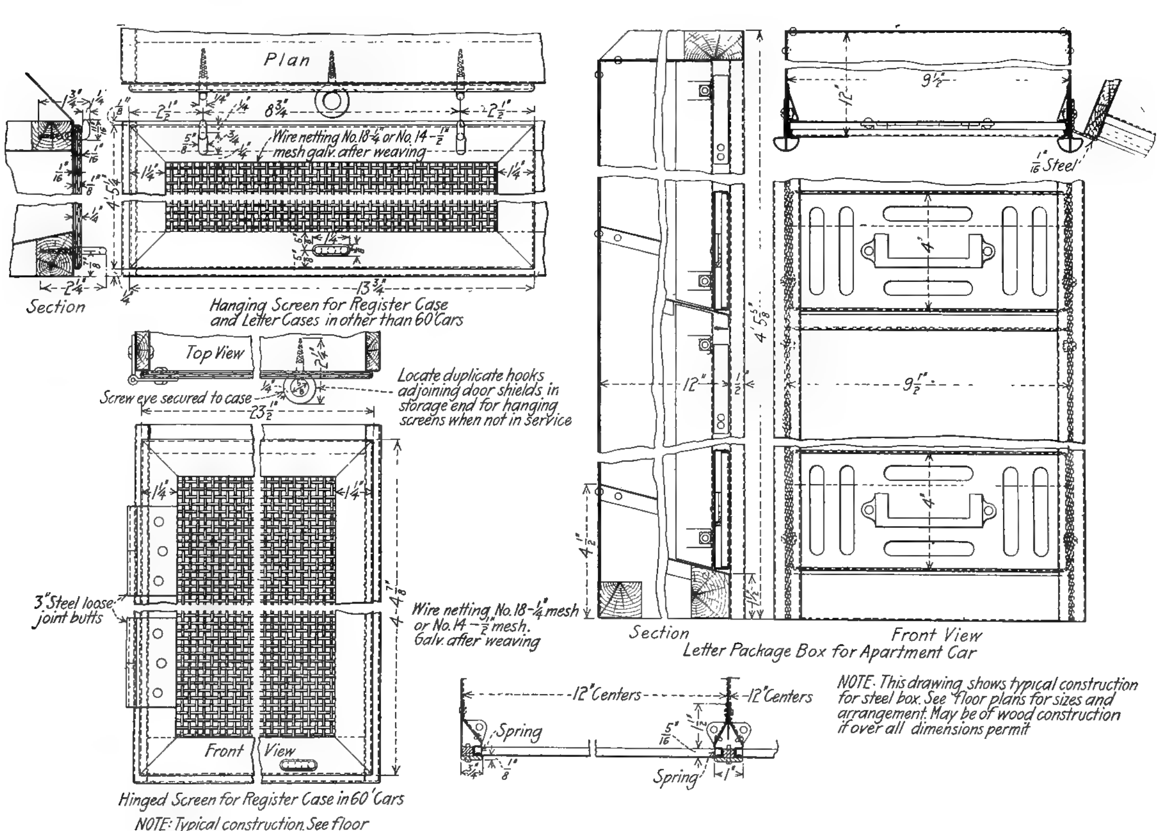


Fig. 1872—Screens for Register Case, and Letter Package Box.
United States Government Specifications for Postal Cars.

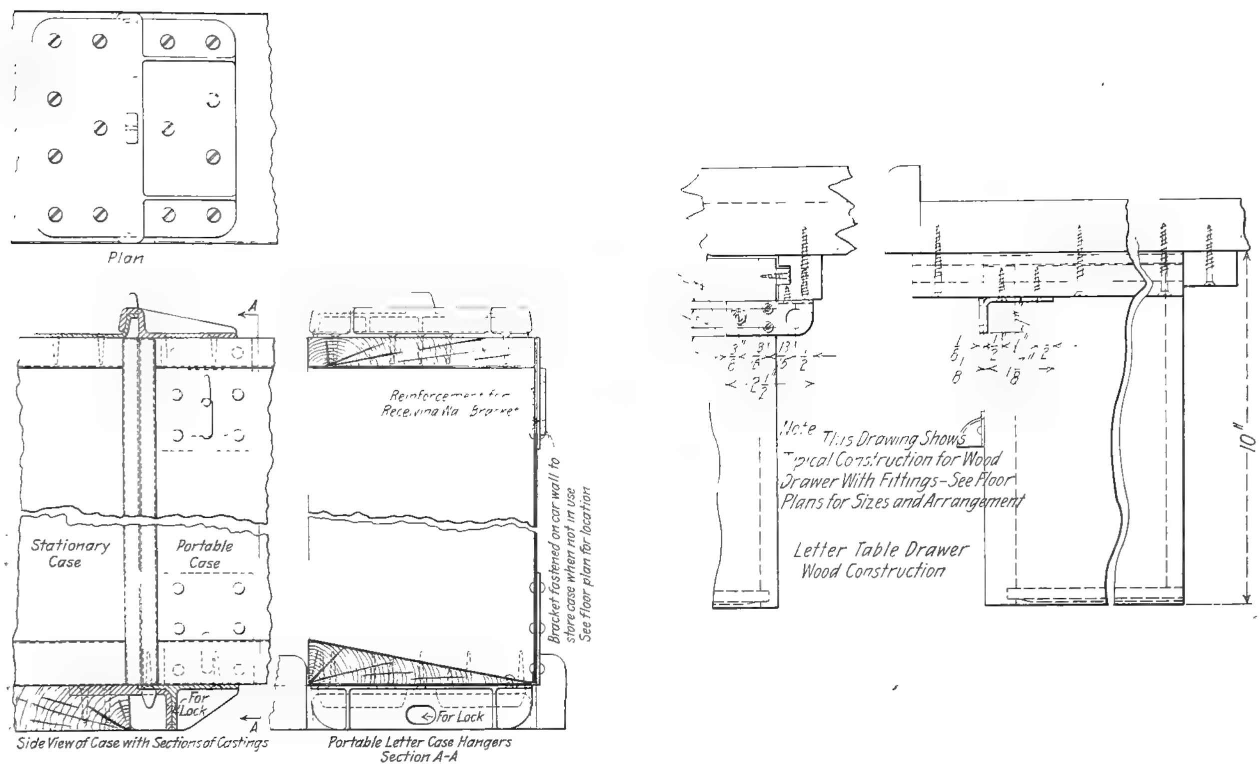


Fig. 1873—Portable Letter Case Hangers, and Letter Table Drawer.

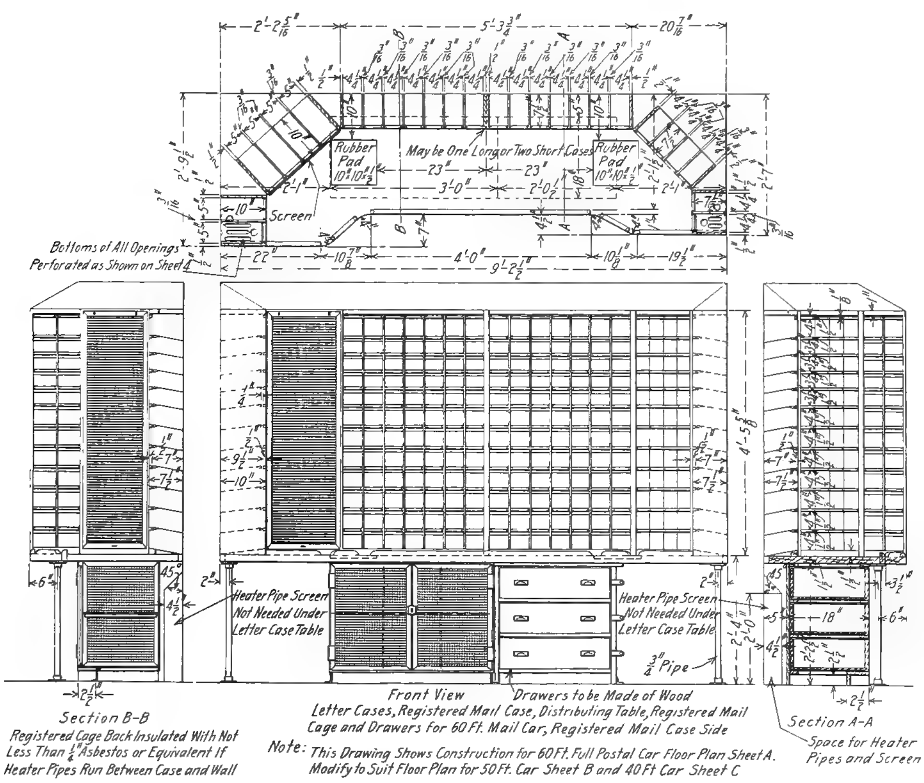


Fig. 1874—Letter Cases and Bins for Registered Mail Case Side of 60-ft. Car.

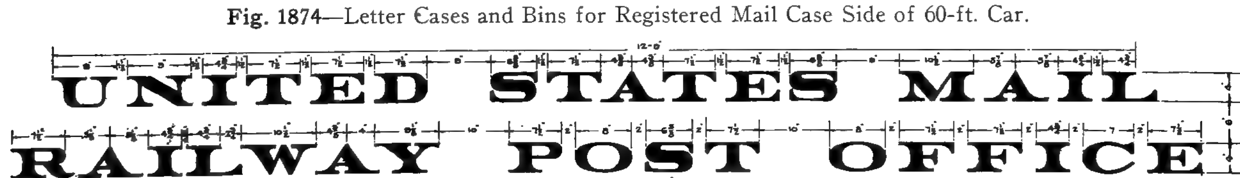


Fig. 1875—Outside Lettering. The Words Are Required as Shown. The Design of Letters is to Harmonize with the Other Lettering on the Car.

United States Government Specifications for Postal Cars.

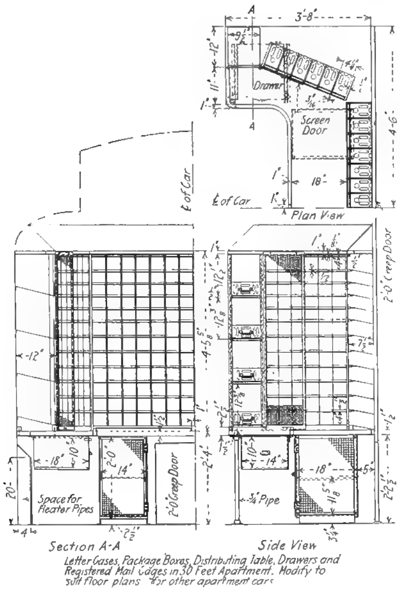


Fig. 1876—Letter Cases, Etc., in 30 ft. Apartment. U. S. Government Specifications for Postal Cars.

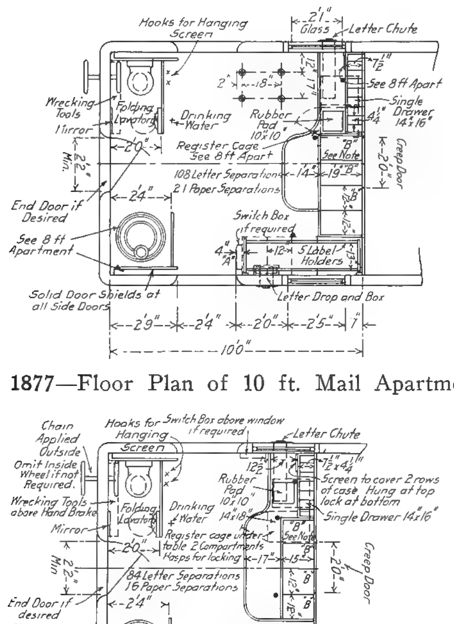


Fig. 1877—Floor Plan of 10 ft. Mail Apartment.

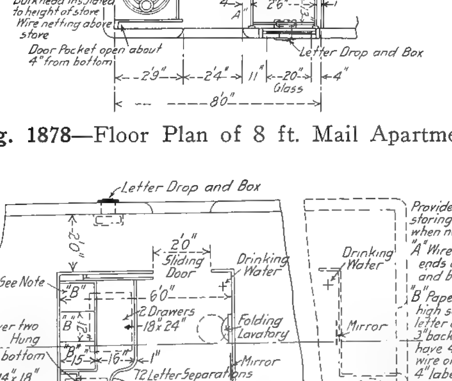


Fig. 1878—Floor Plan of 8 ft. Mail Apartment.

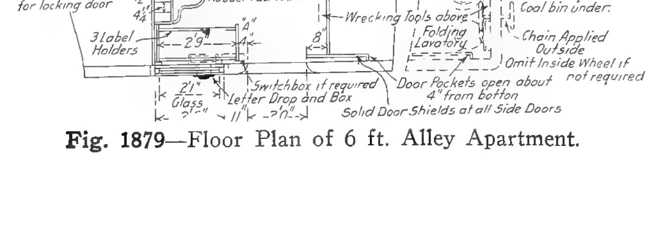


Fig. 1879—Floor Plan of 6 ft. Alley Apartment.

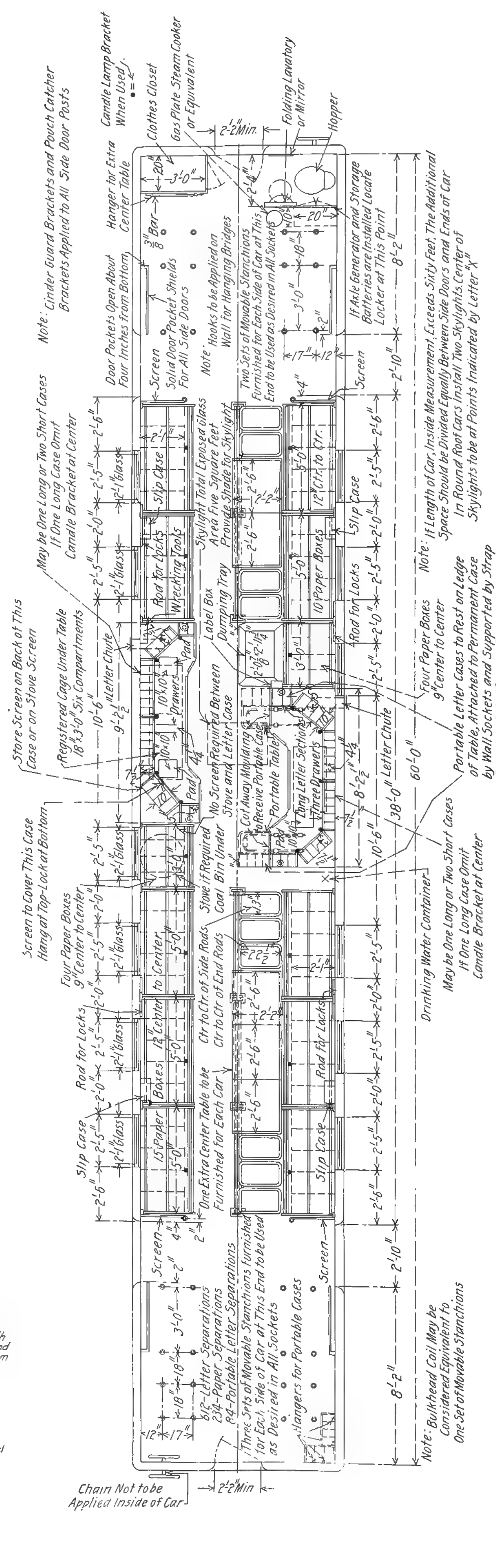


Fig. 1880—Floor Plan Showing U. S. Government Requirements for 60 ft. Postal Car. United States Government Specifications for Postal Cars.

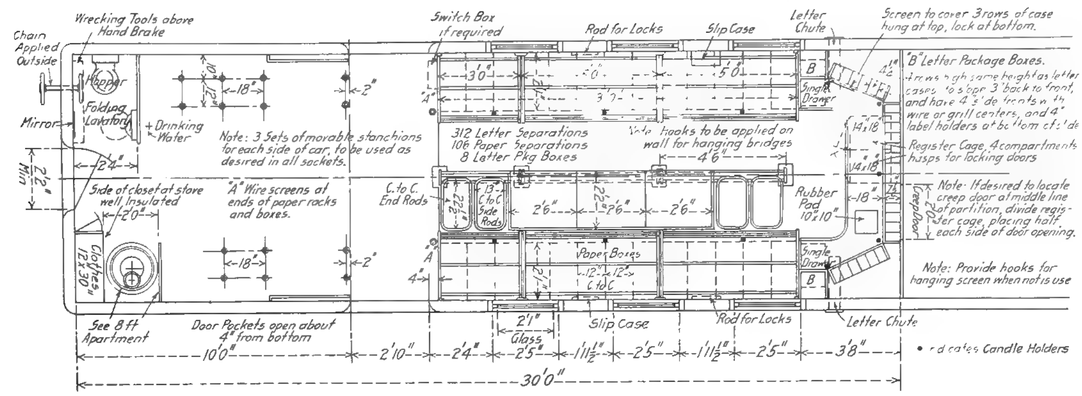


Fig. 1881—Floor Plans Showing U. S. Government Requirements for 30 ft. Mail Apartment.

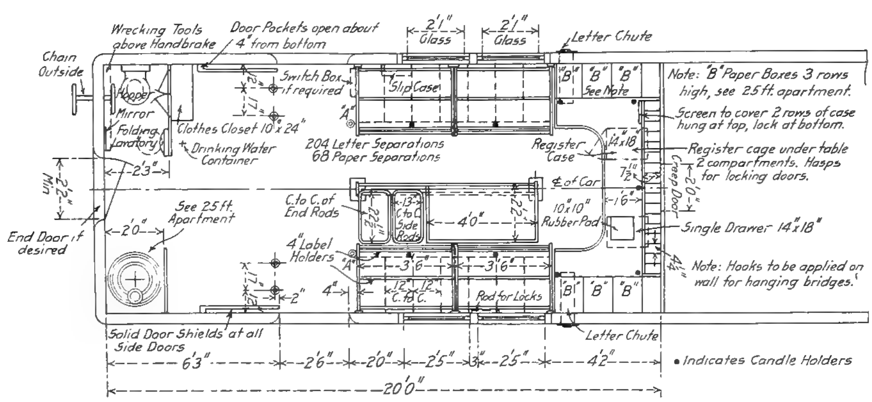


Fig. 1882—Floor Plans Showing U. S. Government Requirements for 20 ft. Mail Apartment.

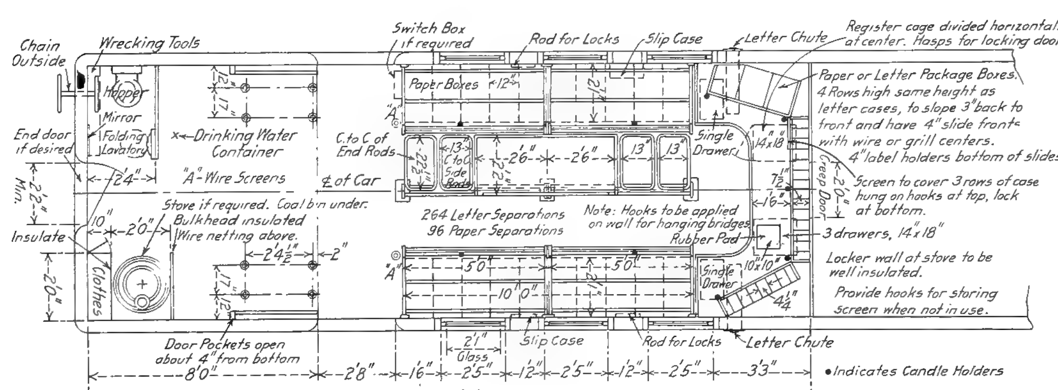


Fig. 1883—Floor Plans Showing U. S. Government Requirements for 25 ft. Mail Apartment.

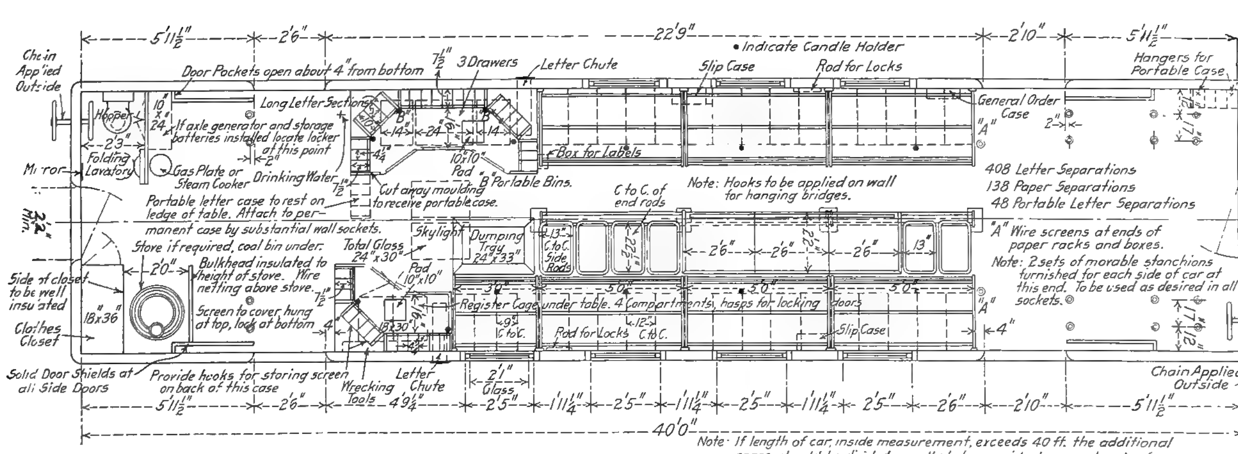


Fig. 1884—Floor Plans Showing U. S. Government Requirements for 40 ft. Postal Car.
United States Government Specifications for Postal Cars.

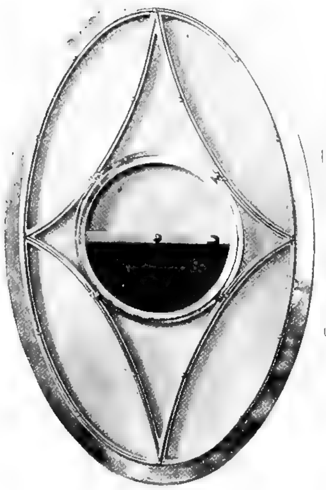


Fig. 1885—Art Glass Oval Sash, with Ventilator, for Saloons. Adams & Westlake Company.

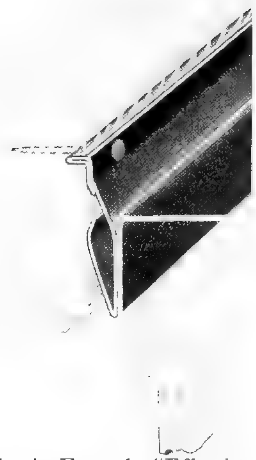


Fig. 1885—A Forsyth "Effective Without Binding." Top Brass Without Stripping. Forsyth Brothers Company.

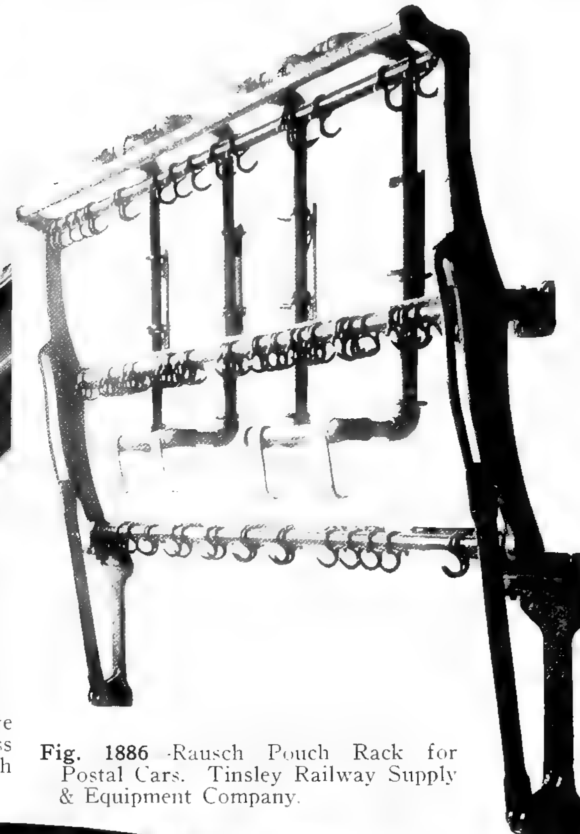


Fig. 1886—Rausch Pouch Rack for Postal Cars. Tinsley Railway Supply & Equipment Company.

Fig. 1887—Art Glass Deck Light. Adams & Westlake Company.

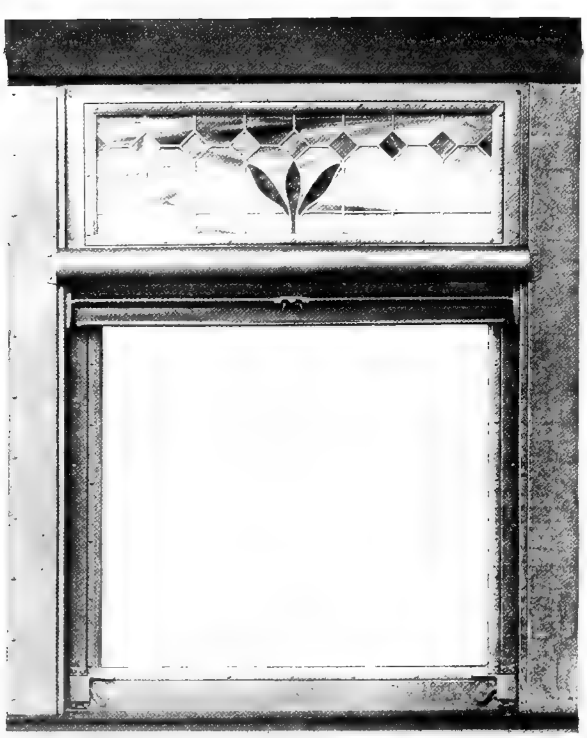


Fig. 1888—Brass Sash for Wooden or Steel Passenger Train Cars.

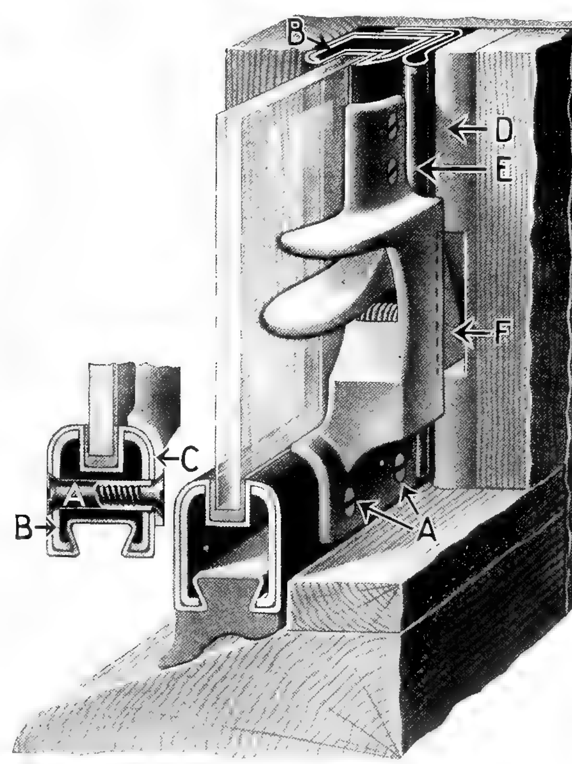


Fig. 1889—Forsyth "Substantial" Sash Locks for Wood and Brass Sash.

Forsyth Brothers Company.

Fig. 1890—Beadless Type of Brass Sash with Narrow Rail.

Fig. 1891—Forsyth "Indestructible" Narrow Rail Brass Sash and Bottom Cushion Weather Stripping.

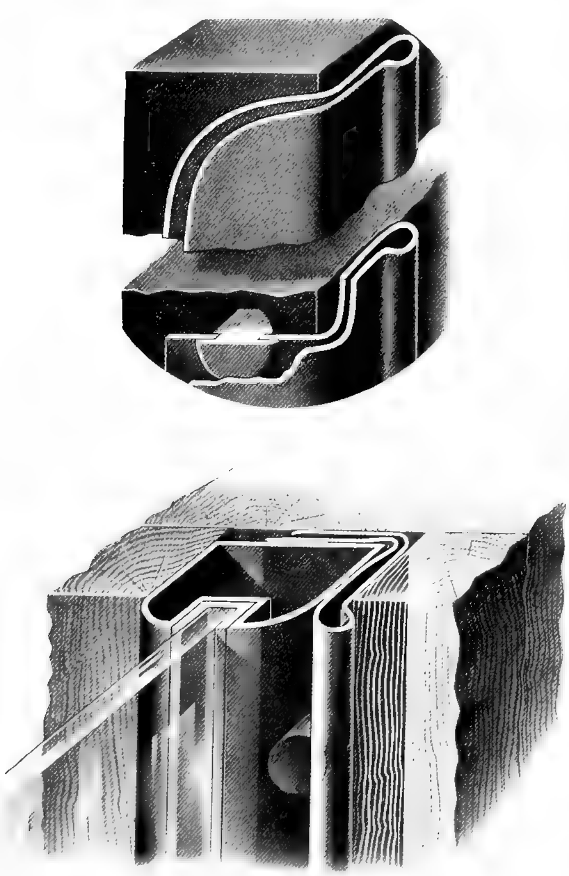


Fig. 1892—Forsyth Spring Bronze Side Weather Stripping, Applicable to Either Brass or Wooden Sash.

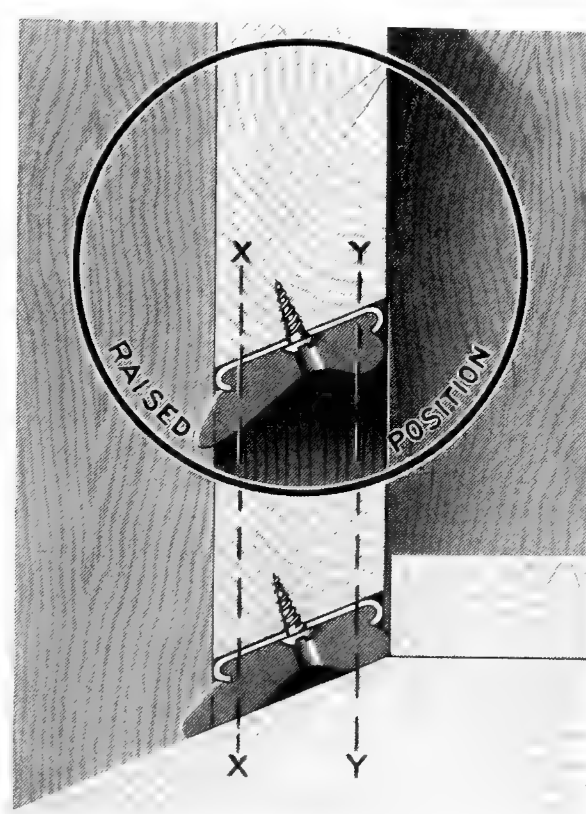


Fig. 1893—Forsyth Bottom Cushion Weather Stripping Applied to Wooden Sash.

Forsyth Brothers Company.

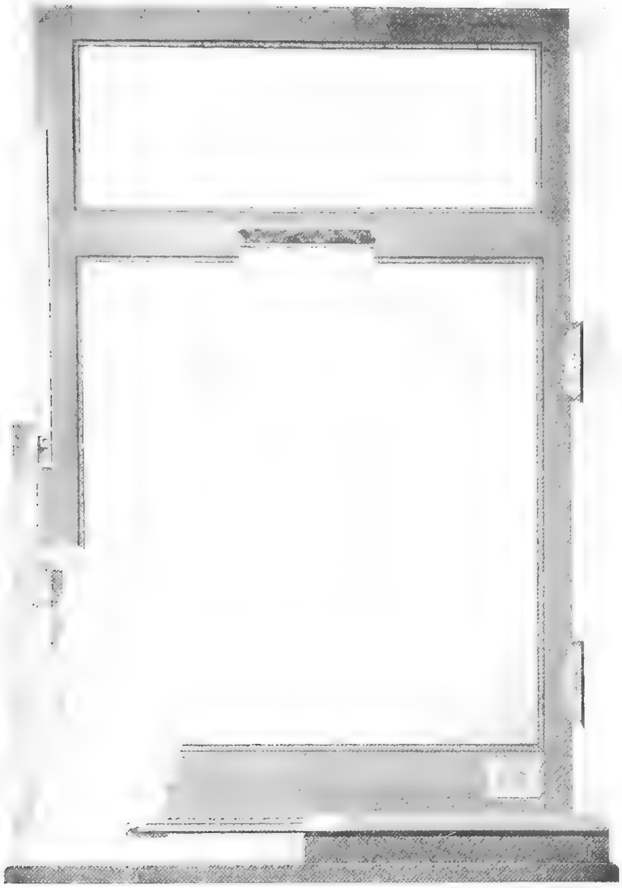


Fig. 1894—Duplex Weatherproof Window, Showing Arrangement of Side Compression Springs and No. 3 Flush Lock.

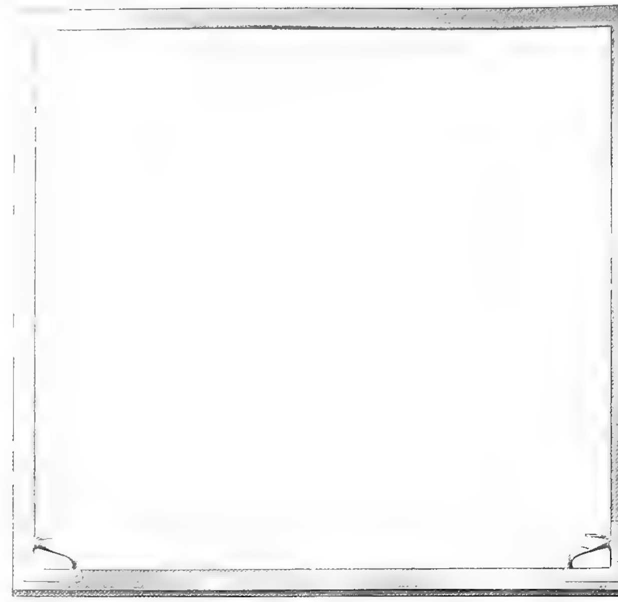


Fig. 1895—Acme Brass Sash.

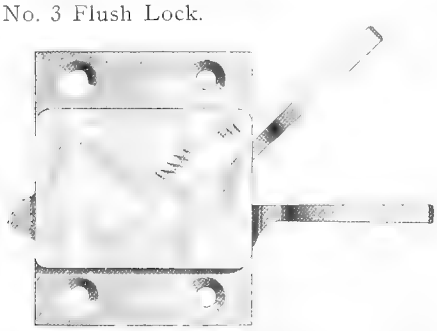


Fig. 1896—Acme Type C Sash Lock for Application to the Base of the Sash.

Fig. 1897—Acme Flush Lock No. 3, Applied to Sash.

Fig. 1898—Cross Section of Duplex Weatherproof Window for Double Sash.

Fig. 1899—Sill Construction of Duplex Weatherproof Window.

Acme Supply Company.

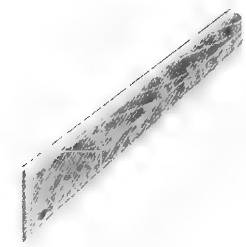


Fig. 1901—Meeting Rail Construction, Duplex Weatherproof Window. Acme Supply Company.

Fig. 1900—Corner of Acme Brass Sash, Showing Reinforcement and Lock. Acme Supply Company.

Fig. 1903—Eclipse Deck Sash Ratchet. Transportation Utilities Company.

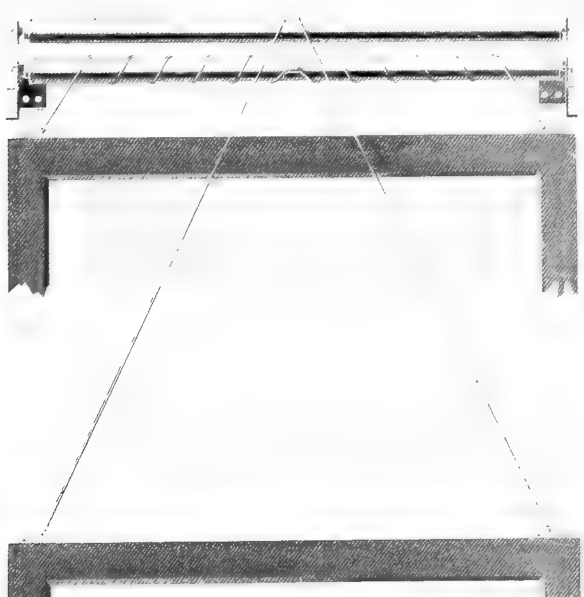


Fig. 1902--Reliance Sash Balance. Transportation Utilities Company.

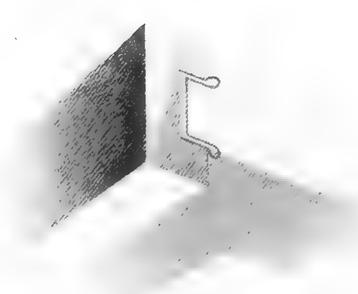


Fig. 1903A—Brown Metallic Window Strip. Transportation Utilities Company.

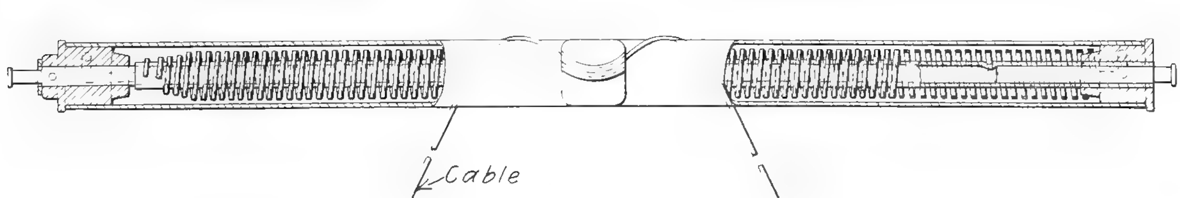


Fig. 1904—Reliance Sash Balance. Transportation Utilities Company.

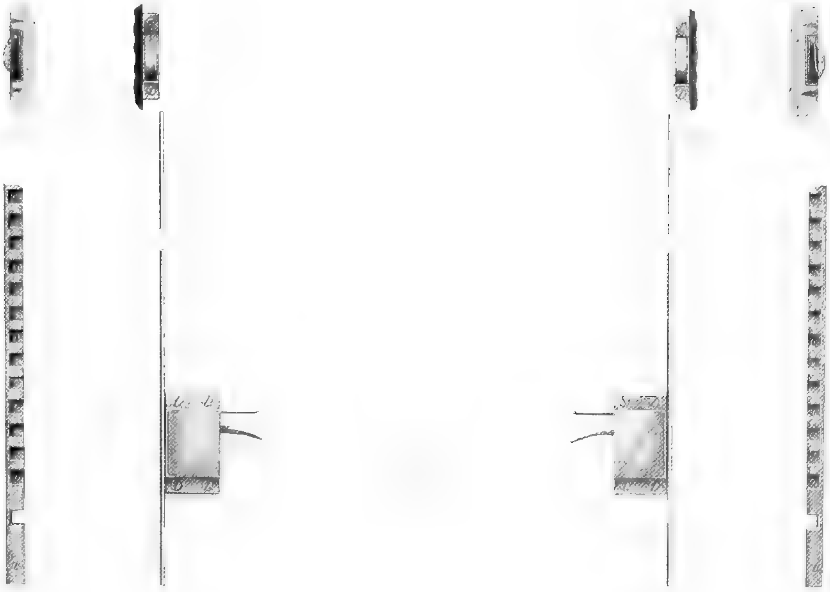


Fig. 1905—National Wedge Lock and Compression Cams Applied to Sash.

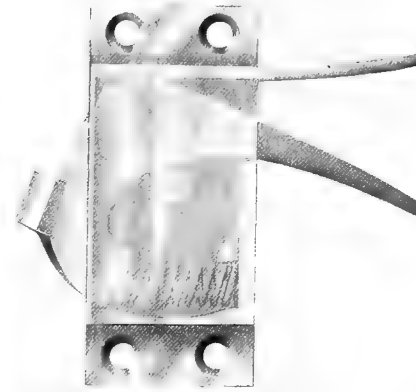


Fig. 1906—Detail Construction of National Wedge Lock.

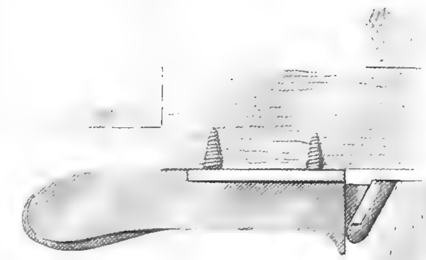


Fig. 1907—Top View of National Wedge Lock Showing Guide on Lock Bearing Against Guide on Stop-Bar.

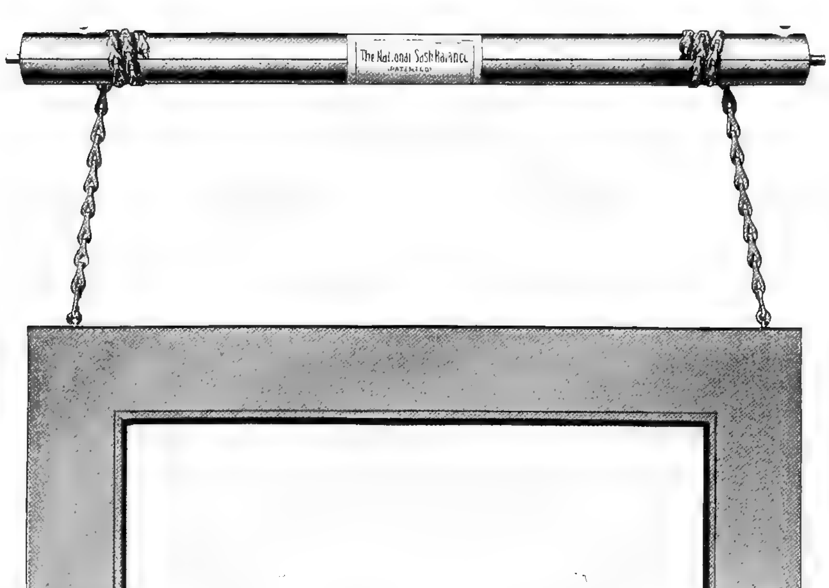


Fig. 1908—Sash Balance, Straight Chain.

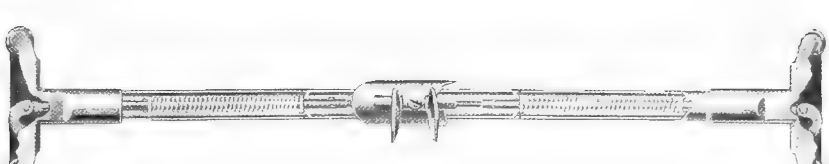


Fig. 1909—National Cam Curtain Fixture in Release Position.

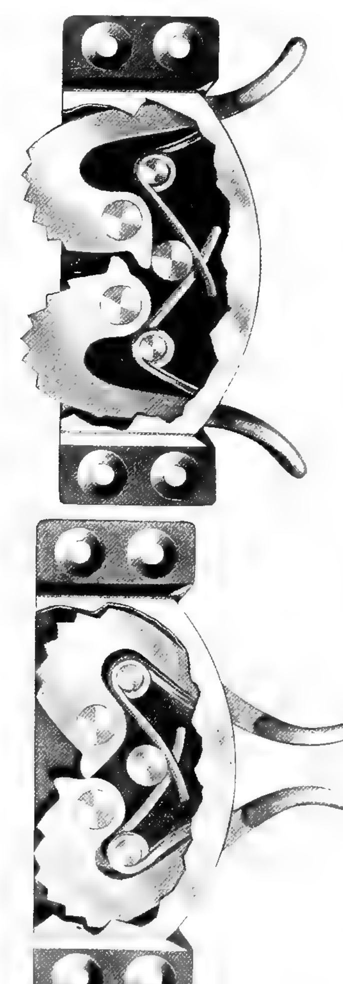


Fig. 1910—Double Cam Sash Lock

National Lock Washer Company.

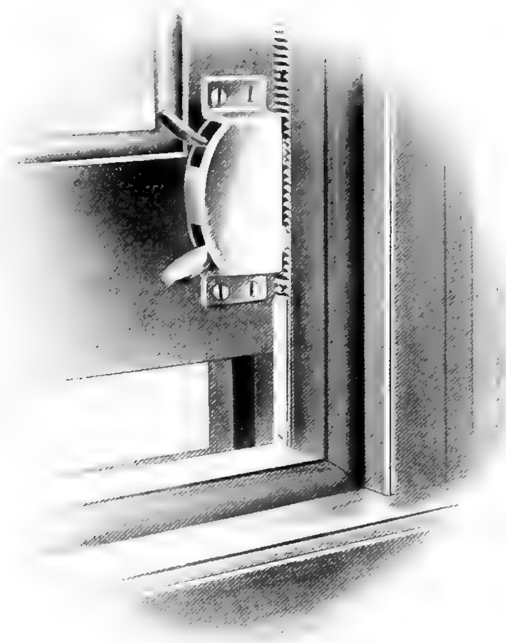


Fig. 1911—Double Cam Sash Lock Applied to Sash. National Lock Washer Company.

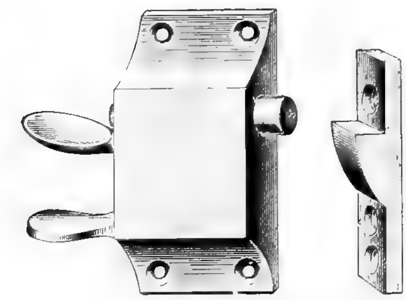


Fig. 1913—Sash Lock No. 063. Russel & Erwin Manufacturing Company.

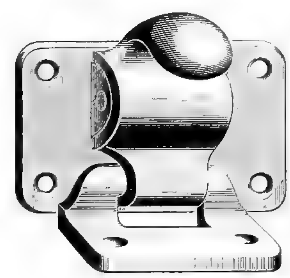


Fig. 1914—Sash Fastener and Latch. Russel & Erwin Manufacturing Company.

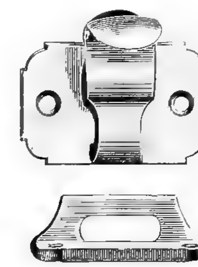


Fig. 1915 — Sash Fastener and Lift. R. & E. Manufacturing Company.

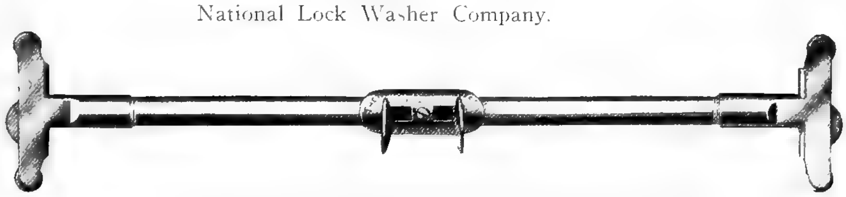


Fig. 1912—National Cam Curtain Fixture in Holding Position. National Lock Washer Company.

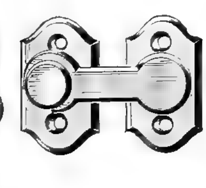


Fig. 1916 — Window Bars. R. & E. Manufacturing Company.

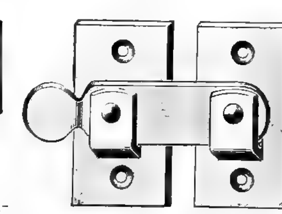


Fig. 1917—Window Bars. R. & E. Manufacturing Company.

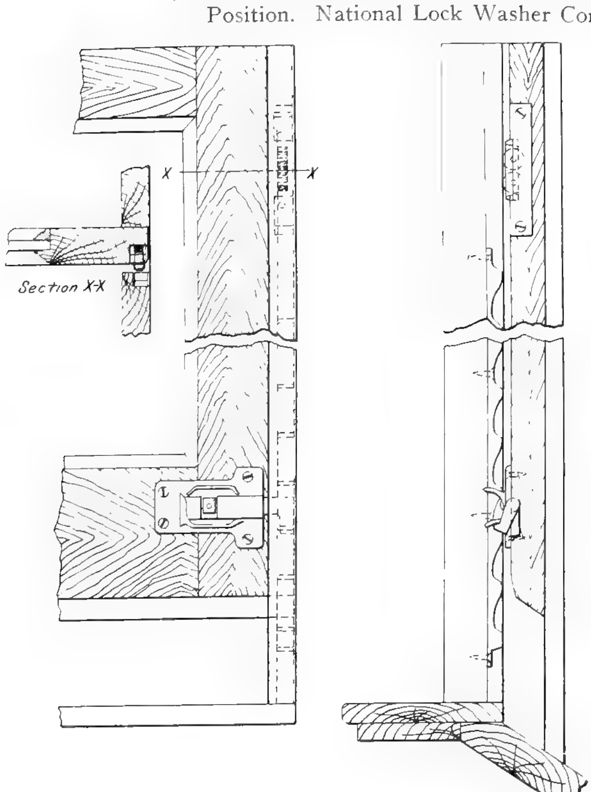


Fig. 1918—No. 177 Lock Applied to Sash. Dayton Manufacturing Company.

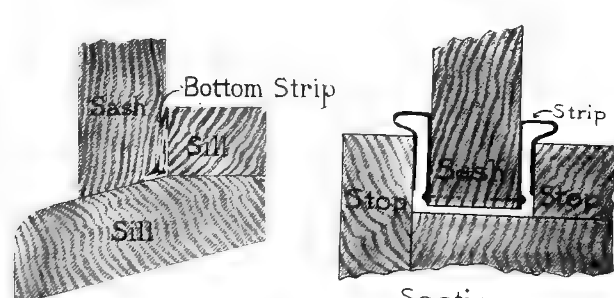


Fig. 1919—Application of Detroit Metal Weather Strips. Frost Railway Supply Company.

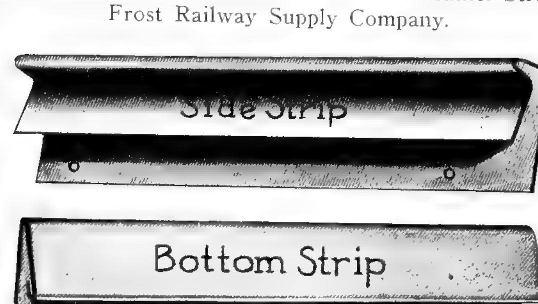


Fig. 1920—Detroit Metal Weather Strips. Frost Railway Supply Company.

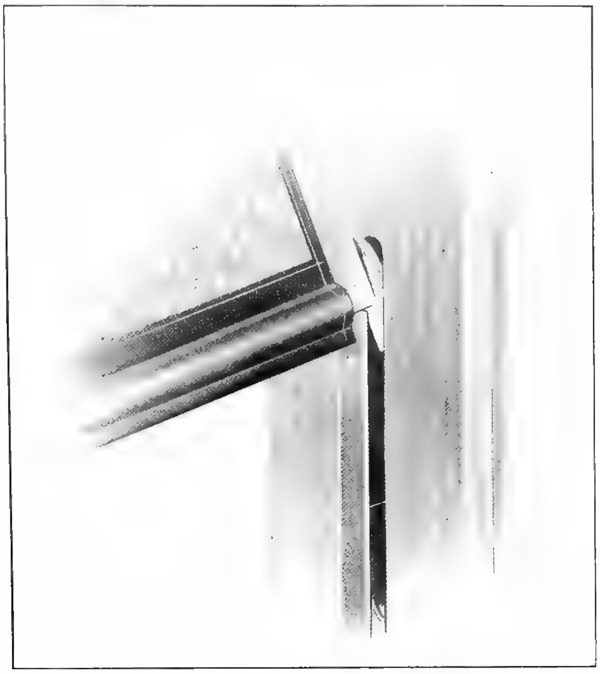


Fig. 1921—Dayton Curtain Fixture, Showing Removal of Shoe from Groove When Necessary.

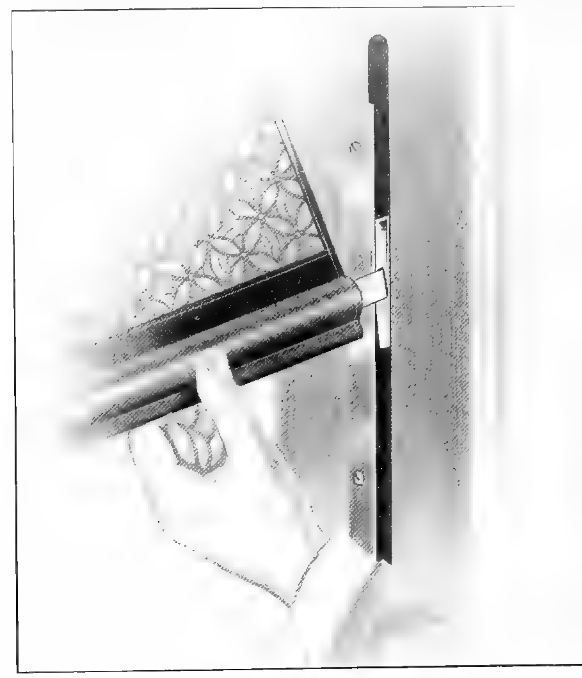
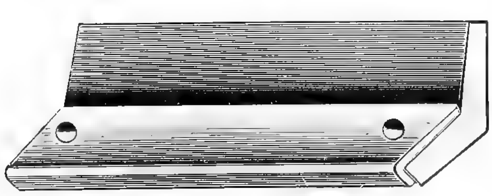


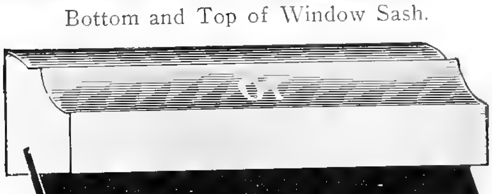
Fig. 1922—Dayton Curtain Fixture with Retaining Strip to Prevent Accidental Displacement.

Fig. 1923—Section Through Dayton Curtain Fixture, Showing Adjustable Foot.
Dayton Manufacturing Company.

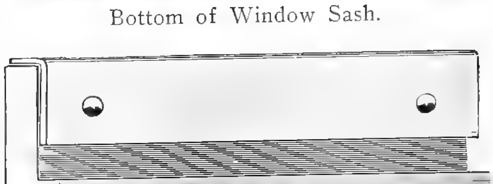
Sides and Bottom of Window Sash.



Bottom and Top of Window Sash.



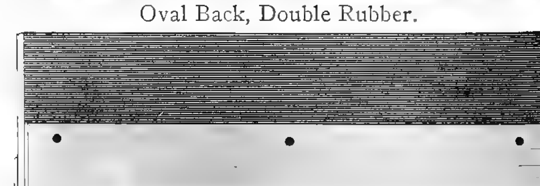
Bottom of Window Sash.



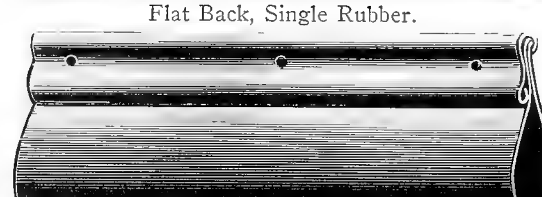
Sides and Top of Doors.

Fig. 1924—Steel Car Weather Strips.

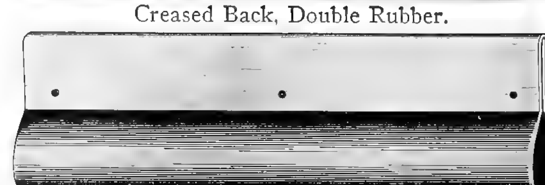
Oval Back, Double Rubber.



Flat Back, Single Rubber.



Creased Back, Double Rubber.



Flat Back, Double Rubber.

Fig. 1925—Metallic Weather Strips.

D. W. Bosley Company.

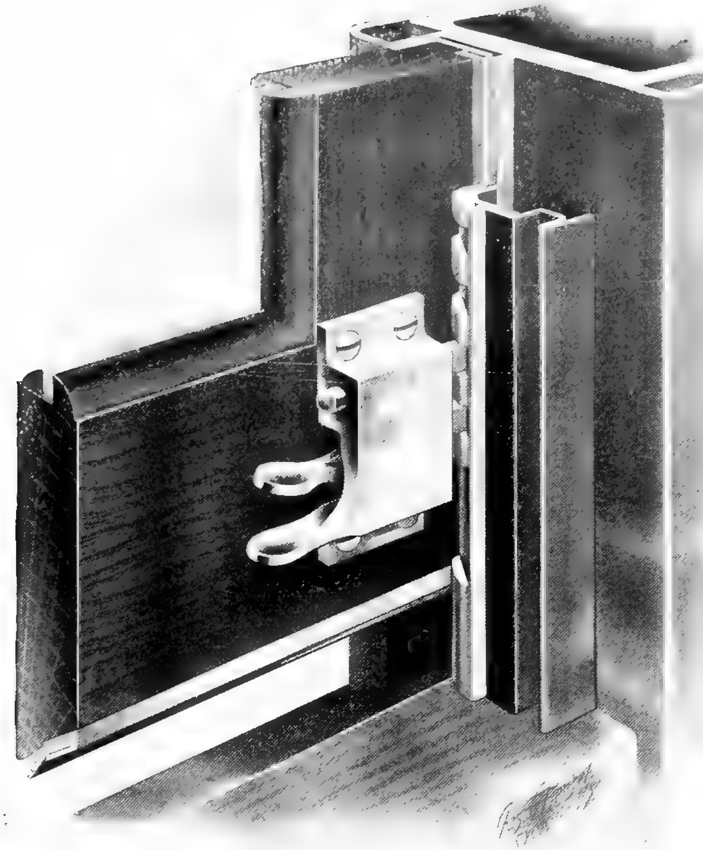


Fig. 1926—Edwards No. 7 Lock and Brass Bar with Metal Stop Casing and Side and Bottom Weather Stripping, Used on Steel Cars, Unbalanced Sash.

Fig. 1927—Edwards No. 7 Lock and Bar, Used on Wood Cars with Unbalanced Sash.

Fig. 1928—No. 7 Wedge Lock and Bar.

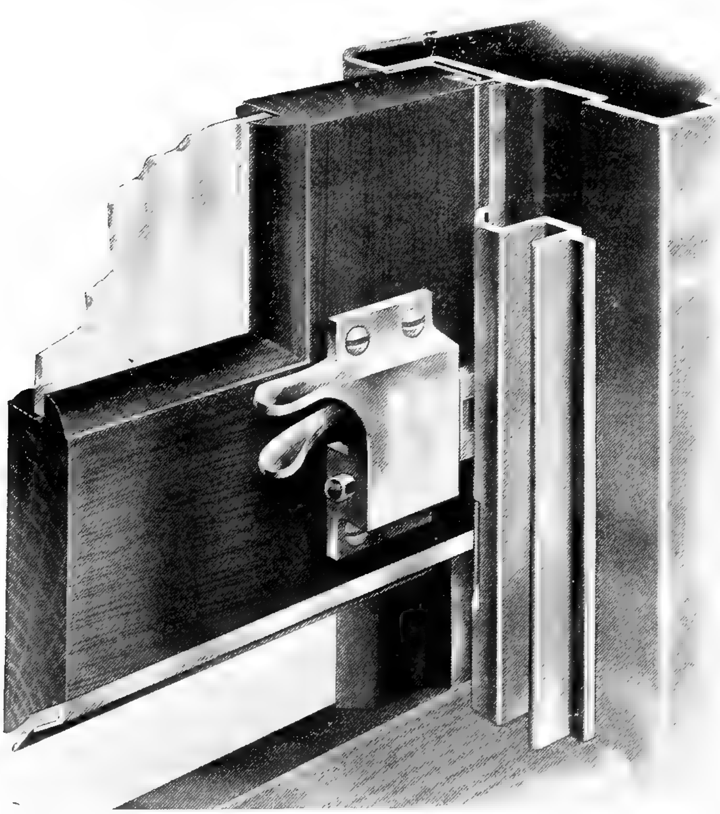


Fig. 1929—Edwards No. 7 Lock and Extended Brass Stop Casing and Curtain Guide with Side and Bottom Weather Stripping, Used on Steel Cars with Balanced Sash.

Fig. 1930—Edwards No. 7 Lock and Bar, Used on Wooden Cars, with Balanced Sash.

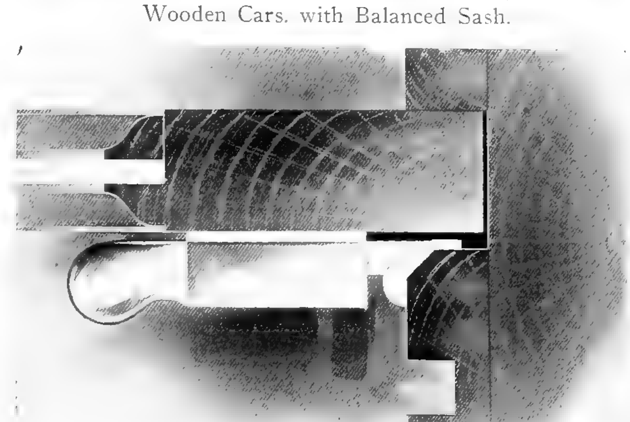


Fig. 1931—Top View, Showing No. 7 Wedge Lock and Stop Bar Mounted on Sash.

O. M. Edwards Company, Incorporated.

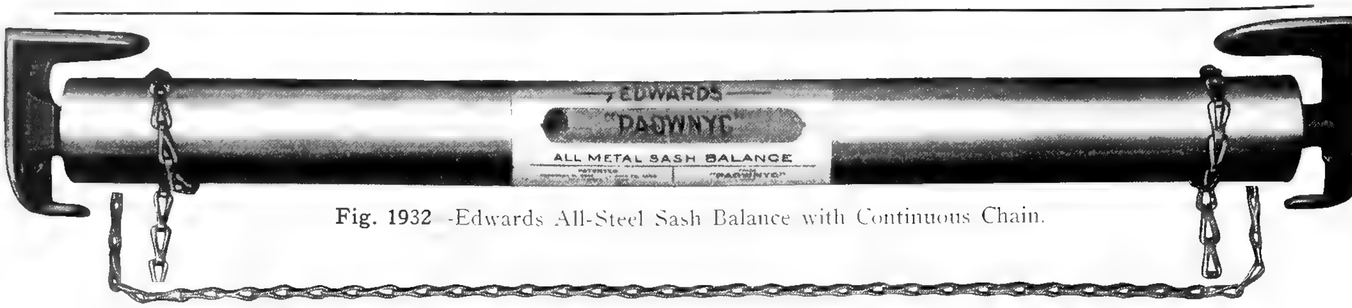


Fig. 1932 -Edwards All-Steel Sash Balance with Continuous Chain.

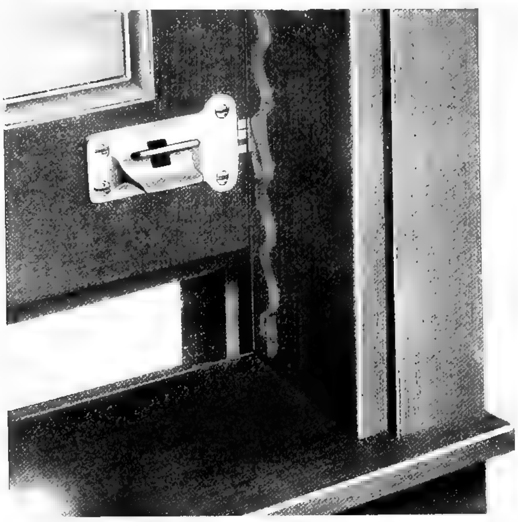


Fig. 1933—Edwards No. 13 Sash Lock with Phantom View of Stop Bar as Used Without Roller Sash Balance.

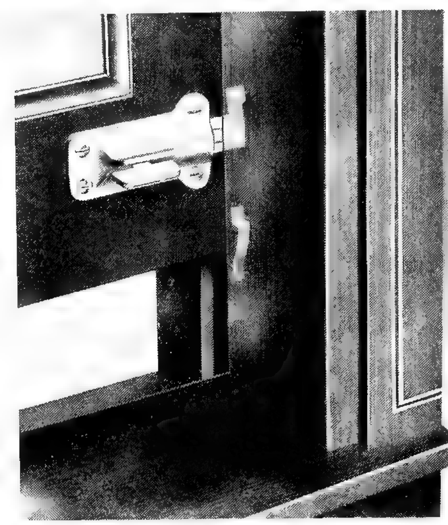


Fig. 1934—Edwards No. 13 Sash Lock with Phantom View of Keeper Plate as Used with Roller Sash Balance.

Fig. 1935—Sash Lock No. 22-28 and Stop Bar.

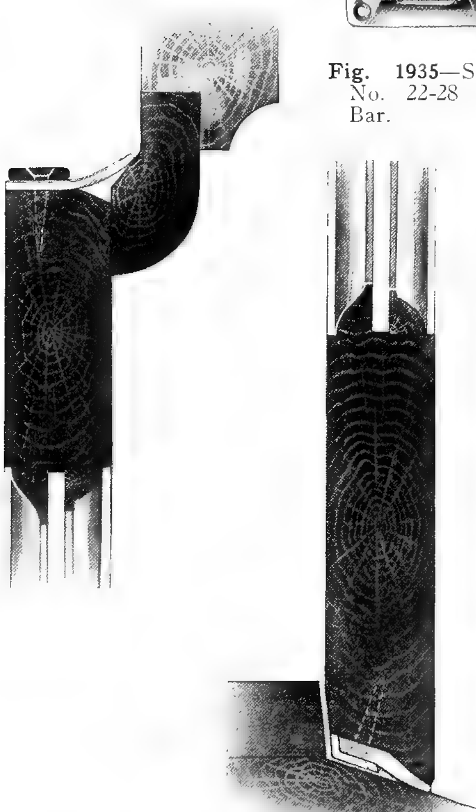


Fig. 1936—Edwards Top and Bottom Weather Stripping, Top Rubber Reinforced with Spring Brass Strip.

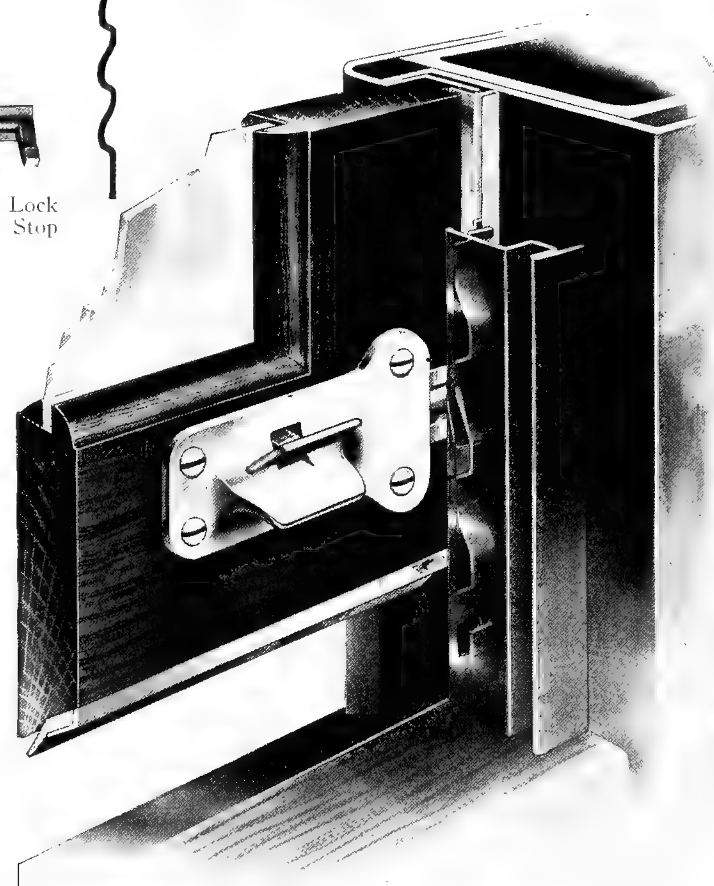


Fig. 1937—Edwards No. 13 Lock with Metal Stop Casing and Side and Bottom Weather Stripping Used on Steel Cars.

O. M. Edwards Company, Incorporated

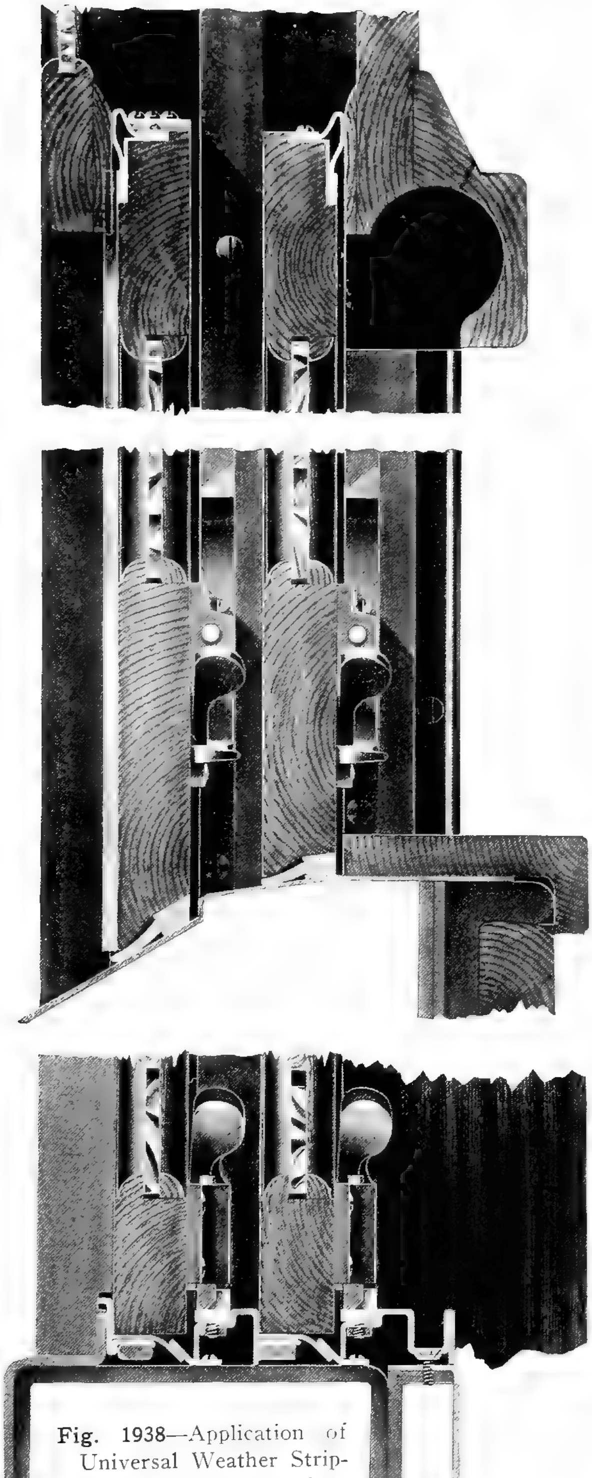


Fig. 1938—Application of Universal Weather Stripping, No. 10 Gravity Wedging Locks and Racks.

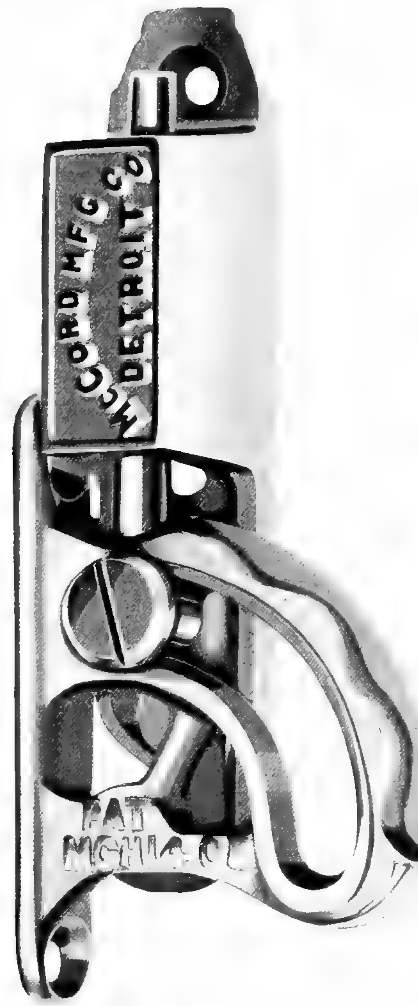


Fig. 1939—Universal Malleable Iron Deck Sash Ratchet.

Fig. 1940—Universal No. 5 Plain Sash Lift.

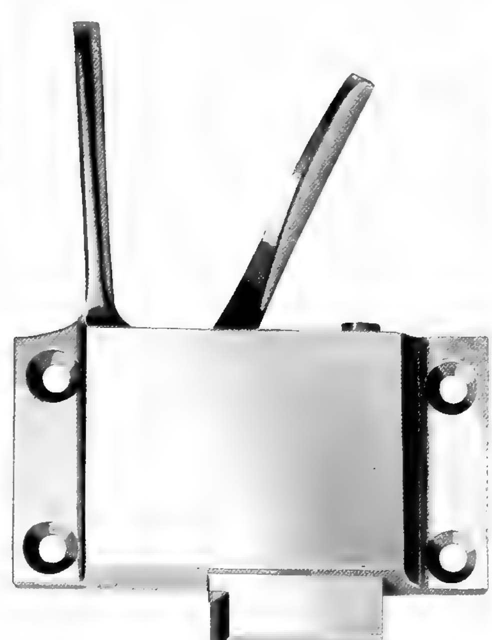


Fig. 1941—Universal No. 10 Gravity Wedging Lock and Rack.

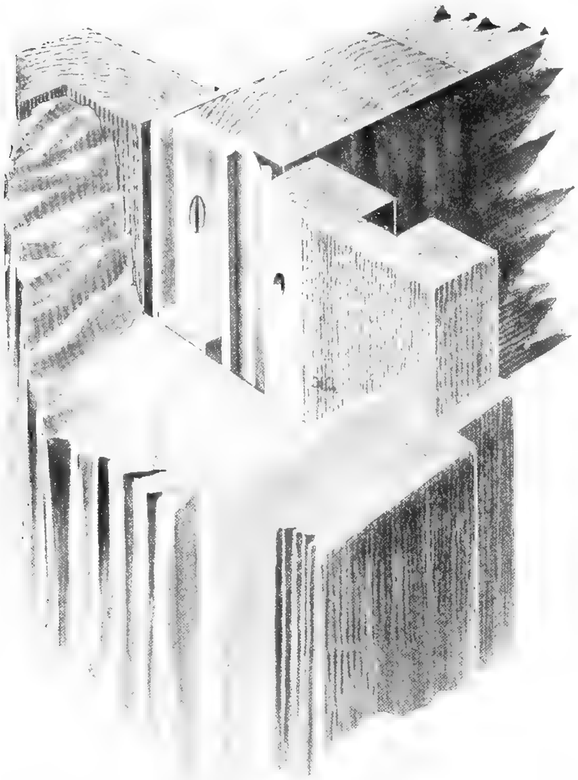


Fig. 1942—Universal Side Weather Stripping, Standard Design.

Fig. 1943—Universal Top Weather Stripping.

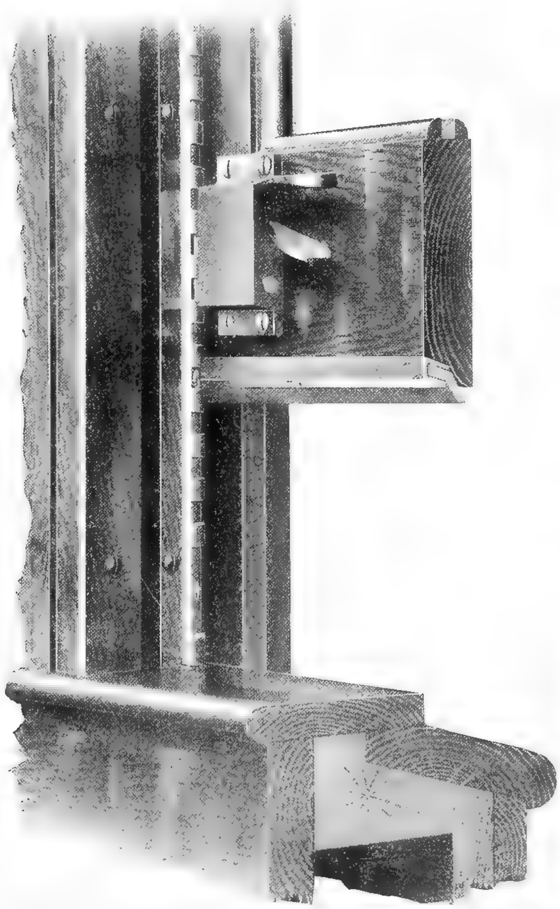


Fig. 1944—Universal Bottom Weather Stripping and No. 20 Wedging Sash Lock and Rack.

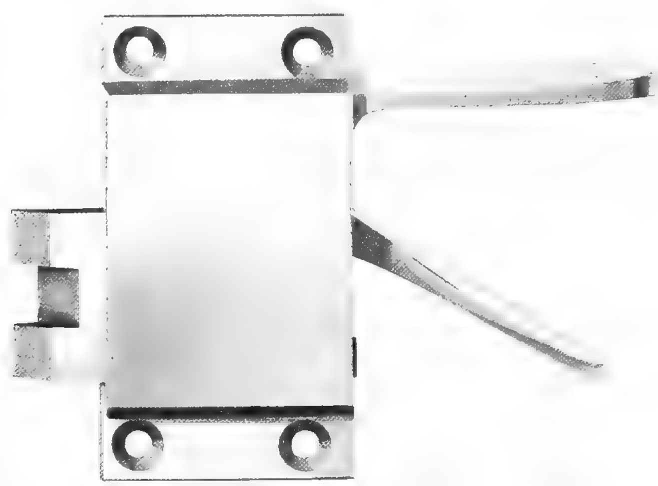


Fig. 1945—Universal No. 23 Wedging Sash Lock.

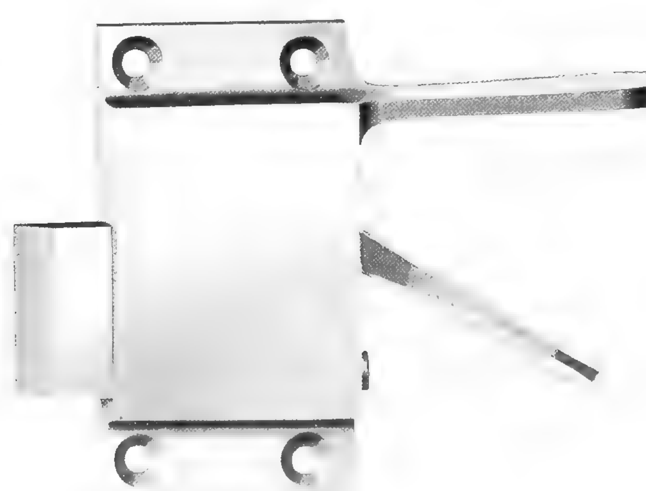


Fig. 1946—Universal No. 24 Wedging Sash Lock.

McCord Manufacturing Company.

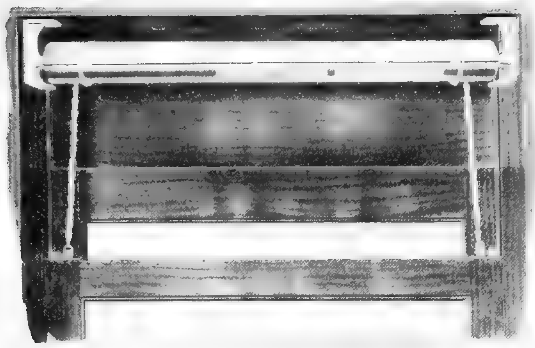


Fig. 1947—Universal Metal Roller Sash Balance with Positive Chain Adjusting Connections.

Fig. 1948—Universal Wedging Racks.

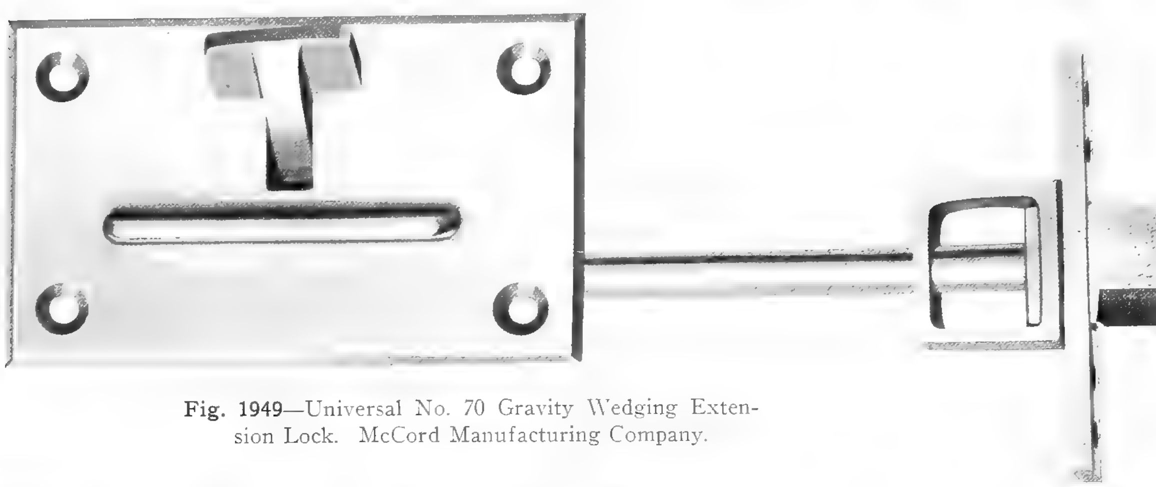


Fig. 1949—Universal No. 70 Gravity Wedging Extension Lock. McCord Manufacturing Company.

Fig. 1950—Universal No. 15 Flush Sash Lift. McCord Manufacturing Company.

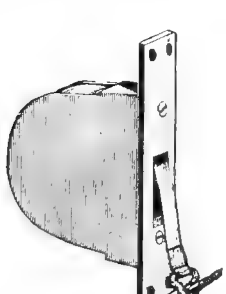


Fig. 1951—Caldwell Window Sash Balance.

Fig. 1952 — Universal Side Weather Stripping, DB Design. McCord Manufacturing Company.

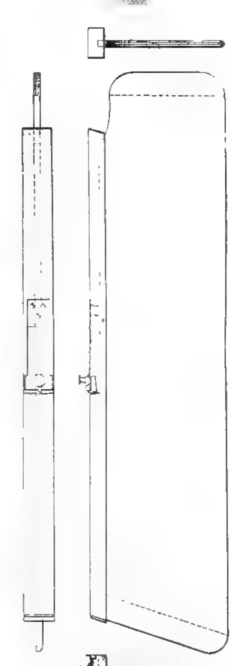
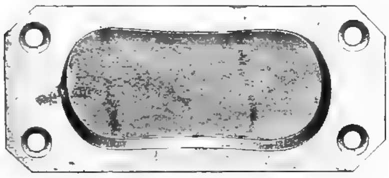
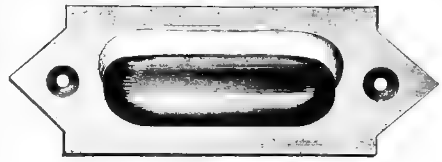


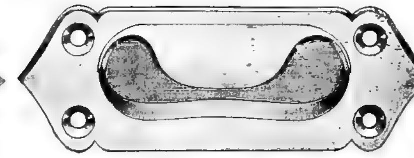
Fig. 1953—Window Dust Guard or Deflector.



Adams & Westlake Company.

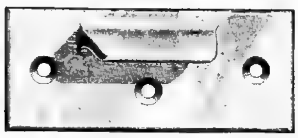


Jas. L. Howard & Company.



Adams & Westlake Company.

Fig. 1954—Mortise Sash Lifts.



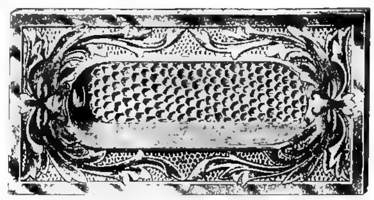
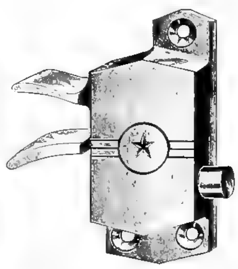


Fig. 1955—Sash Lifts. Dayton Manufacturing Company.



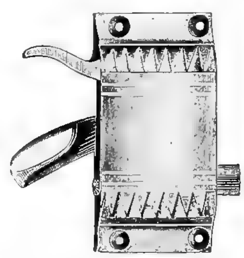


Fig. 1956—Window Sash Locks. James L. Howard & Company

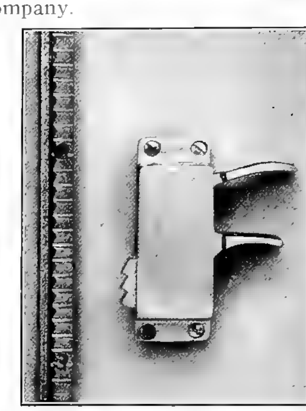


Fig. 1957—No. 83 Ratchet Sash Lock and Stop. Jas. L. Howard & Company.

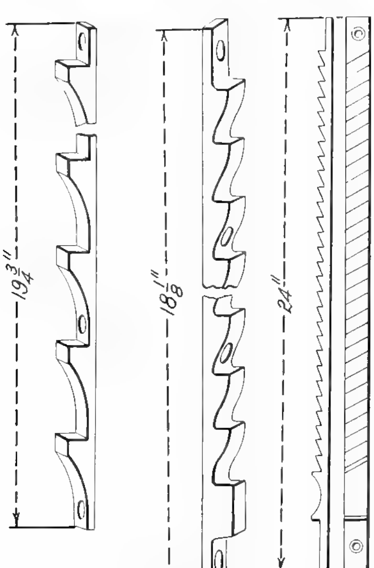


Fig. 1958—Sash Lock Racks or Stop Bars. Dayton Manufacturing Company.

Fig. 1960—Sash Lock Racks. A. & W. Co.

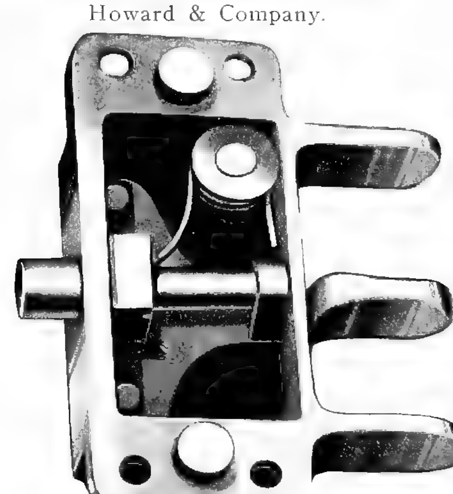
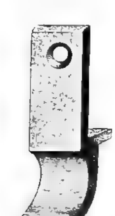
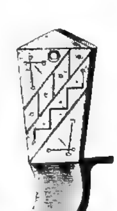


Fig. 1961—No. 763 Sash Lock. Adams & Westlake Company.



A.&W.Co.

A.&W.Co.



D. M. Co.

Fig. 1959—Window Blind Pulls.

Fig. 1962—Sash Locks. Adams & Westlake Company.

Fig. 1963—Deck Sash Openers. Adams & Westlake Company.

Fig. 1964 -Deck Sash Pulls. Adams & Westlake Company.

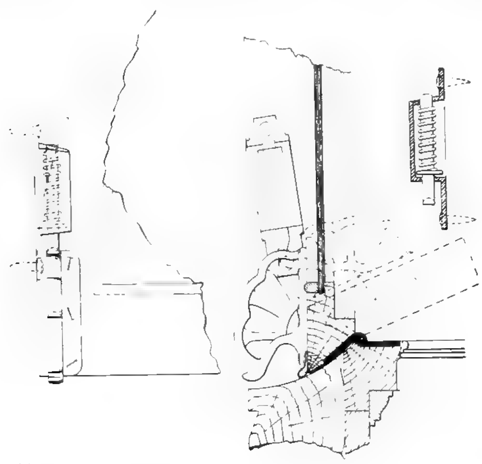
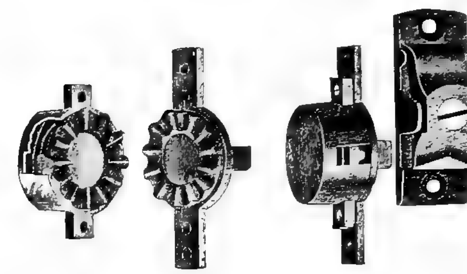


Fig. 1965—Deck Sash Pivot and Ratchet Catch.



Lower Ratchet Plate and Spring. Upper Ratchet Plate. Ratchet Pivot. Clamp.

Fig. 1966—Morgan Automatic Deck Sash Pivot and Clamp. Adams & Westlake Company.

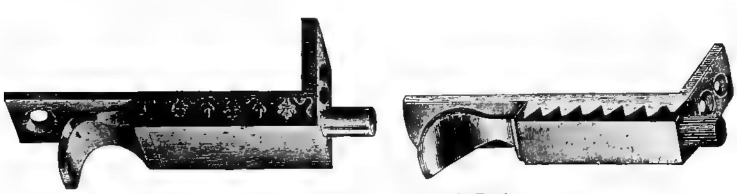


Fig. 1967—Window Blind Bolts.

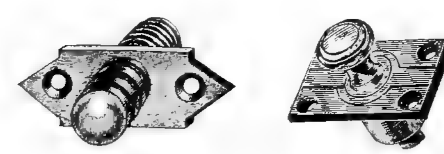


Fig. 1968—End Door Sash Bolts.

Adams & Westlake Company.

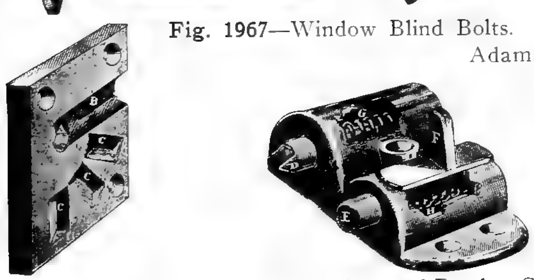
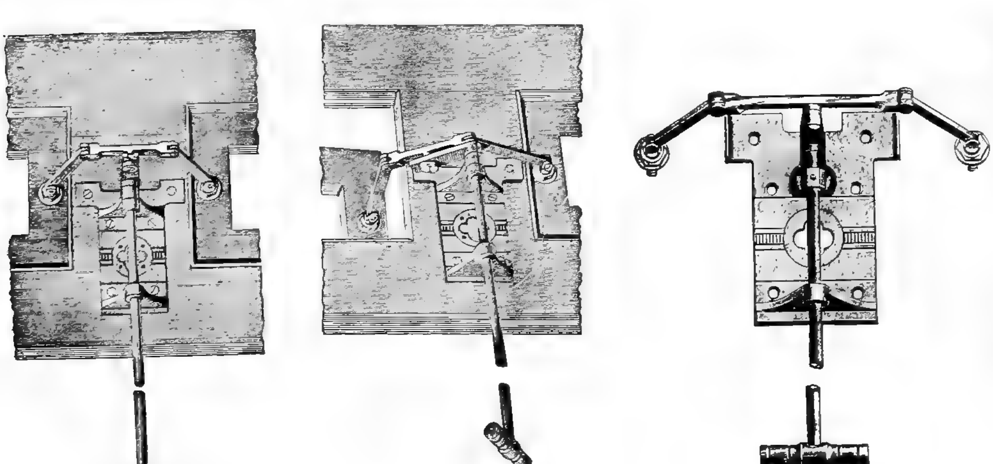


Fig. 1969—Monitor Deck Sash Pivot and Ratchet Catch.

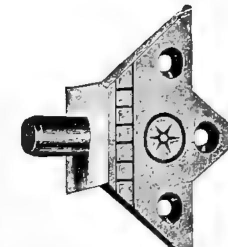
Fig. 1970—Sash Bars.

Dayton Manufacturing Company.

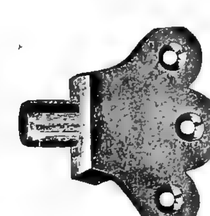


Windows Closed. One Window Open. Opener Complete.

Fig. 1971—Mansfield Deck Sash Opener. Adams & Westlake Company.



Jas. L. Howard & Co.



A. & W. Co.

Fig. 1972—Deck Sash Pivots.

Fig. 1973—Regal Revolving Shade Box, Type B, Open, With Curtain Roller Exposed, from Inside of Car. Acme Supply Company.

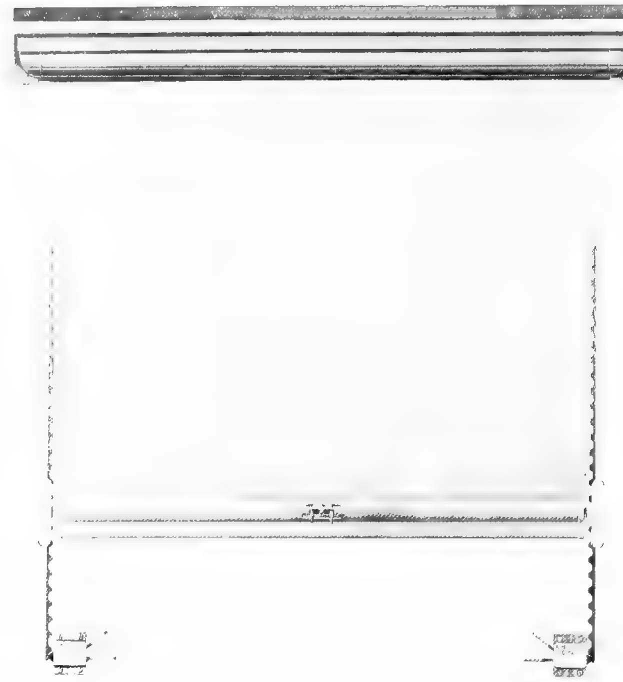


Fig. 1974—Regal Revolving Shade Box, Type B, in Position on Window with Crown Curtain Fixture, Acme Type C Sash Locks and Racks. Acme Supply Company.

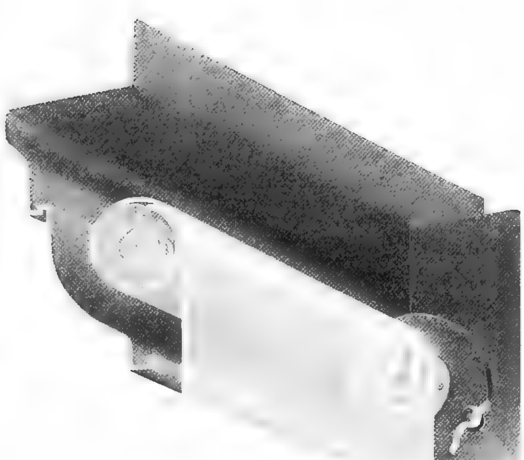


Fig. 1975—Regal Revolving Shade Box, Type B, in Cross Section, from Outside of Car with Side of Car Cut Away to Show Curtain Roller and Bracket in Position, Shield Closed. Acme Supply Company.

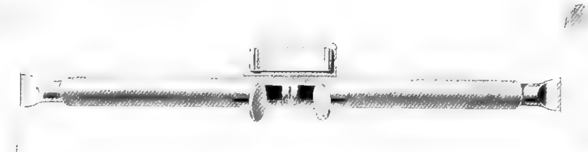


Fig. 1976—Crown Curtain Fixture, Showing Ticket Holder. Acme Supply Company.

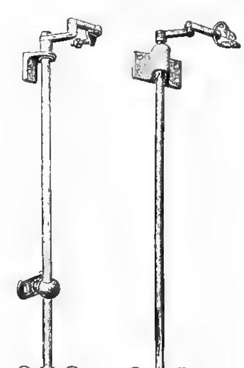


Fig. 1977—Deck Sash and Transom Openers.

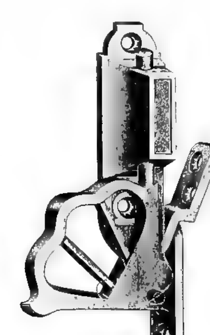


Fig. 1978—Hart's Combined Deck Sash Ratchet, Pivot and Stop.

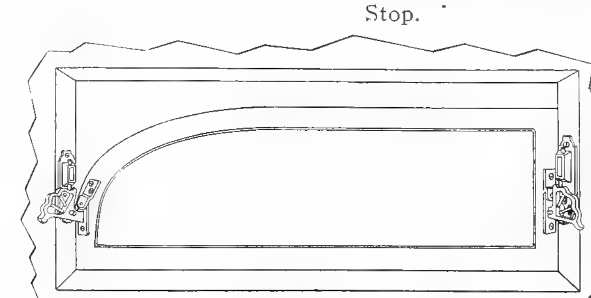


Fig. 1979—Hart's Deck Sash Ratchet Applied to Deck Sash. Dayton Manufacturing Company.

Fig. 1980—Rex Sash Balance and Attachments.

Fig. 1981—Curtain Equipped with Rex Friction Roller Complete with Bottom Bar.

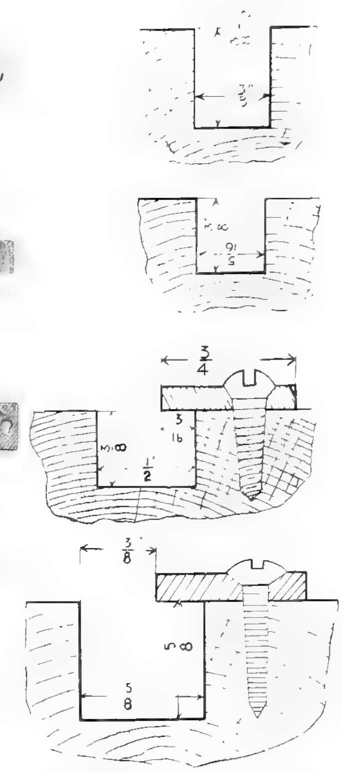


Fig. 1982—Standard Size Grooves for Ring Fixtures.

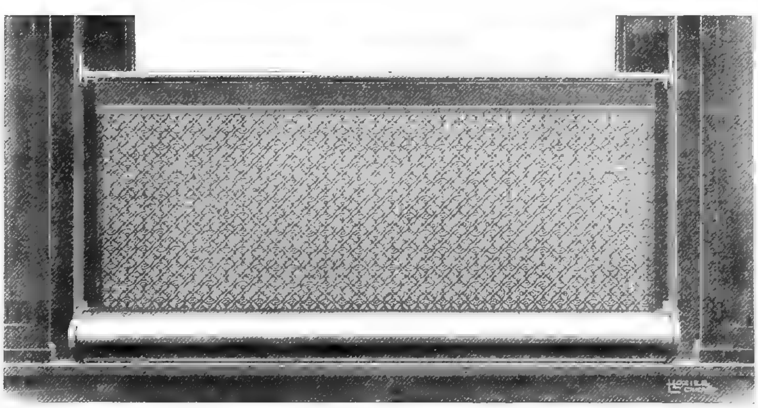


Fig. 1983—Saloon Window Curtain with Rex All-Metal Roller, Brass Curtain Box and Rod Holders.

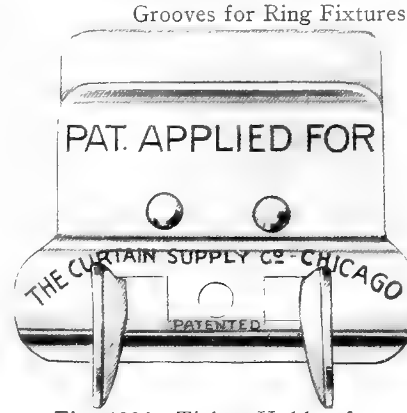


Fig. 1984—Ticket Holder for Ring Fixtures.

Fig. 1985—Ring Fixtures for Open Grooves, 3/8 in. by 3/8 in., with Pinch Handles.

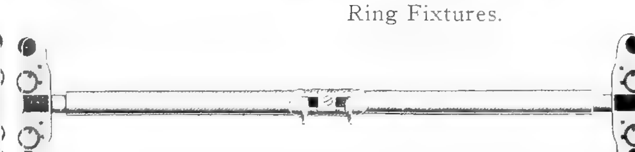


Fig. 1986—Ring Fixtures with Flanges for Enclosed Grooves, 5/8 in. by 5/8 in., with Pinch Handles.

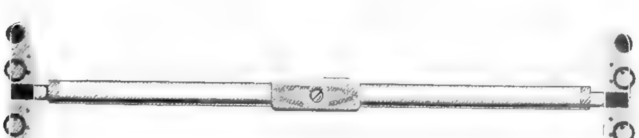


Fig. 1987—Ring Fixtures for Open Grooves, 3/8 in. by 3/8 in., Without Pinch Handles.

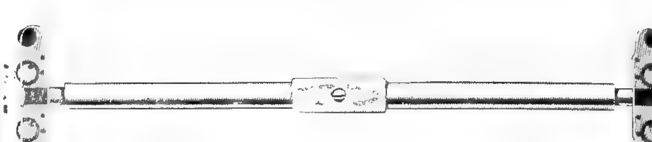


Fig. 1988—Ring Fixtures with Flanges for Enclosed Grooves, 5/8 in. by 5/8 in., Without Pinch Handles.

Fig. 1989—Rex All-Metal Roller for Window Curtains, with Extension Sleeve and Lock. Curtain Supply Company.

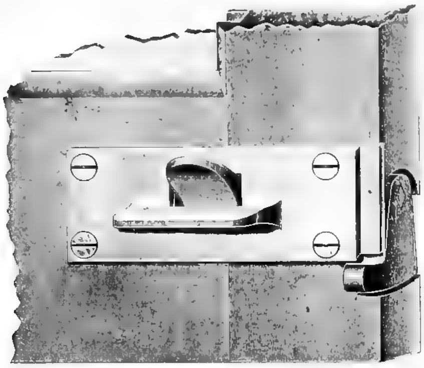


Fig. 1990—Depensafe Sash Lock. Railway Supply & Curtain Company.

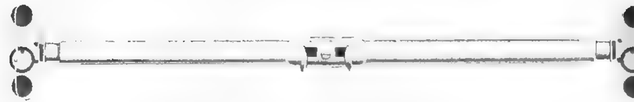


Fig. 1991—Ring Fixture with Short Tip for Small Enclosed Grooves.

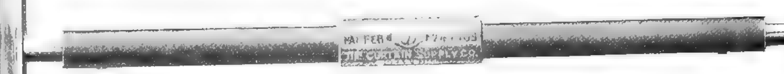


Fig. 1992—Keeler Eccentric Curtain Fixture.

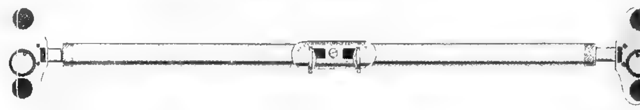


Fig. 1993—Ring Fixture with Short Tip for Small Open Grooves.

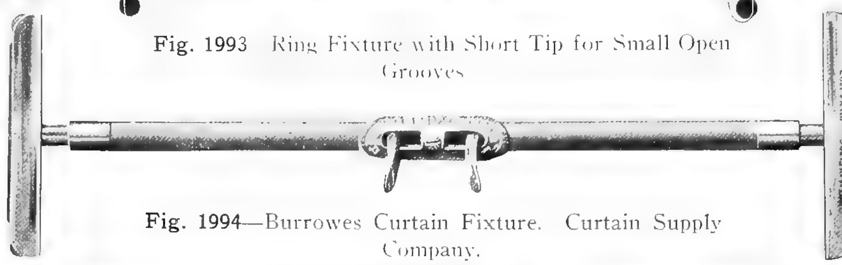


Fig. 1994—Burrowes Curtain Fixture. Curtain Supply Company.

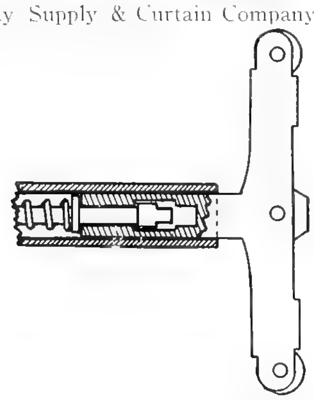


Fig. 1995—Diagram Showing Fool-proof Operating Connection of Sta-rite Curtain Fixture. Railway Supply & Curtain Company.

Fig. 1996—Rycco All-Metal Curtain Roller. Railway Supply & Curtain Company.

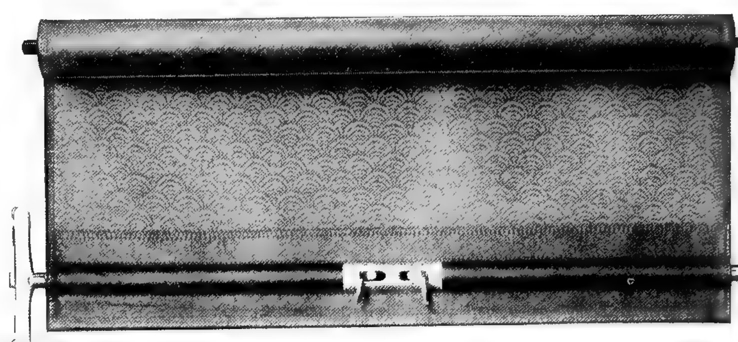


Fig. 1997—Sta-rite Curtain with Fool-proof Fixture. Railway Supply & Curtain Company.

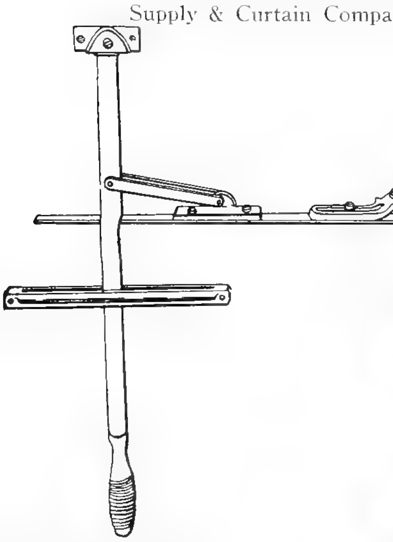


Fig. 1998 – Continuous Deck Sash Opener.

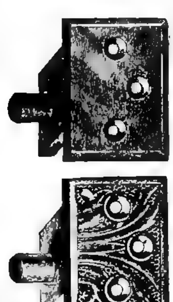


Fig. 1999—Deck Sash Pivots. Dayton Manufacturing Company.

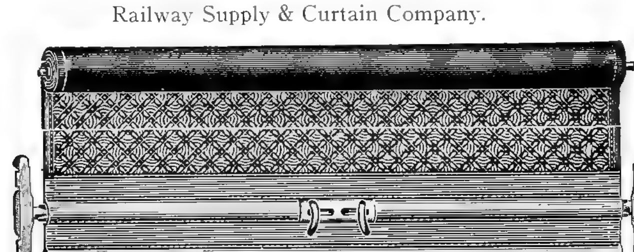


Fig. 2000—Comsate Curtain with Fool-proof Fixture. Railway Supply & Curtain Company.

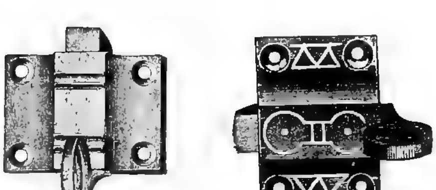
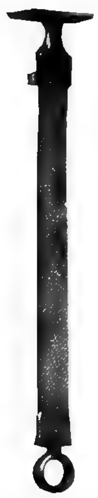
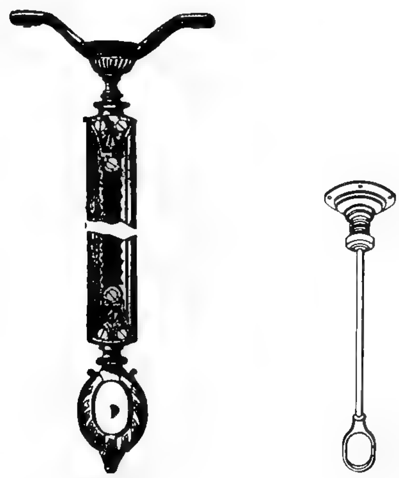


Fig. 2001—Deck Sash and Transom Catches. Adams & Westlake Company.

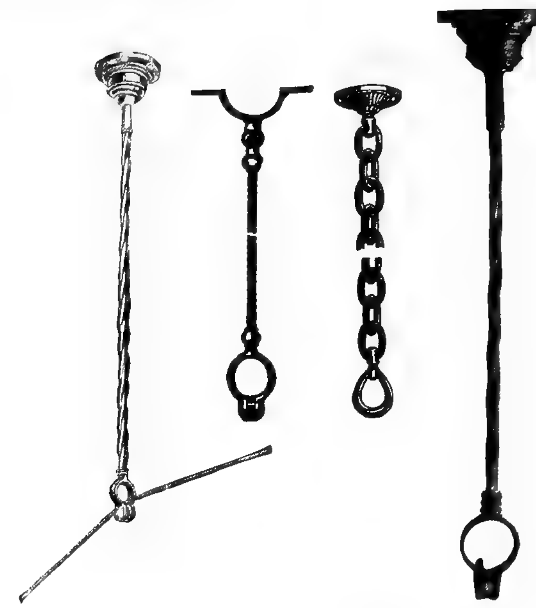
Fig. 2002—Handless Curtain and Fixture. Railway Supply & Curtain Company.



Jas. L. Howard & Company.



Dayton Manufacturing Company.



Adams & Westlake Company.

Fig. 2003—Signal Cord Hangers.

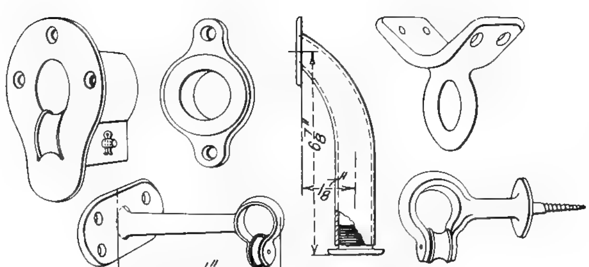
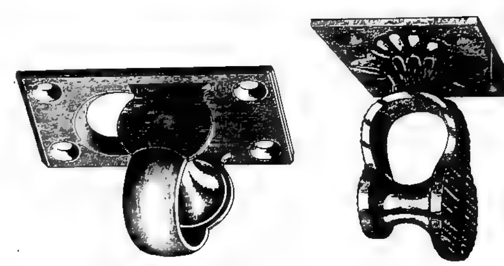


Fig. 2004—Signal Cord Bushings. Dayton Manufacturing Company.



A. & W. Co. D. M. Co.

Fig. 2005—Angle Signal Cord Guides.

Fig. 2006—Overhead Guide. D. M. Co.

Fig. 2007—Corner Guide. A. & W. Co.

Fig. 2008—Side Pulley Guide. A. & W. Co.

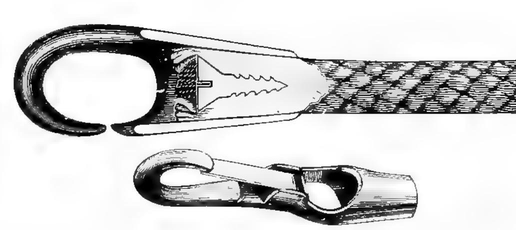


Fig. 2009—Signal Cord Couplings. Samson Cordage Works.

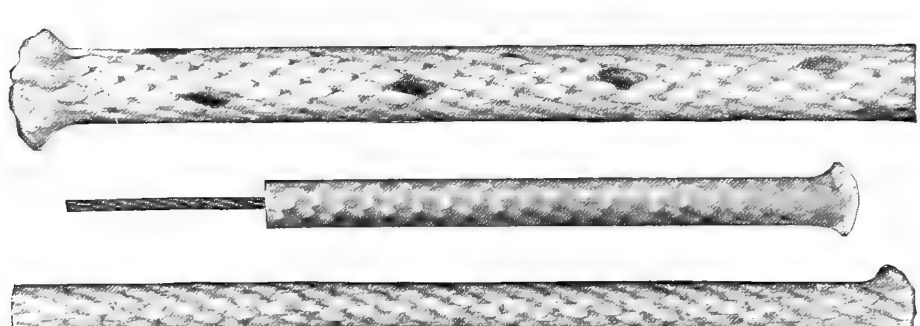


Fig. 2010—Signal Cords. Samson Cordage Works.

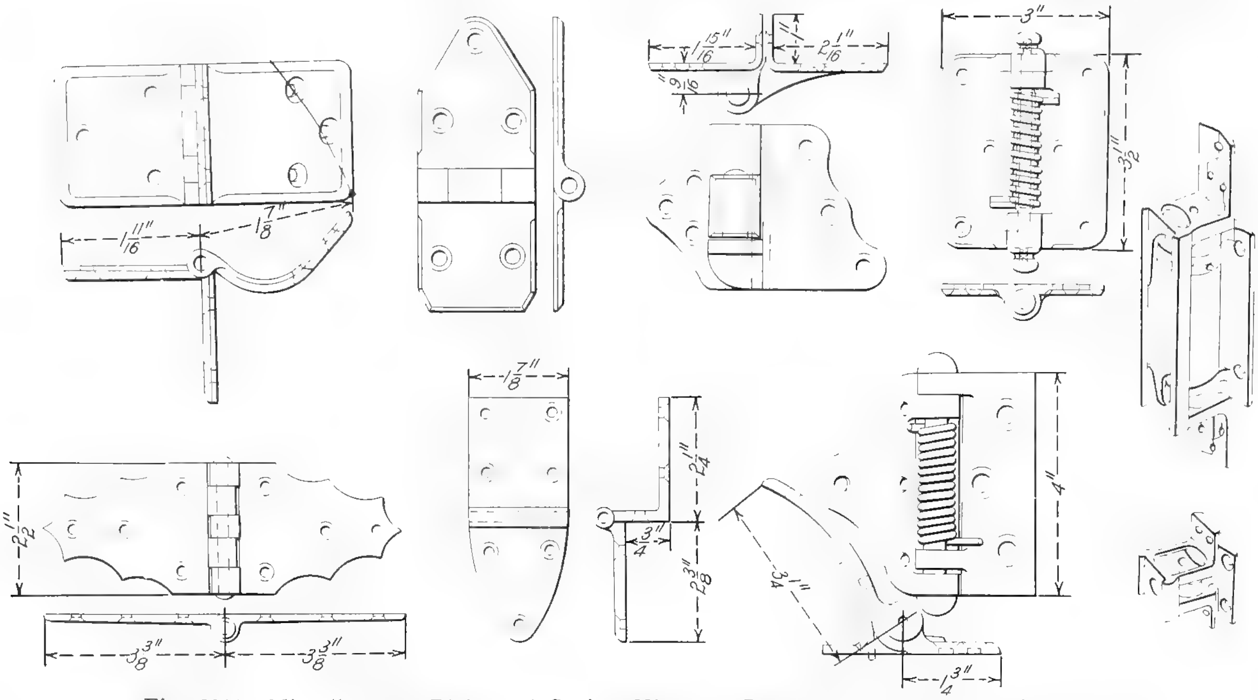
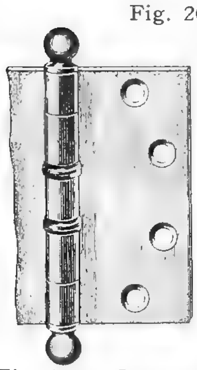
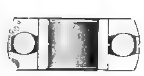
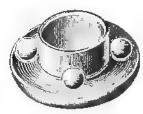


Fig. 2011—Miscellaneous Plain and Spring Hinges. Dayton Manufacturing Company.

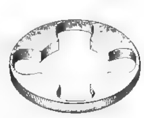




Washer Complete.



Washer Base.



Ball Guide.

Fig. 2012—Loose Pin Butt Hinge with Ball Bearing Washer.

Fig. 2013—Loose Joint Butt Hinge. R. & E. Mfg. Co.

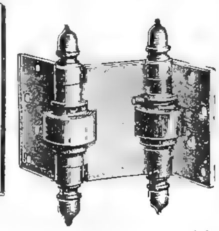


Fig. 2014—Double Acting Spring Hinge. A. & W. Co.

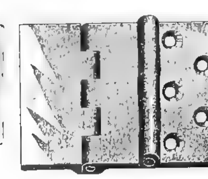
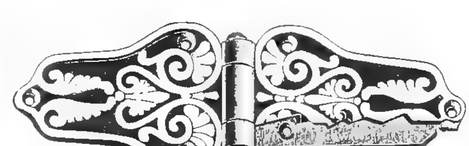


Fig. 2015—Table Hinge. A. & W. Co.

Adams & Westlake Company.



Dayton Manufacturing Company.

Fig. 2016—Brass Covered Vestibule Door Hinges.

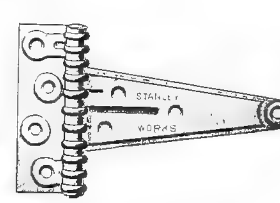


Fig. 2017—T Hinge.

Fig. 2018—Riveted Joint Butt Hinge.

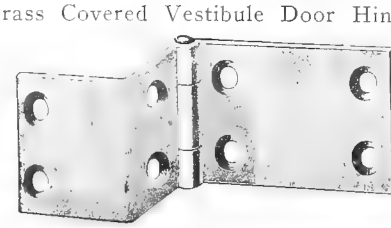


Fig. 2019—Offset Riveted Joint Butt Hinge.

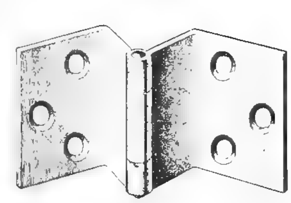


Fig. 2020—Pocket Hinge.

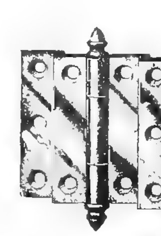


Fig. 2021—Rabbeted Door Hinge. A. & W. Co.

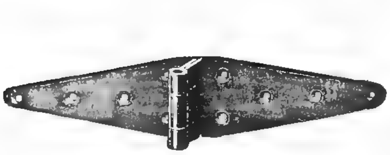


Fig. 2022—Distributing Table Hinge for Postal Cars. D. M. Co.

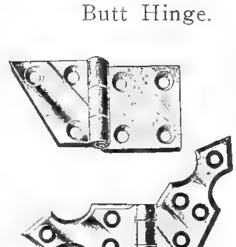


Fig. 2023—Lamp House Hinges. D. M. Co.

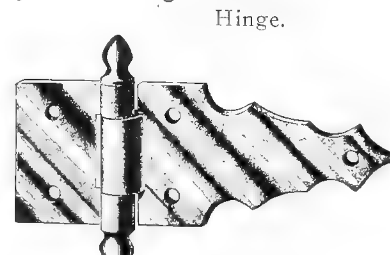


Fig. 2024—Refrigerator Door Hinge. D. M. Co.

Fig. 2025—Lamp House Hinge. D. M. Co.

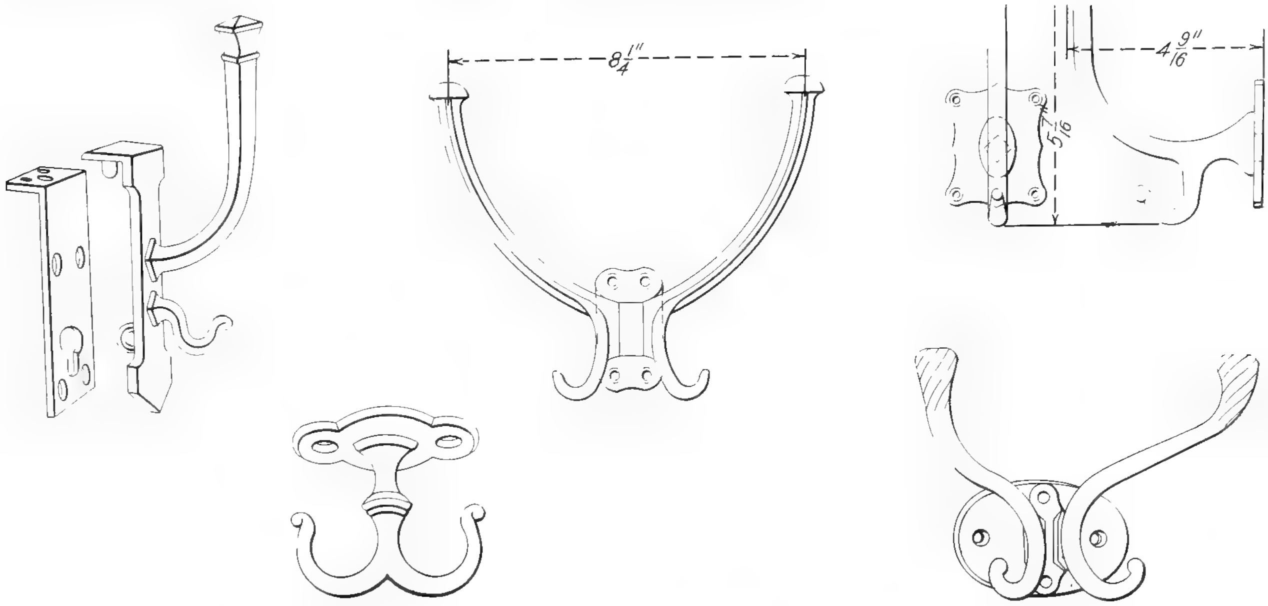
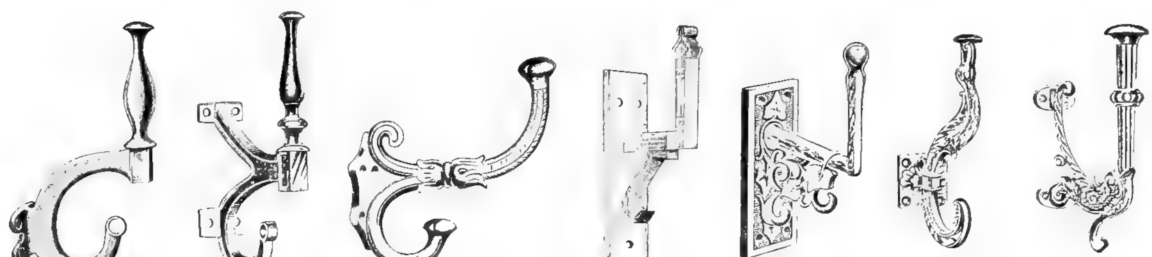


Fig. 2026—Miscellaneous Coat and Hat Hooks. Dayton Manufacturing Company.



D. M. Co. Adams & Westlake Company.

Fig. 2027—Miscellaneous Coat and Hat Hooks.

Fig. 2028—Ceiling Hook. R. & E. Mfg. Co.

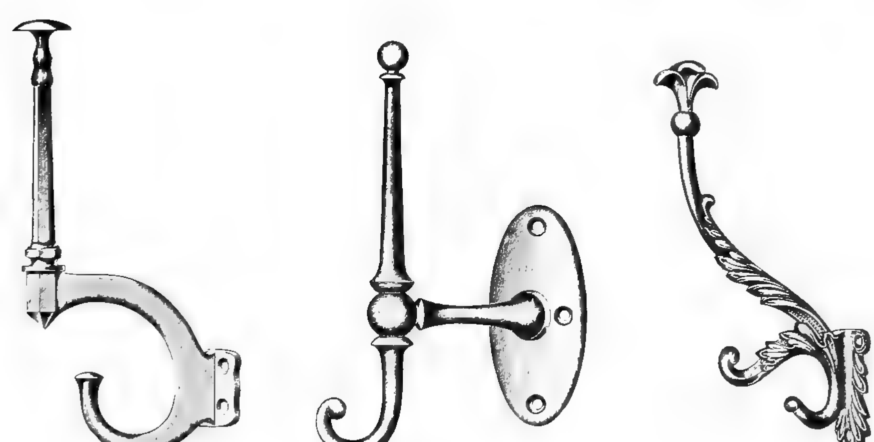


Fig. 2029—Coat and Hat Hooks. Russell & Erwin Manufacturing Company.

Fig. 2030—Wardrobe Hook. R. & E. Mfg. Co.

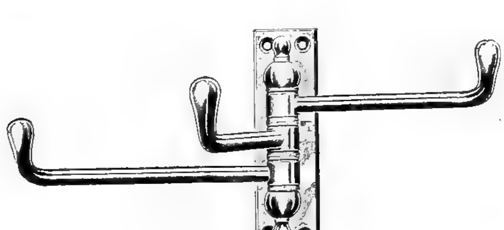
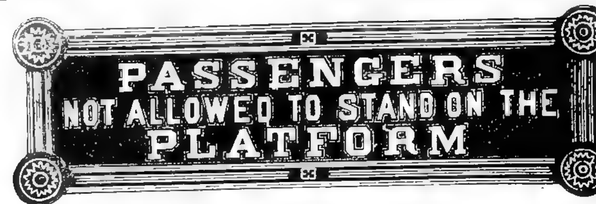


Fig. 2031—Folding Coat Hook. Adams & Westlake Company.

Fig. 2032—Window Rod Brackets. Adams & Westlake Company.

Size, 2 by 6½ ins.



Size, 3⅞ by 11⅝ ins.

Adams & Westlake Company.

Size, 2⅜ by 11 ins.

Size, 2⅜ by 8⅝ ins.

Size, 2⅜ by 9 ins.

Fig. 2033—Notice Plates. Dayton Manufacturing Company.

Fig. 2037—Pen Rack. D. M. Co.

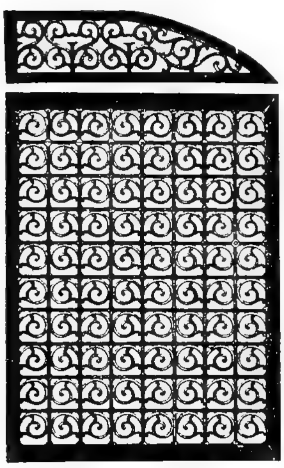


Fig. 2034—Cast Grilles. A. & W. Co.

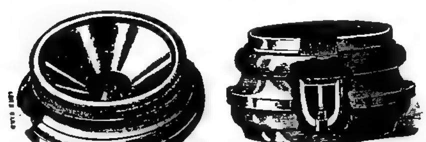


Fig. 2035—Spittoon. Dayton Manufacturing Company.

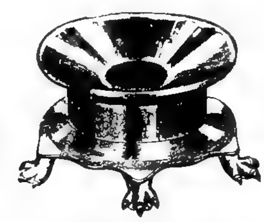


Fig. 2036—Cast Spittoon.

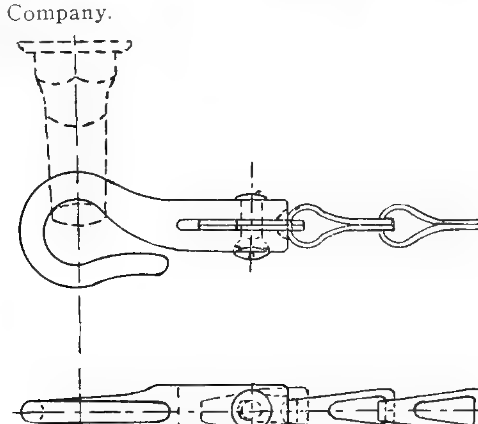


Fig. 2038—Chain and Hook for Conductor's Valve, Pennsylvania Railroad. American Chain Company.

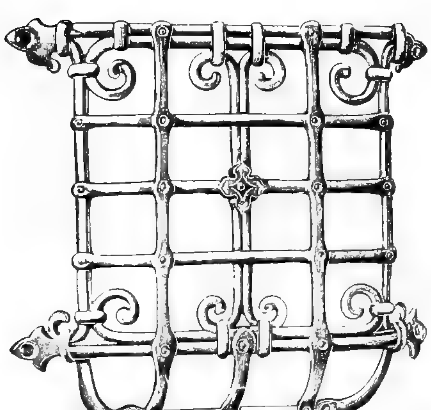


Fig. 2039—Telegraph Blank Rack. Adams & Westlake Company.

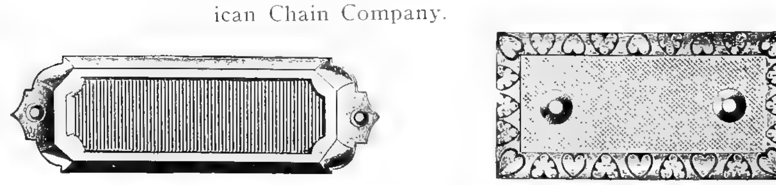


Fig. 2039A—Match Strikers. Adams & Westlake Company.

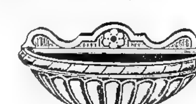


Fig. 2042 — Ash Receiver. A. & W. Co.

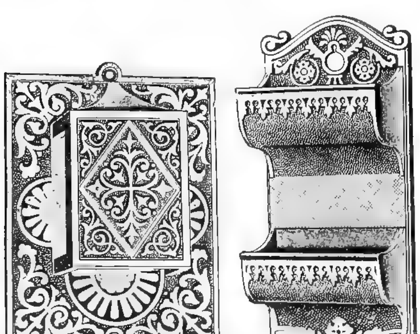


Fig. 2040—Match Box Holder and Match Safe. Adams & Westlake Company.

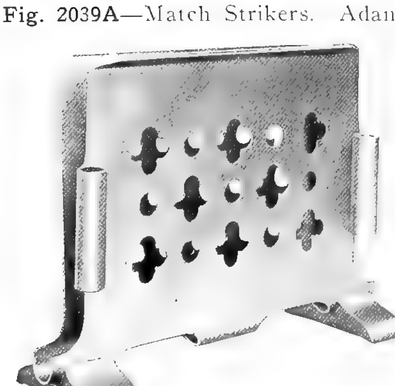


Fig. 2041—Menu Card Holder for Dining Cars. Dayton Mfg. Co.

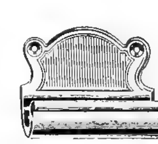


Fig. 2043 — **Match** Striker and Cigar Holder. A. & W. Co.

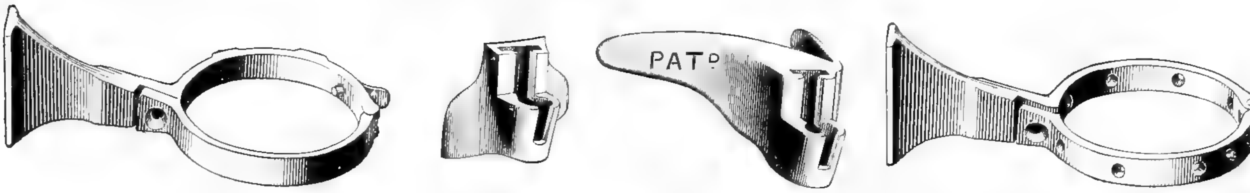


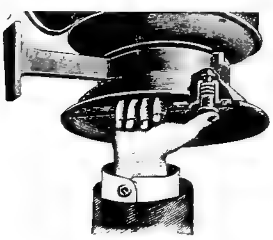
Fig. 2044—Marker or Tail Lamp Brackets. Armspear Manufacturing Company.

Fig. 2045 - Combination Lamp and Flag Socket. Armspear Manufacturing Company.

Fig. 2046 - Adjustable Marker Arm. Peter Gray & Sons.

Fig. 2047 — Flag Holder. Dressel Railway Lamp Works.

Fig. 2048—Mica Lantern Globe. Storrs Mica Company.



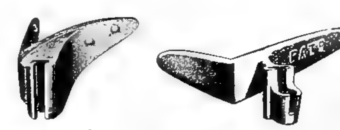
Lamp Bracket, Adjustable.

Parted Lamp Bracket.

Solid Lamp Bracket.

Top Support Bracket.

Set Screw Bracket.



Corner Sockets.

Fig. 2049—Lamp and Flag Holders. Adams & Westlake Company.

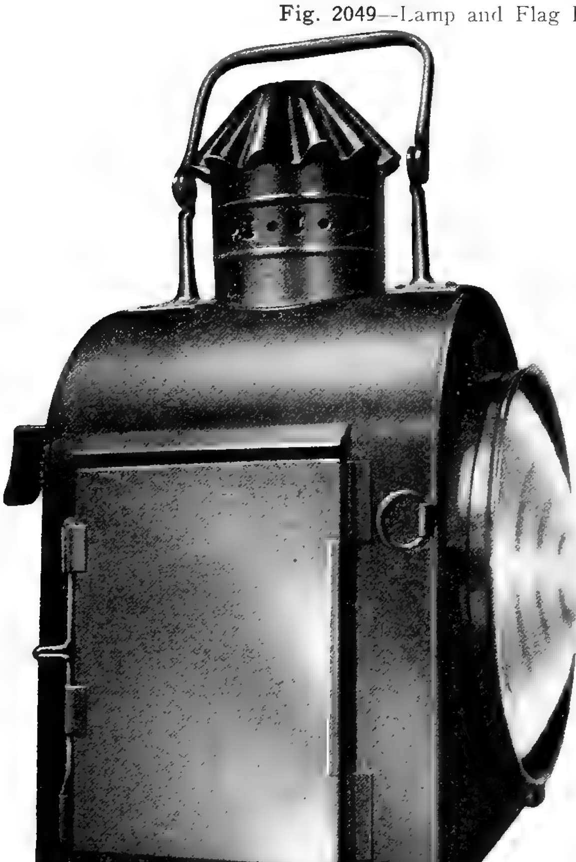


Fig. 2050—Platform Tail Lamp with Upper Draft Ventilator and 8 in. Lens.

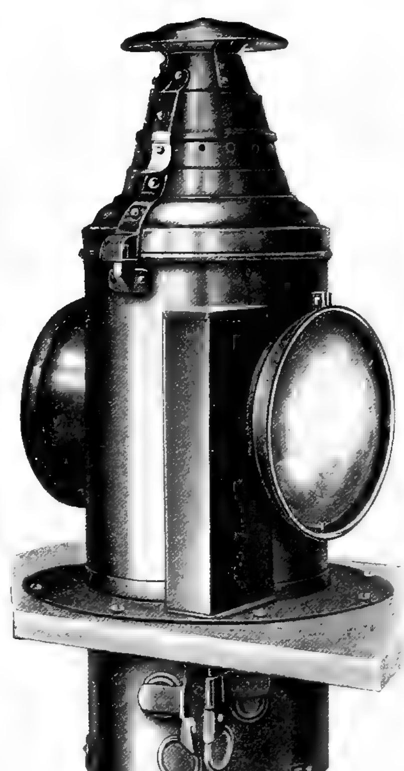


Fig. 2051—Automatic Deck Caboose Lamp with Externally Controlled Color Changes.

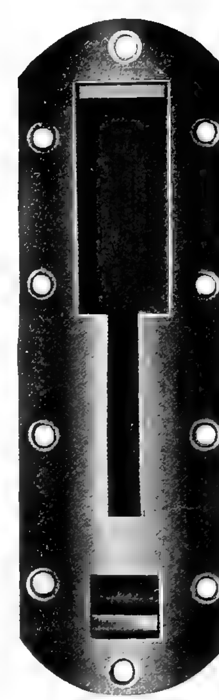


Fig. 2052 — Flag and Lamp Socket.

Dressel Railway Lamp Works.

Fig. 2053—Dressel Low Burner with Flame Spreader.

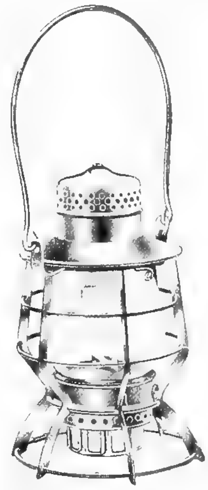


Fig. 2054—Dressel Steel Guard Lantern with Lard Oil Burner and Detachable Base.

Fig. 2055—Combination Tail and Route Signal Lamp.

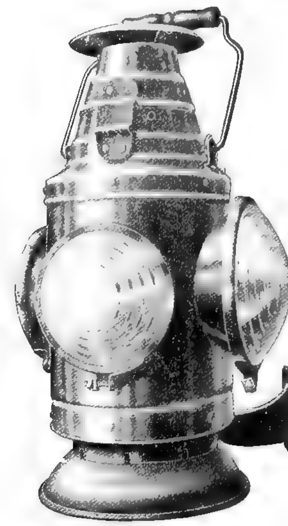


Fig. 2056—Tail Lamp with Detachable Base.

Dressel Railway Lamp Works

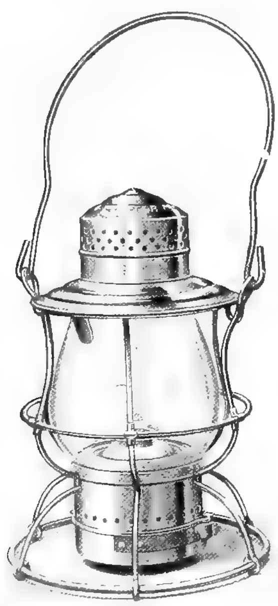


Fig. 2057—Armspear Hand Lantern.

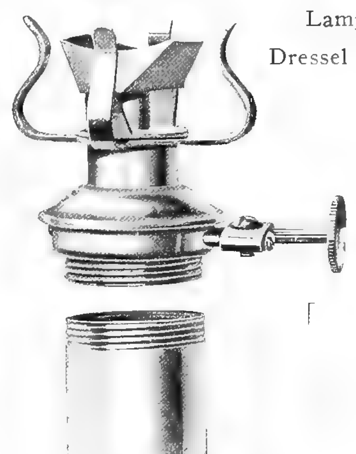


Fig. 2058 — Armspear Flat Flame Field Long Time Burner.

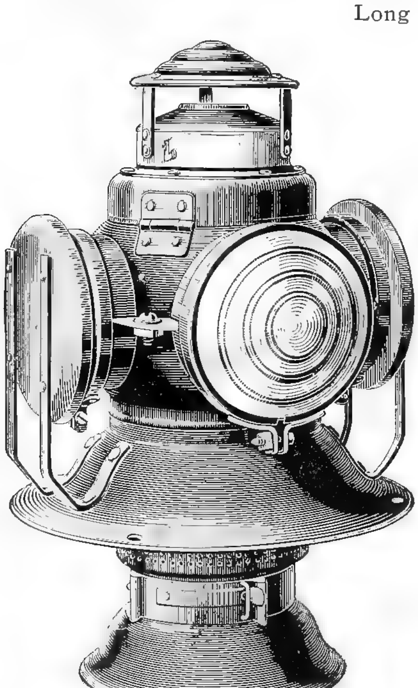


Fig. 2059—Armspear Caboose Deck Lamp

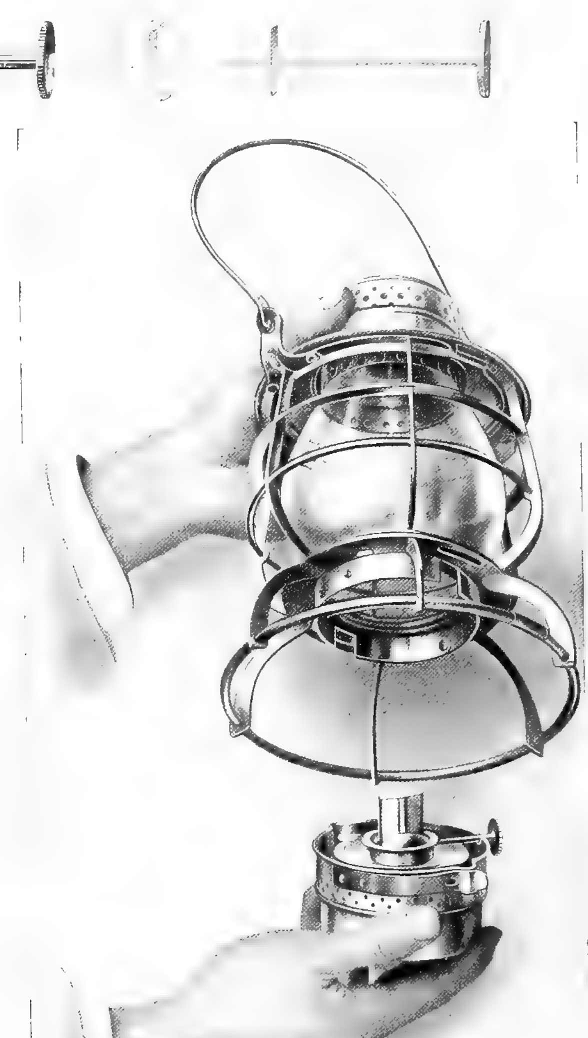


Fig. 2060—Armspear Outside Adjustment Lantern.

Armspear Manufacturing Company.

Fig. 2061—Armspear Platform Tail Lamp. Armspear Manufacturing Company.

Fig. 2062—Straight Body Steel Marker Lamp. Armspear Manufacturing Company.

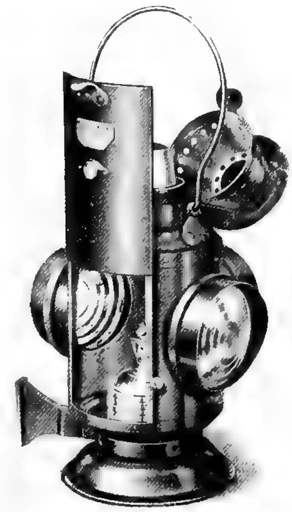


Fig. 2063—Three Lens Marker Lamp. Peter Gray & Sons.

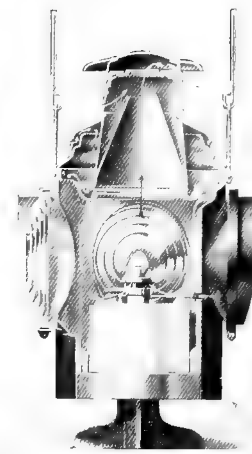


Fig. 2064—Section Through Round Body Lamp Showing Top Draught Method. Peter Gray & Sons.

Fig. 2065—Platform Tail Lamp.

Fig. 2066—Cupola Marker Lamp.

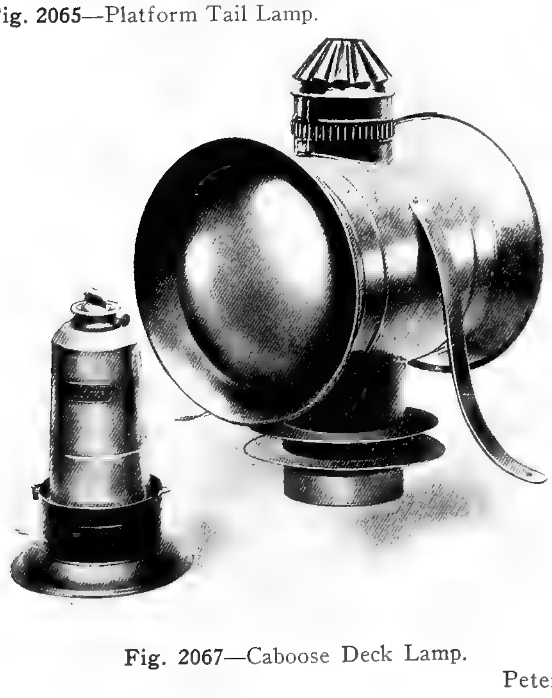


Fig. 2067—Caboose Deck Lamp.

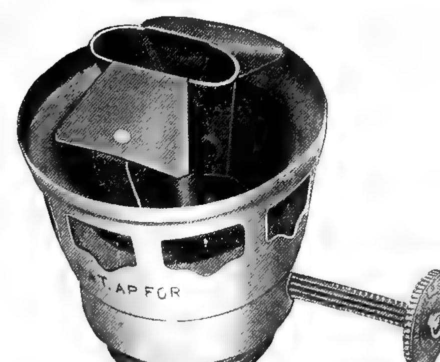


Fig. 2068—Chimneyless Burner.

Peter Gray & Sons.

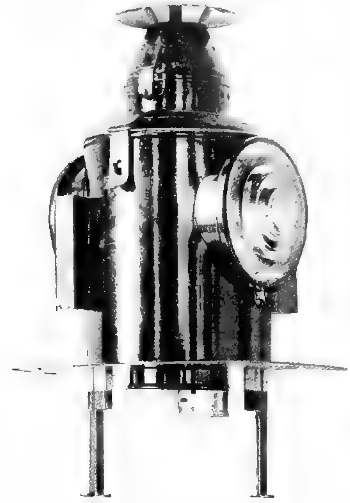


Fig. 2069 Caboose Cupola Lamp.

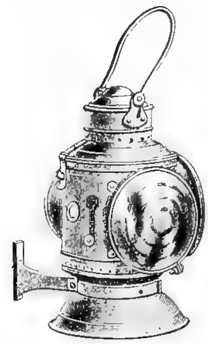


Fig. 2070—Caboose Tail Lamp.

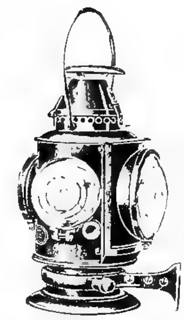


Fig. 2071—Tornado Coach Tail Lamp.

Adams & Westlake Company.

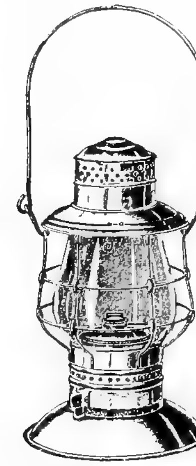


Fig. 2072—Double Wire Guard Lantern.

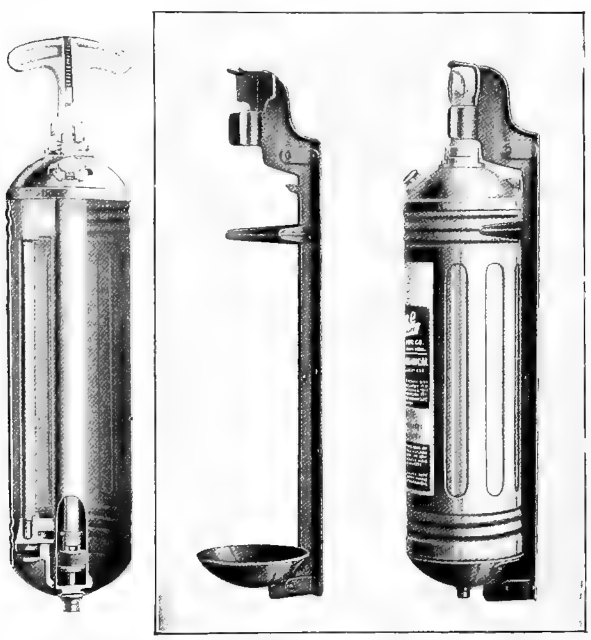


Fig. 2073—Pyrene Fire Extinguisher and Bracket. Pyrene Manufacturing Company.

Fig. 2074—Electrene Fire Extinguisher. Electrene Company.

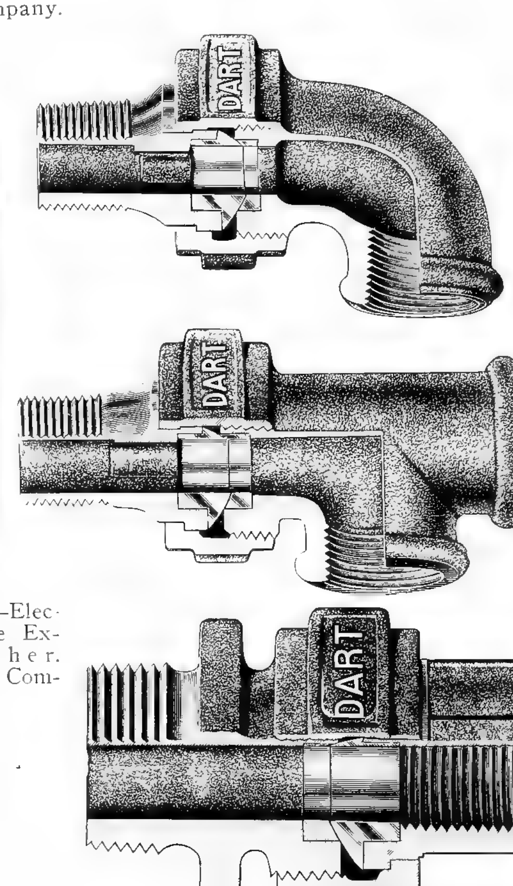


Fig. 2076—Dart Unions. E. M. Dart Manufacturing Company.

Fig. 2075—"Dynamite" Flexible Metallic Steam Heat Hose. Mulconroy & Company.

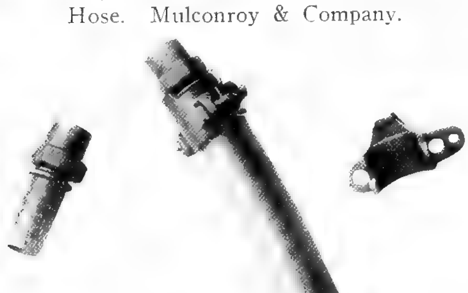


Fig. 2077—Steam Hose Nipple and Clamp. National Malleable Castings Company.

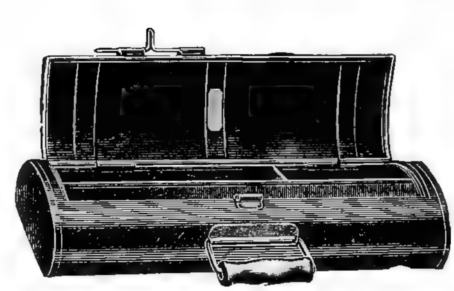


Fig. 2078—Carrying Case for Fusees and Torpedoes. Peter Gray & Sons.

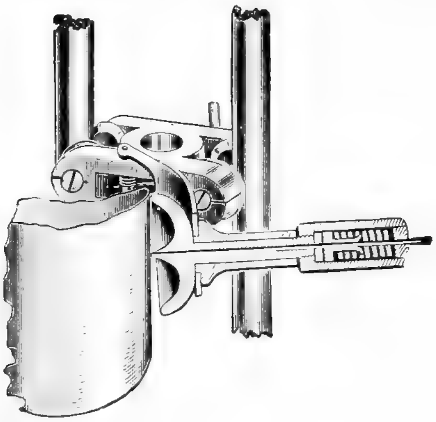


Fig. 2079—Pencil Holder for Boyer Speed Recorder. Chicago Pneumatic Tool Company.

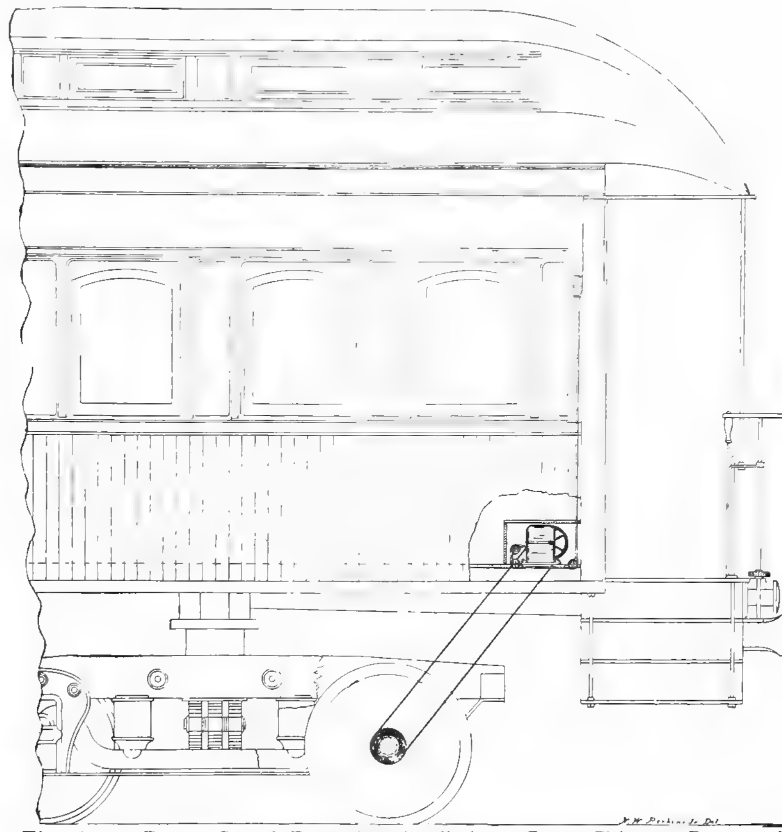


Fig. 2081—Boyer Speed Recorder Applied to Car. Chicago Pneumatic Tool Company.

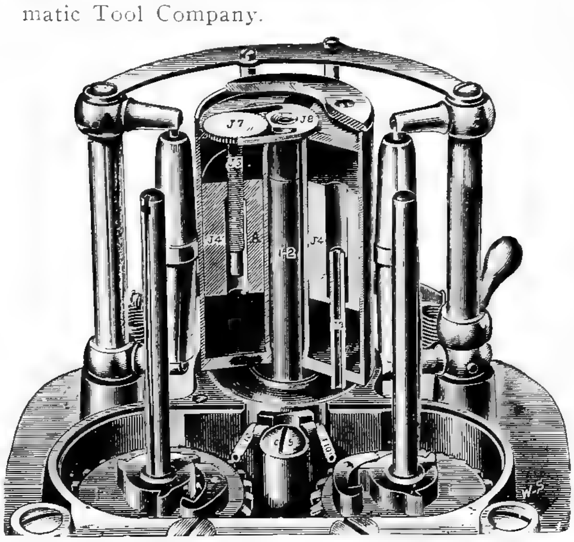


Fig. 2080—Paper Drum of Boyer Speed Recorder. Chicago Pneumatic Tool Company.

Fig. 2084—Electric Vacuum Car Cleaner. Railway Utility Company.

Fig. 2082—Crane Union with Outside and Inside Thread. The Crane Company.

Fig. 2083—Crane Union with Inside Thread. The Crane Company.

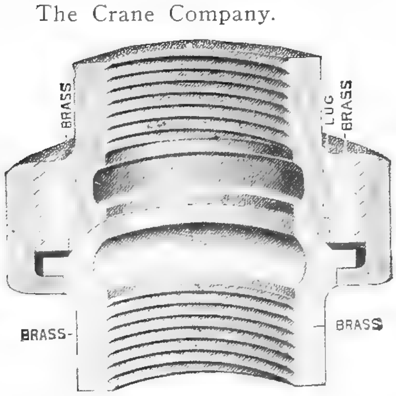


Fig. 2085—Nokoros Union.

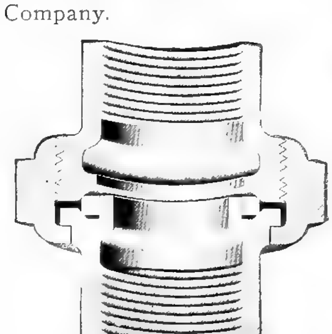


Fig. 2086—Compression Disc Union.

Illinois Malleable Iron Company.

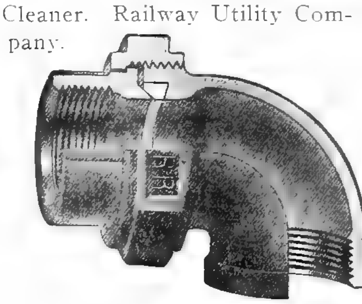


Fig. 2087—Crane Union Elbow. The Crane Company.

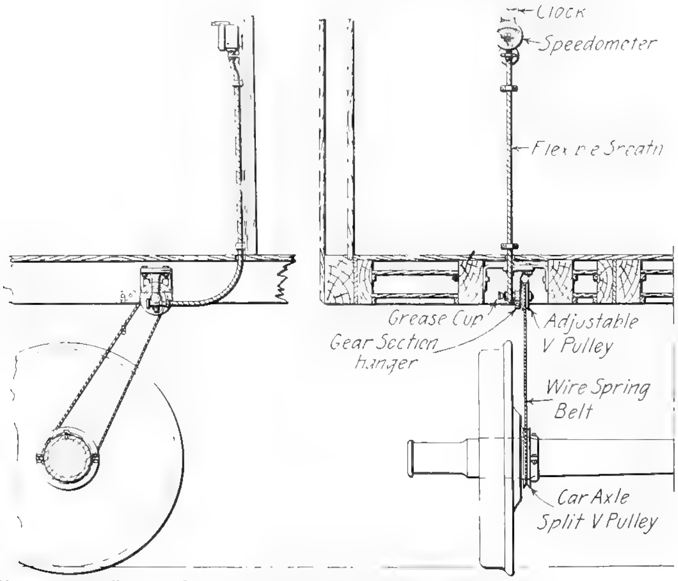


Fig. 2088—Jones Speedometer and Recorder. H. W. Johns-Manville Company.

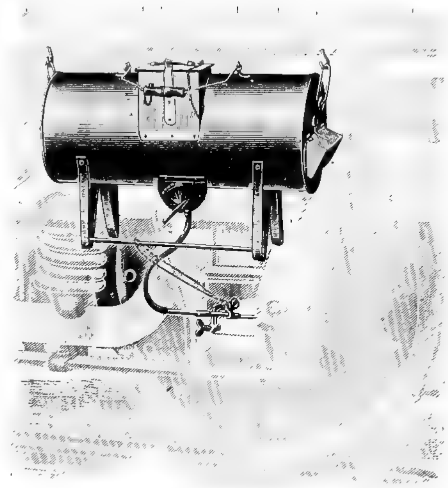


Fig. 2099—Cook Car Journal Cooler. Cook Car Journal Cooler Company.

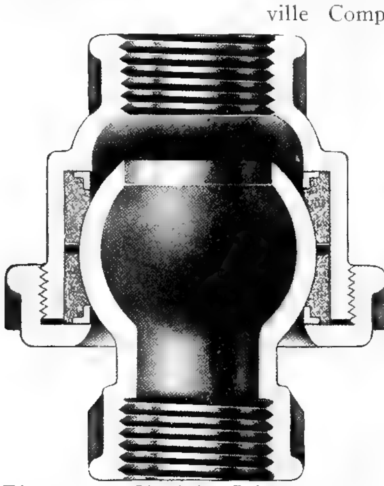


Fig. 2100—Flexible Joint. Barco Brass & Joint Company

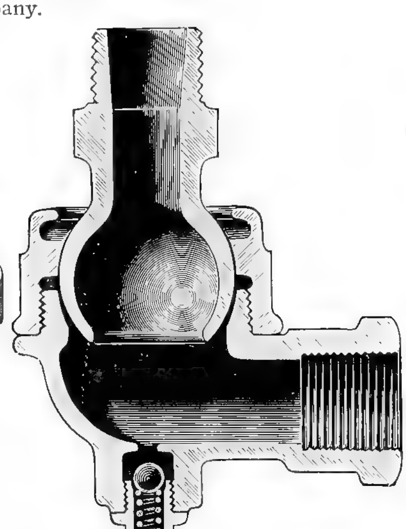


Fig. 2101—Flexible Metallic Joint. Moran Flexible Steam Joint Company.

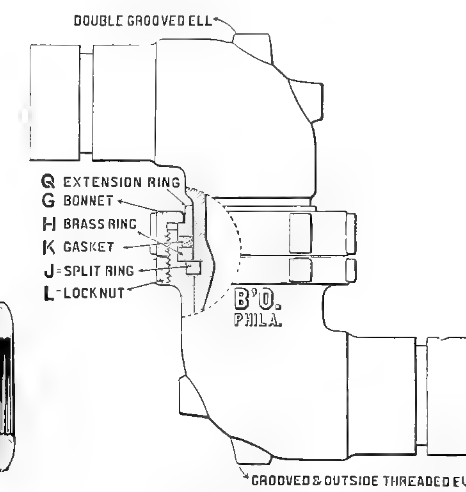


Fig. 2102—Swing Joint. L. J. Bordo Company.

Fig. 2103—Interlocking Metal Hose. Pennsylvania Flexible Metallic Tubing Company.

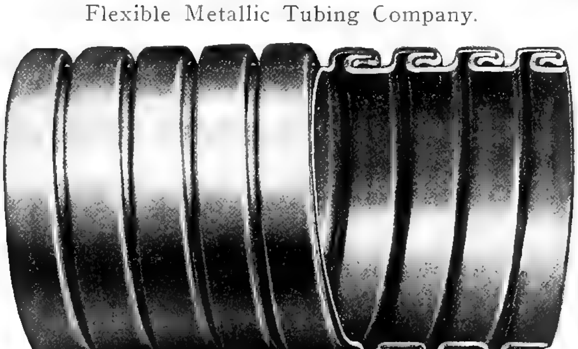


Fig. 2104—Metal Hose. American Metal Hose Company.

Fig. 2105—Metallic Flexible Steam Hose, Couplers and Lock. Greenlaw Manufacturing Company.

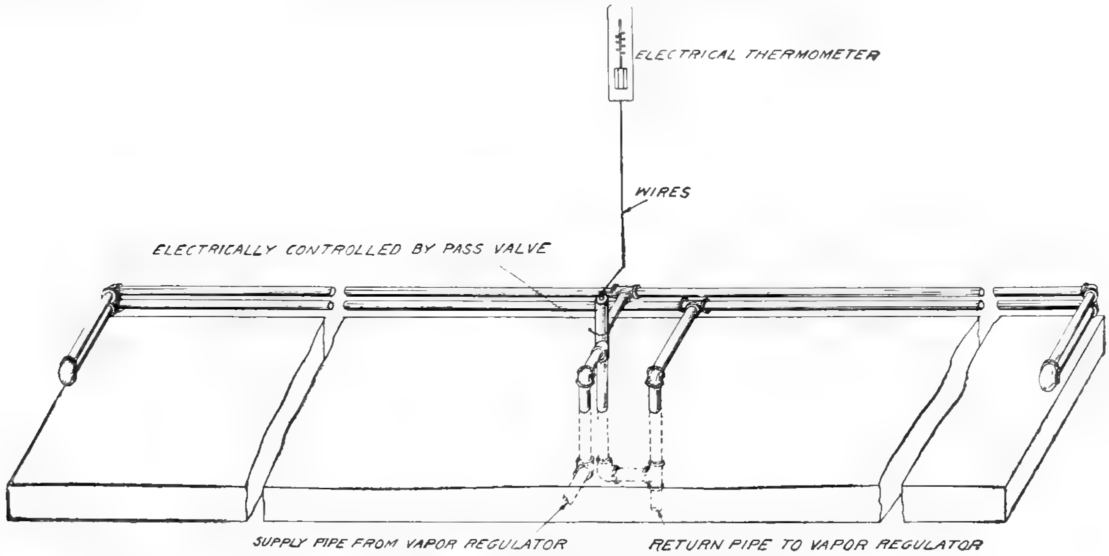


Fig. 2106—Diagram Showing Railway Utility Company's Direct Electrically Controlled By-Pass Valve for Temperature Regulation of Passenger Cars.

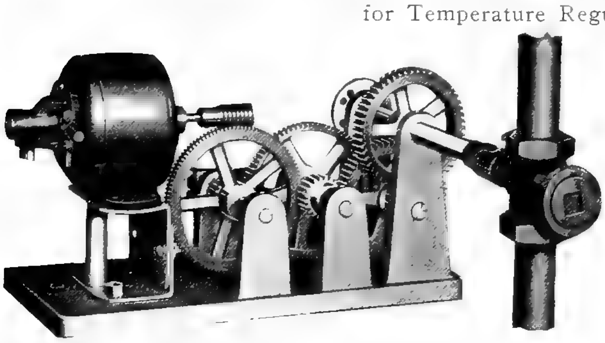


Fig. 2107—Electric Motor and Mechanism Controlling Steam Inlet Valve for Temperature Regulation of Passenger Cars. Railway Utility Company.

Fig. 2108—Temperature Regulating Apparatus Applied to Parlor Car. Railway Utility Company.

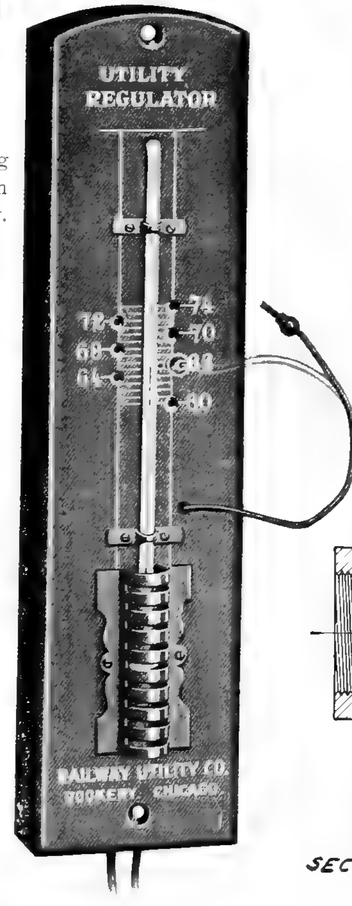


Fig. 2109—Electric Thermostat for Automatic Control of Motor Shown in Fig. 2107.

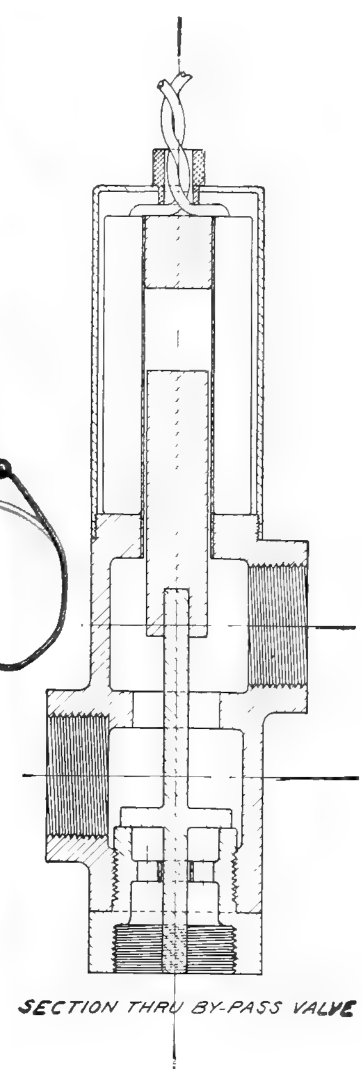


Fig. 2110—Section Through By-Pass Valve Controlled Direct from Thermostat by Solenoid. Railway Utility Company.

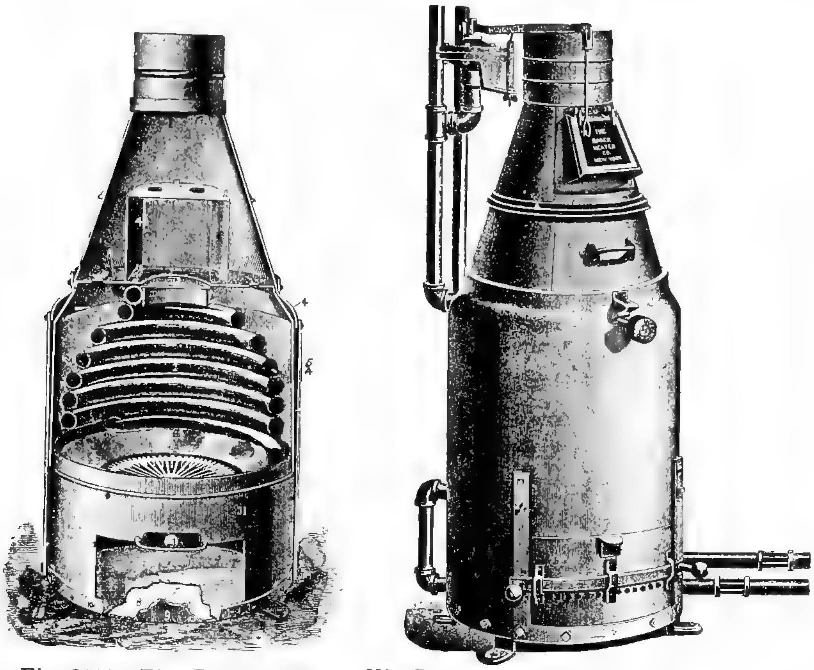


Fig. 2111—Fire-Proof Heater. W. C. Baker Car Heater Company.

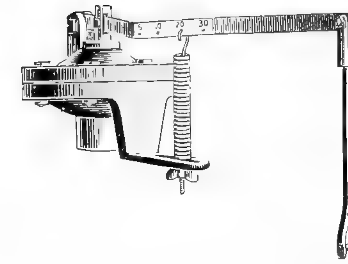


Fig. 2112—Automatic Fire Regulator and Pressure Indicator Combined for Baker's Fire-Proof Heater.

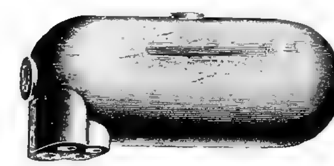
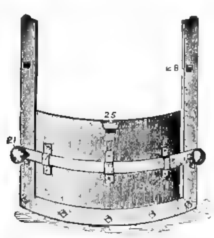
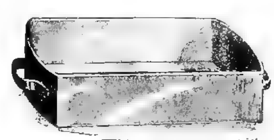


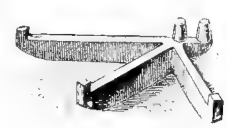
Fig. 2113—Circulating Drum for Baker's Improved Two-Coil Fire-Proof Heater.



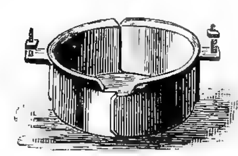
Ash Pit Door Frame.



Removable Ash Pan.



Fire Grate Support.



Coal Feed Chute.

Fig. 2114—Parts for Baker's Fire-Proof Heater.

Fig. 2115—Perfected Heater.

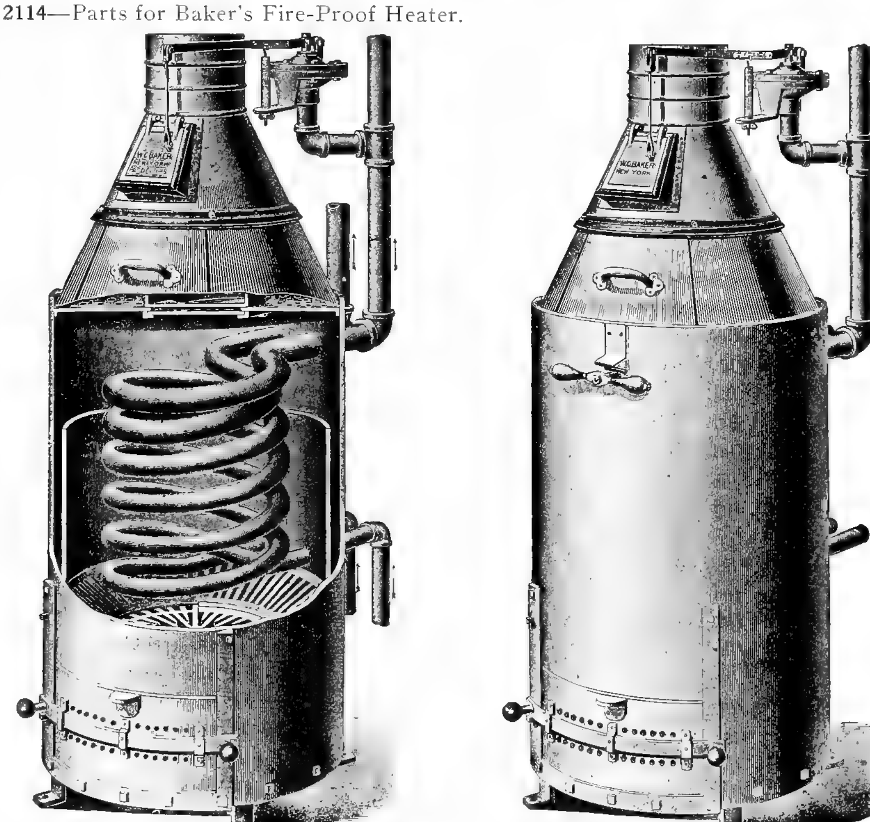


Fig. 2116—Improved Two-Coil Fireproof Heater.
W. C. Baker Car Heater Company.

Fig. 2117—Mighty Midget Heater.

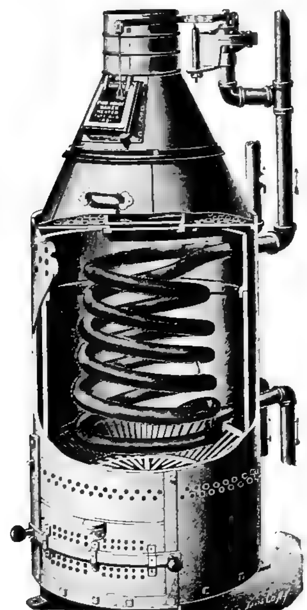


Fig. 2118 — Double-Coil Fire-Proof Heater with Solid Steel Shell.

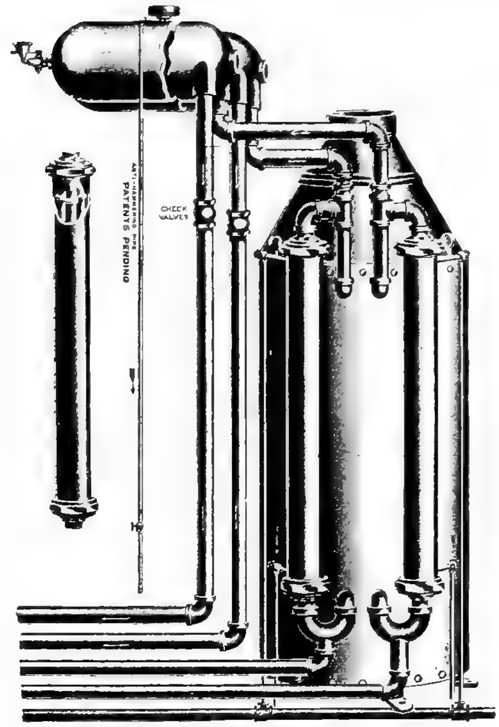


Fig. 2119—Baker Heater with Steam Attachment.

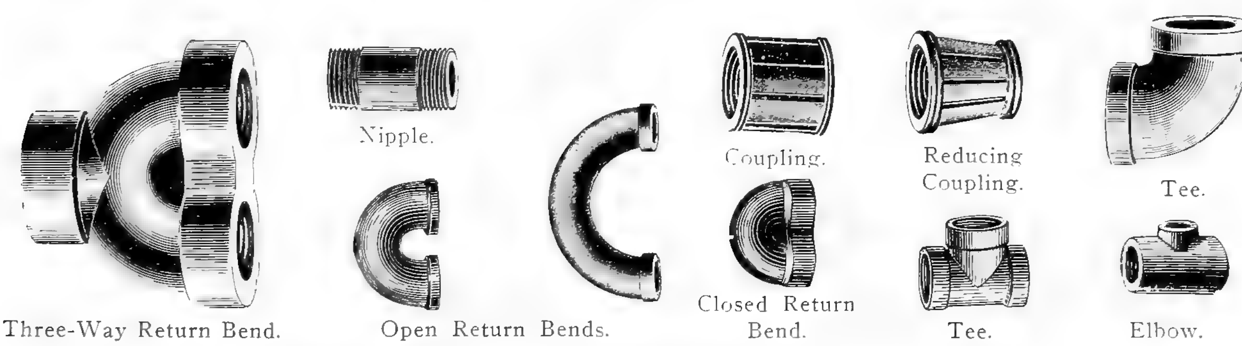


Fig. 2120—Fittings and Special Parts for Baker's Heating Apparatus.

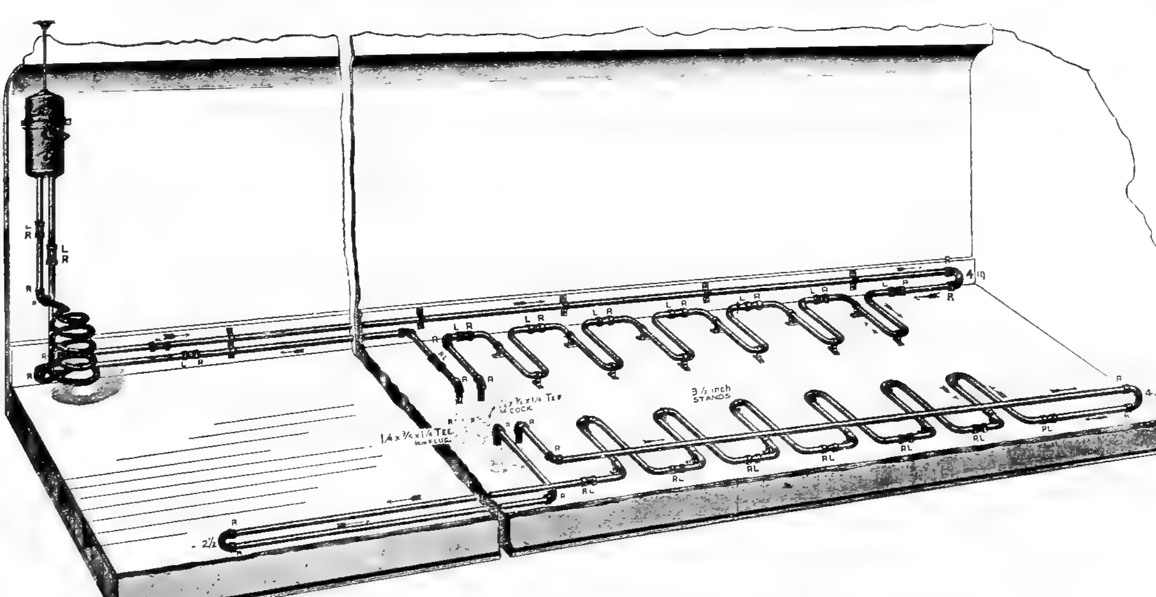


Fig. 2121—Arrangement of Pipings for Passenger Cars Heated with the Baker Heater.

W. C. Baker Car Heater Company.

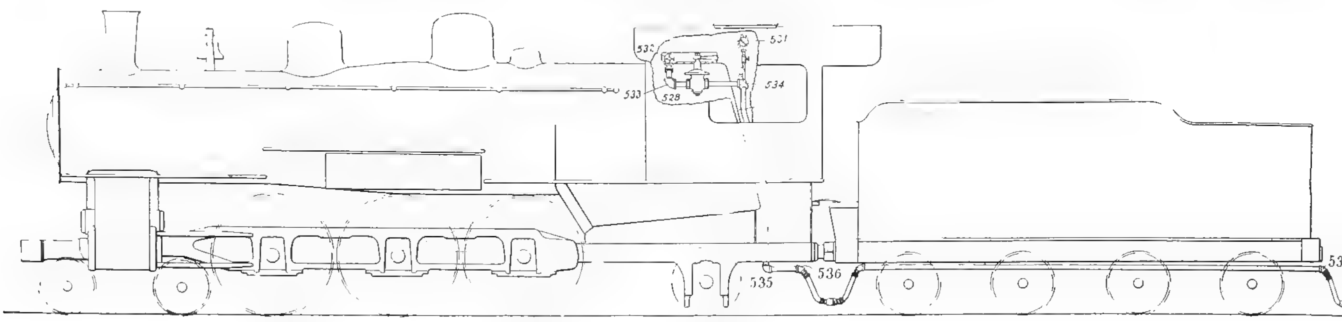


Fig. 2122—Arrangement of Gold's Heating Apparatus on Locomotive and Tender.

Parts of Locomotive Equipment, Fig. 2122.

804S *Steam Hose and Couplers*
889 *Pressure Regulator*
531 *Steam Gage*
532 *Starting Gage*
533 *1½-in. Elbow*
534 *2 in. by ¼ in. by 2 in. Tee*
535 *2-in. Elbow*
536 *2 in. by 1½ in. 65 Deg. Elbow*
552 *2-in. R. & L. Coupling*

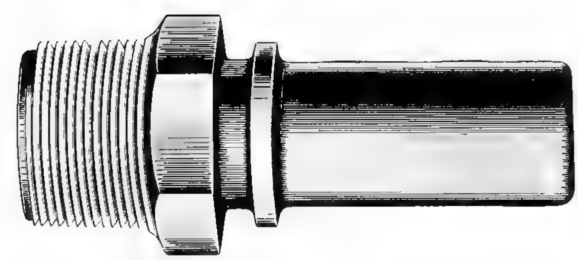


Fig. 2124—Steam Hose Nipple.

Parts of Valve, Fig. 2126.

A *Body*
B *Dome*
C *Spring Case*
D *Lock Nut*
E *Adjusting Screw*
F *Bottom Plug*
G *Outlet Union Nut*
H *Outlet Union Nipple*
I *Inlet Union Nut*
J *Inlet Union Nipple*
K *Main Valve*
L *Lower Diaphragm Plate*
M *Controlling Valve Plug*
N *Top Diaphragm Plate*
O *Top Spindle*
P *Bottom Strainer*
Q *Main Diaphragm*
R *Controlling Diaphragm*
S *Controlling Valve*
T *Botton Spring*
U *Controlling Valve Spring*
V *Regulating Spring*
W *Hand Wheel*
X *Hand Wheel Nut*
Y *Top Strainer*
Z *Vent Plug*

Parts of Valve, Fig. 2125.

A *1½-in. Inlet Union Nipple*
B *2-in. Outlet Union Nipple*
C *Bolts and Nuts for Dome and Body*
D *Balance Spindle*
E *Oscillating Washer*
F *Bottom Spring*
G *Body of Regulator*
H *Bottom Plug*
I *Handle*
J *Top Nut*
K *Hollow Screw*
L *Top Spring*
M *Dome of Regulator*
N *Lock Nut*
O *Top Flange*
P *Bottom Flange*
Q *Top Spindle*
R *Set Screw*
T *1½-in. Inlet Union Nut*
U *2-in. Outlet Union Nut*
530 *Diaphragm*

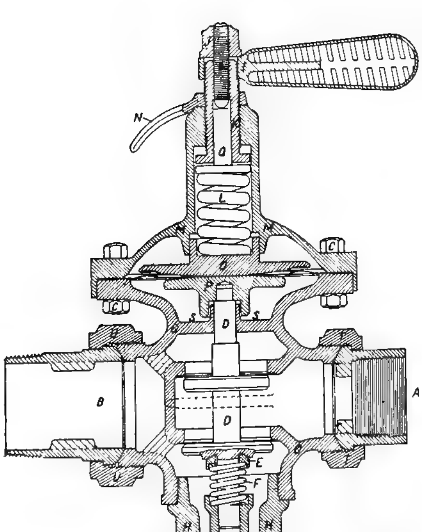


Fig. 2125—Gold's Improved Balance Valve Pressure Regulator, No. 528.

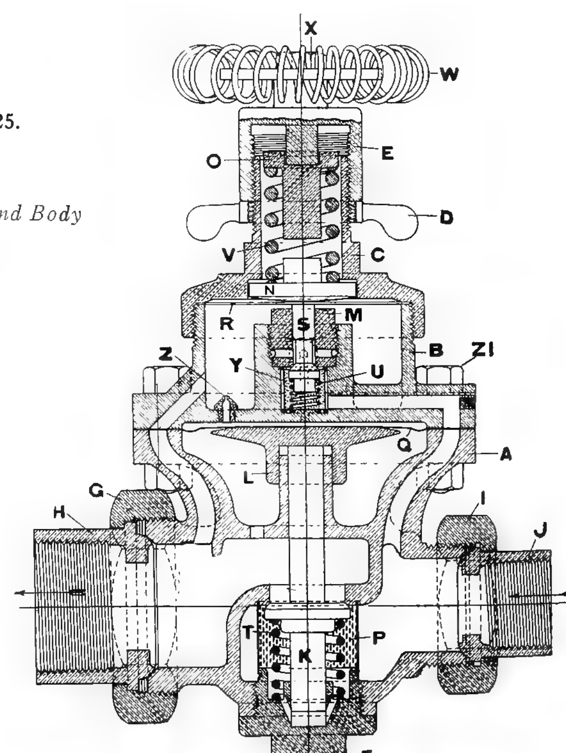


Fig. 2126—Gold's New Ideal Pressure Regulators.

Gold Car Heating & Lighting Company.

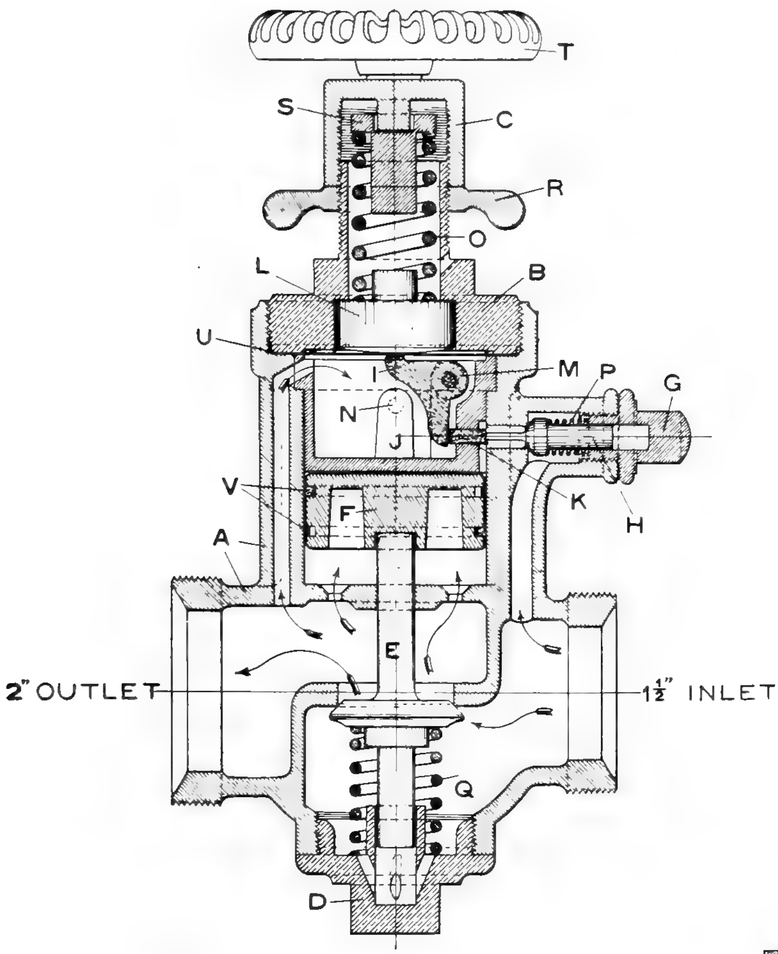


Fig. 2127--Gold's Pressure Regulator, No. 1014.

Parts of Regulator, Fig. 2127.

A *Body*
B *Dome*
C *Adjusting Screw*
D *Bottom Plug*
E *Main Valve*
F *Piston*
G *Control Valve Cap*
H *Control Valve Stem*
I *Bell Crank*
J *Bell Crank Case*
K *Valve Pin*
L *Diaphragm Plate*
M *Bell Crank Screw*
N *Stop Screw*
O *Regulating Spring*
P *Control Valve Spring*
Q *Bottom Spring*
R *Lock Nut*
S *Top Spindle*
T *Hand Wheel*
U *Diaphragm*
V *Piston Rings*

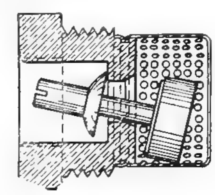


Fig. 2128—Gold's Gravity Safety Trap No. 882.

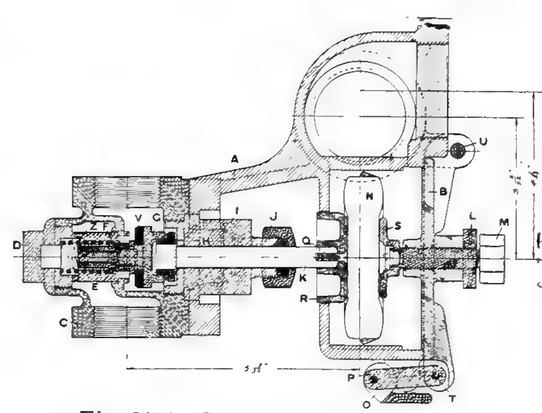


Fig. 2131—Gold's Vapor Valve, No. 887.

Parts of Valve, Fig. 2131

A *Body*
B *Door*
C *Valve Body*
D *Bottom Plug*
E *Screen*
F *Disc Nut*
G *Disc Holder*
H *Valve Seat Nut*
I *Bonnet*
J *Packing Nut*
K *Valve Stem*
L *Lock Nut*
M *Adjusting Screw*
N *Diaphragm*
O *Cam*
P *Link*
Q *Valve Stem Screw*
R *Diaphragm Plate*
S *Adjusting Screw*
T *Rivets*
U *Hinge Pin*
V *Disc*
W *Body Bolt Nuts*
X *Body Bolts*
Y *Cotters*
Z *Spring*

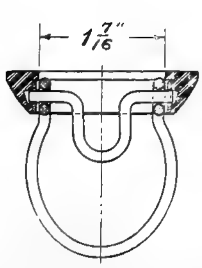


Fig. 2129 — Gold's Steam Coupler Gasket, No. 403B.

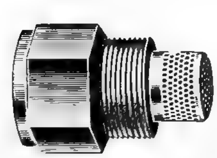


Fig. 2130—Strainer Nipple, No. 840.

Fig. 2132—Gold's Steam Hose Coupler, No. 804S.

Gold Car Heating & Lighting Company.

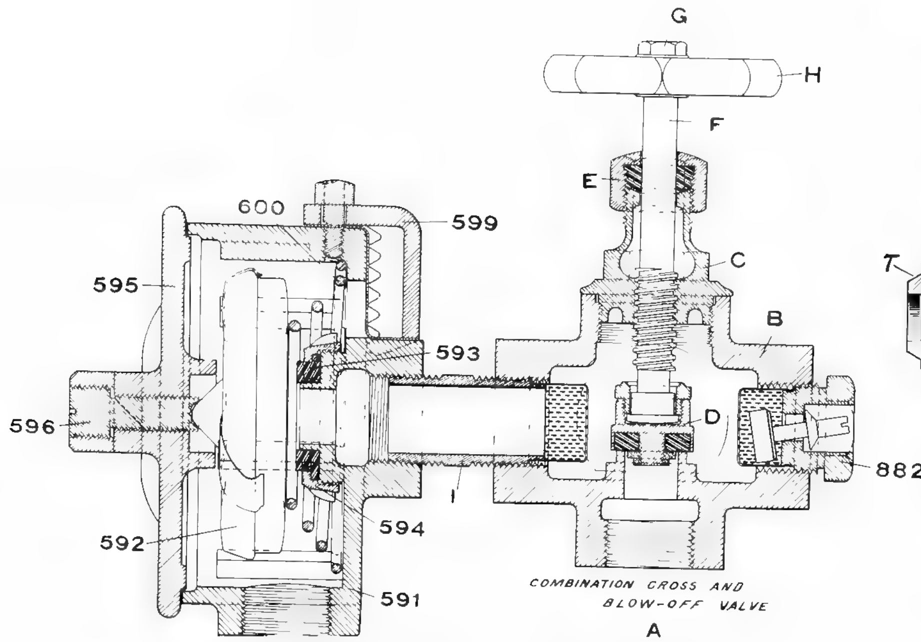


Fig. 2133—Gold's Horizontal or Tee-Trap, No. 590.

Parts of Trap, Fig. 2133.

591	*Body*	A	*Complete Valve Section*
595	*Cover*	B	*Body Only*
599	*Ventilator*	C	*Bonnet Only*
596	*Set Screw and Nut*	D	*Disc Holder Complete*
594	*Collar*	E	*Packing Nut*
593	*Seat*	F	*Spindle*
600	*Spring*	G	*Spindle Nut*
592	*Diaphragm*	H	*Hand Wheel*
		I	*Strainer Nipple*

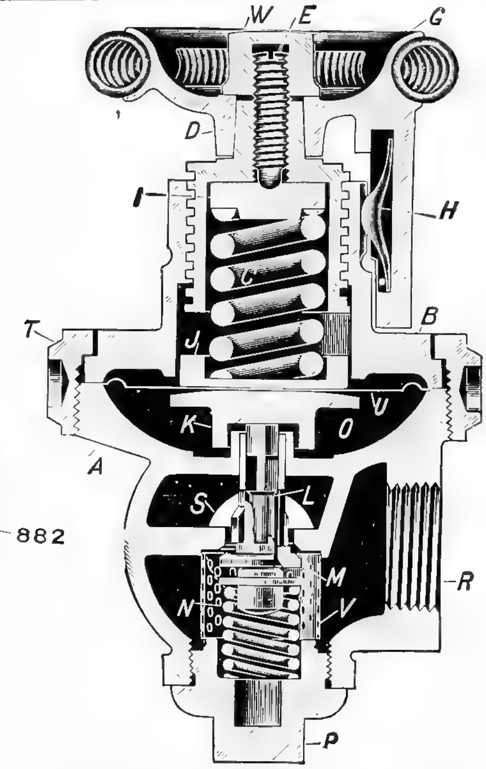


Fig. 2134—Gold's Stop Valve Temperature Regulator, No. 737.

Parts of Regulator, Fig 2134.

A	*Body of Regulator*	K	*Bottom Flange*
B	*Dome of Regulator*	L	*Auxiliary Valve Spindle*
C	*Top Spring*	M	*Main Valve Spindle*
D	*Regulating Screw*	N	*Bottom Spring*
E	*Set Screw*	P	*Bottom Plug*
G	*Wheel*	T	*Spanner Nut*
H	*Indicator Spring*	U	*Diaphragm*
I	*Washer*	V	*Strainer*
J	*Top Flange*	W	*Lock Nut*

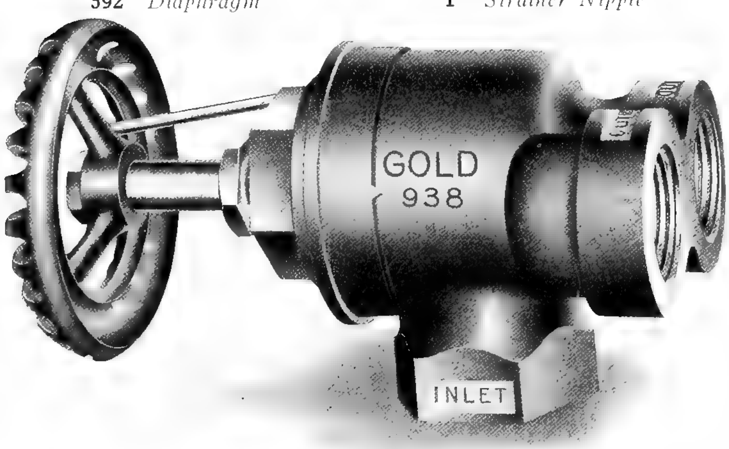


Fig. 2135—Packless Twin Supply Valve, No. 938.

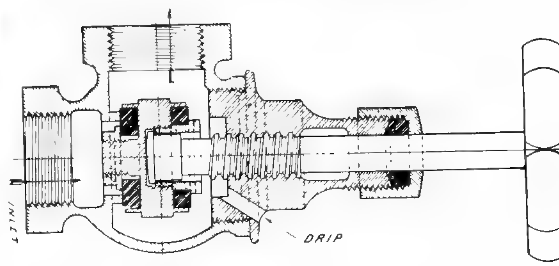


Fig. 2136 –Gold's Drip Valve, No. 870.

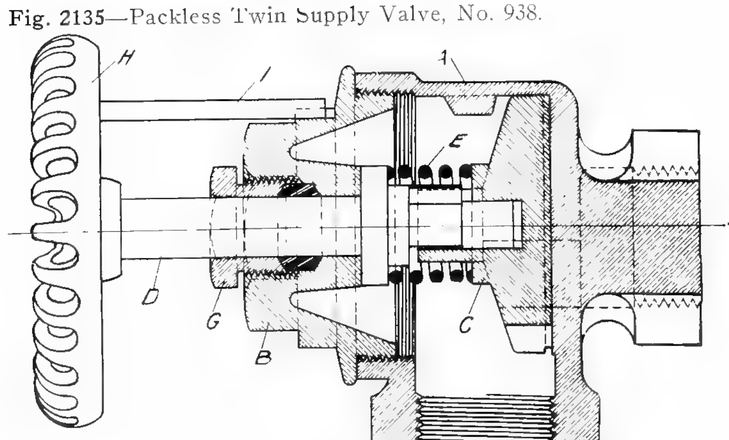


Fig. 2137—Section Through Valve Shown in Fig. 2135.

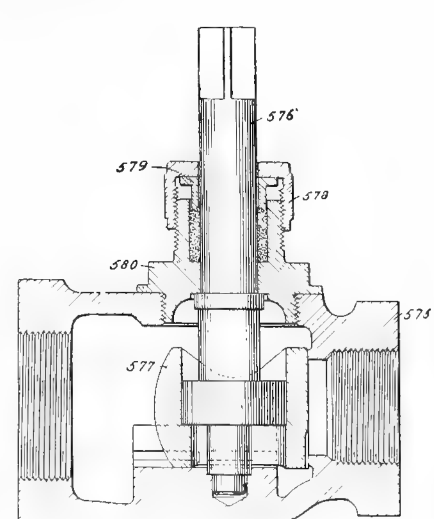


Fig. 2138—End Valve, No. 574.

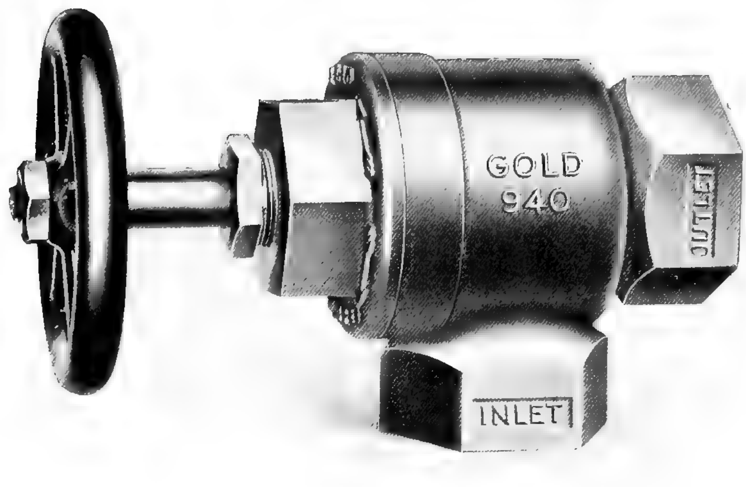


Fig. 2139—Gold's Packless Inlet Valve, No. 940.

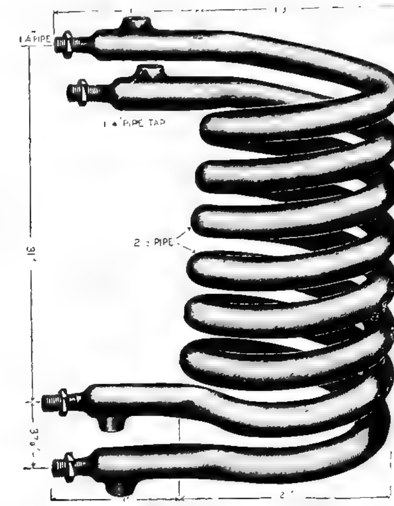


Fig. 2140—Gold's Double Duplex Coil with Welded Ends; 2½ in., No. 609A.

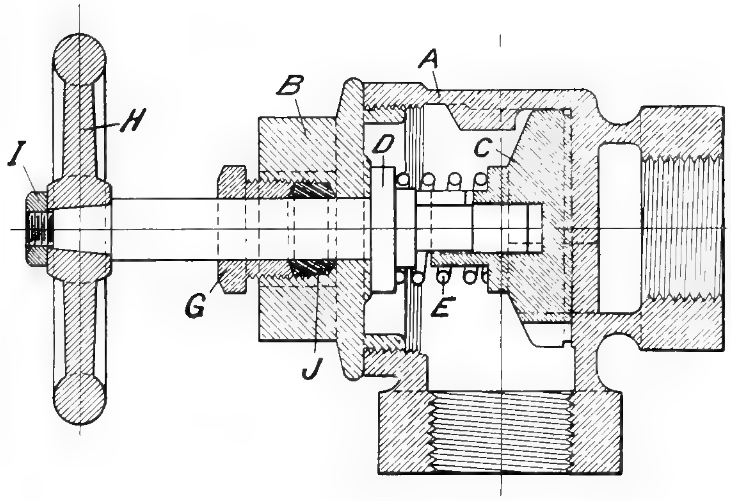


Fig. 2141—Section Through Valve Shown in Fig. 2139.

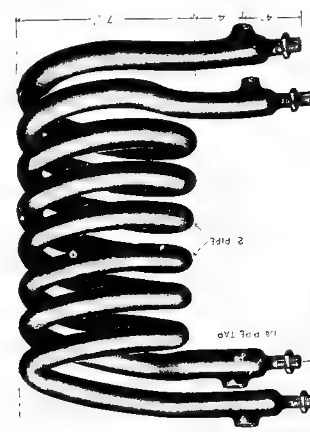


Fig. 2142—Gold's Duplex Coil with Welded Ends; 2 in., No. 608A.

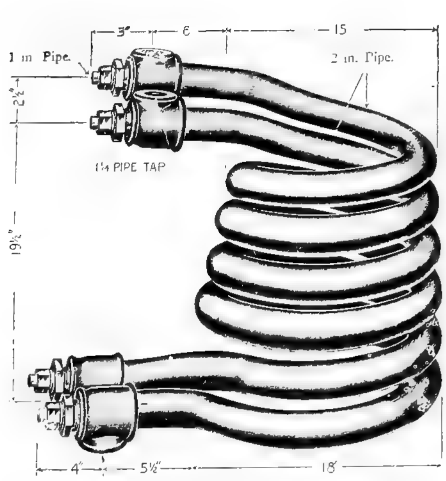


Fig. 2143—Gold's Double Duplex Coil (low); 2 in., No. 608.

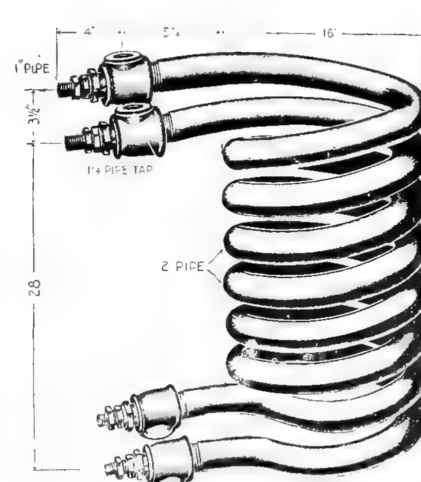


Fig. 2144—Gold's Double Duplex Coil (high); 2 in., No. 609.

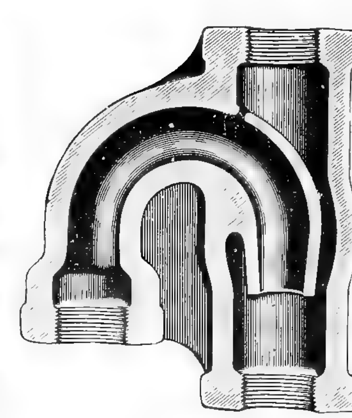


Fig. 2145—Gold's Sealed Jet Accelerator, No. 616.

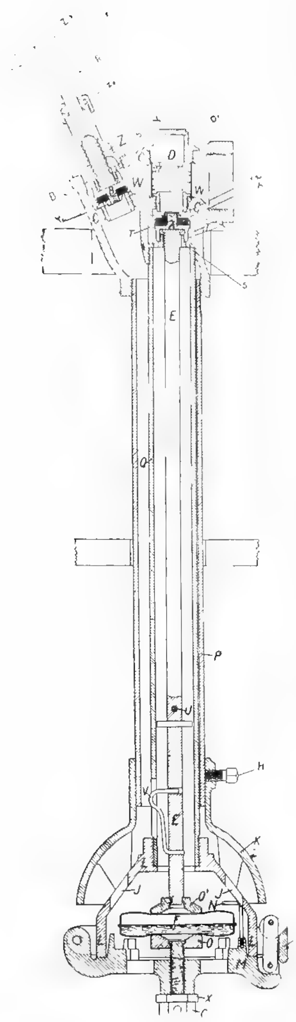
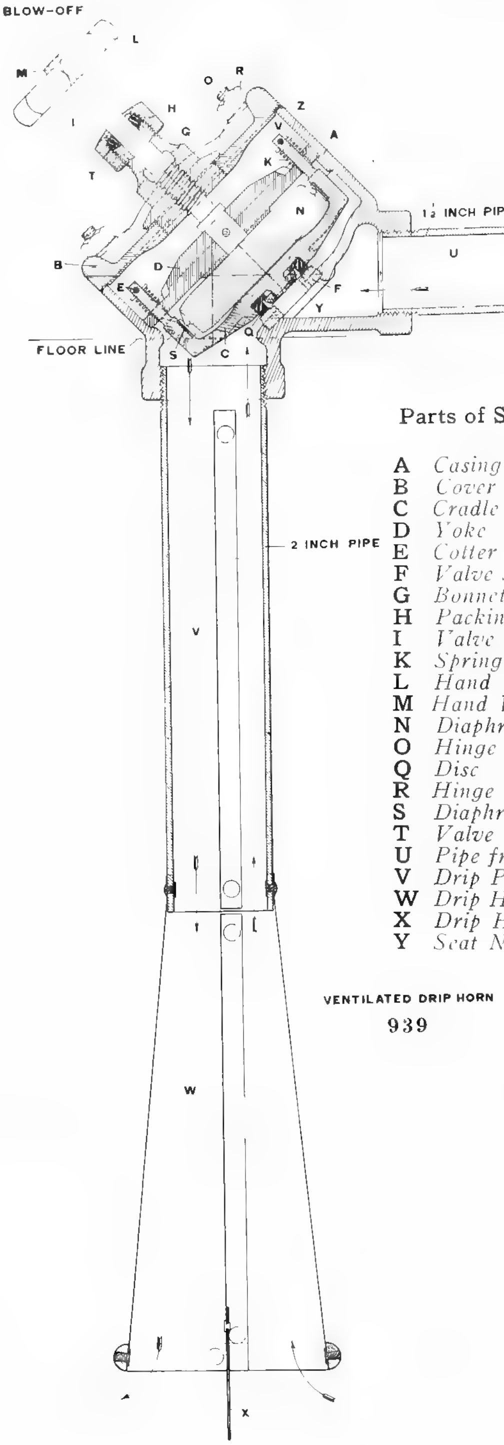


Fig. 2146—Gold's Vertical Trap, No. 606.

Parts of Vertical Trap, Fig. 2146.

A *Automatically Operated Valve*
A_1 *Disc for Automatic Valve*
B *Blow-off Valve*
B_1 *Disc for Blow-off Valve*
C *Cast Iron Trap Head*
C_1 *Trap Head Complete*
D *Strainer to Protect Valve "A"*
D_1 *Trap Head Cap*
E *Valve Stem*
E *Valve Stem Complete*
F *Expansion Diaphragm (containing Expansive Fluid) for Operating Automatic Valve A*
G *Set Screw for Adjusting Trap*
H *Set Screw*
I *Cam Lock for Locking Cover M of Trap*
J *Hand Wheel*
K *Shield to Direct Course of Blow-off Discharge*
L *Cast Iron Casing*
M *Hinged Cover to Trap Casing*
N *Hooks to Prevent Diaphragm Shifting*
N_1 *Bottom Casing Complete*
O *Bottom Plate*
O_1 *Top Plate*
P *Outside Tube*
Q *Inside Tube*
R *Valve Stem for Blow-off*
S *Stem Nut*
T *Guides to Automatic Valve*
U *Guides to Automatic Valve Stem*
V *Spring Catch to Prevent Valve Stem Falling Out when Cover is Opened*
W *Brass Valve Seats Screwed into Iron Body*
X *Lock Nut*
Y *Disc Holder*
Y_2 *Disc Nut*
Z *Bonnet of Blow-off Valve*
Z_1 *Blow-off Valve Bonnet without Disc and Disc Holder*
Z_2 *Blow-off Valve Bonnet Complete*
Z_3 *Valve Stem Nut*
Z_4 *Packing Nut*



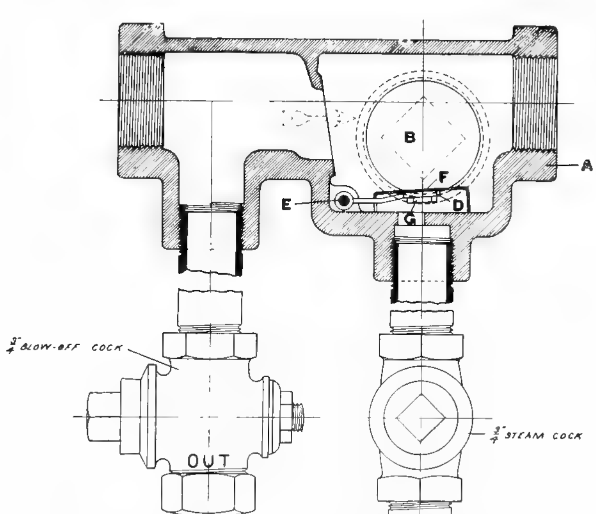
Parts of Steam Trap, Fig. 2147.

A *Casing*
B *Cover*
C *Cradle*
D *Yoke*
E *Cotter*
F *Valve Seat*
G *Bonnet*
H *Packing Nut*
I *Valve Stem*
K *Spring*
L *Hand Wheel*
M *Hand Wheel Nut*
N *Diaphragm*
O *Hinge Bolt*
Q *Disc*
R *Hinge Bolt Nut*
S *Diaphragm Clip*
T *Valve Stem Packing*
U *Pipe from Radiator*
V *Drip Pipe*
W *Drip Horn*
X *Drip Horn Diaphragm*
Y *Seat Nut*

VENTILATED DRIP HORN

939

Fig. 2147—Gold's Duplex Ventilated Steam Trap, No. 912.



923 925

Fig. 2148—Gold's Filling Device, No. 631.

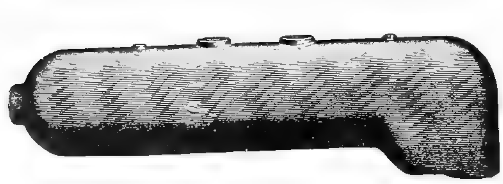


Fig. 2149—Expansion Drum, No. 615.

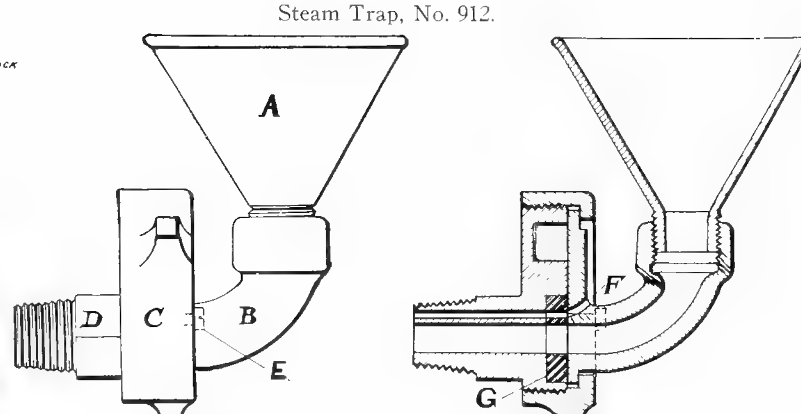


Fig. 2150—Gold's Improved Filling Cocks, No. 628.

Gold Car Heating & Lighting Company.

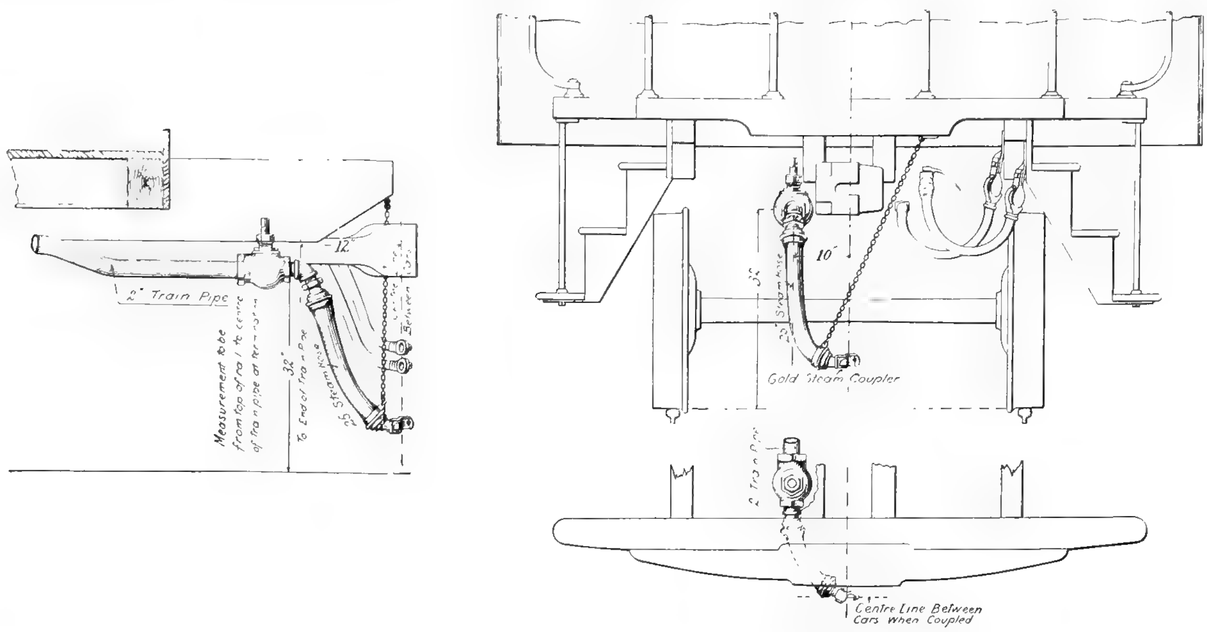
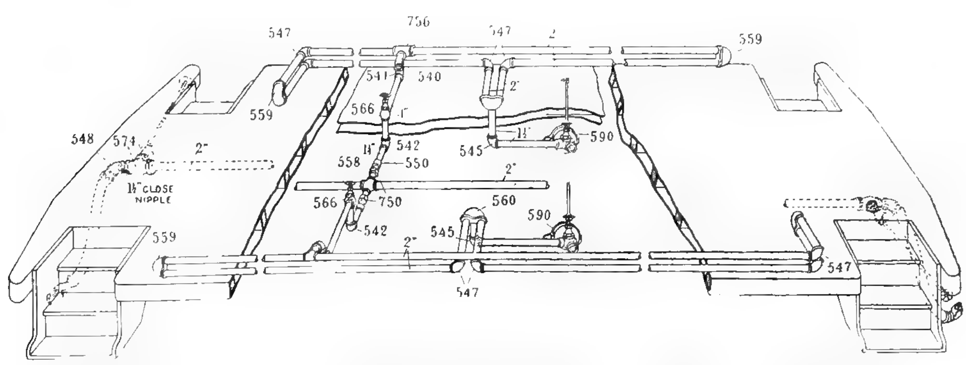


Fig. 2151—Proper Location of End Valve and Steam Hose Coupler.



Fog. 2152—Gold's Direct or Straight Steam System as Applied to Passenger Car.

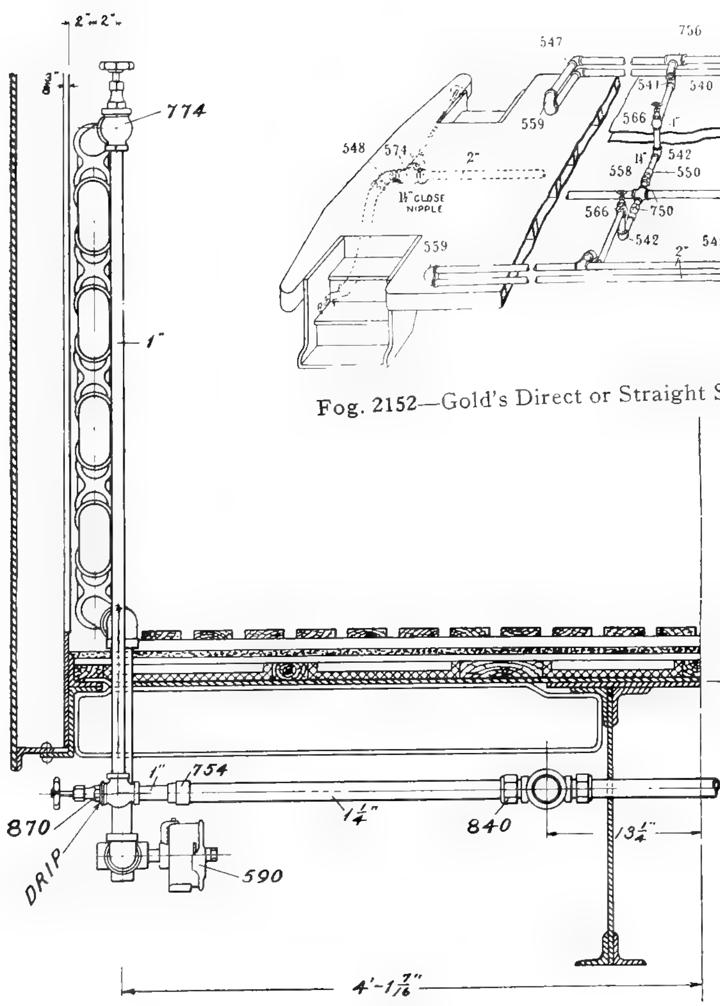


Fig. 2153—Application of Drip Valve, No. 870, to Express Car.

Parts of Safety Valve, Fig. 2154.

A	*Cap*	F	*Spring Abutment*
B	*Body*	G	*Lock Nut*
C	*Ball*	H	*Adjusting Screw*
D	*Cup*	I	*Flange Screws*
E	*Spring*		

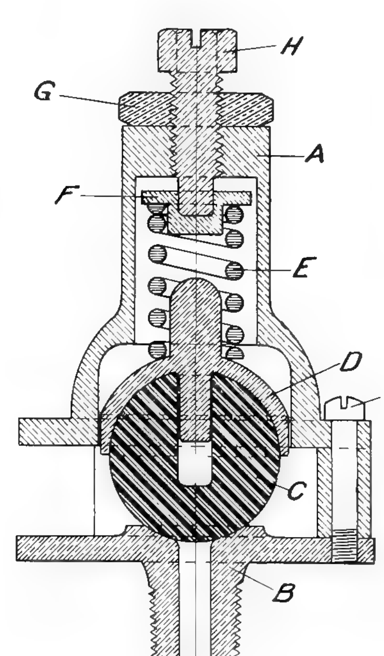


Fig. 2154—Safety Valve, No. 993.

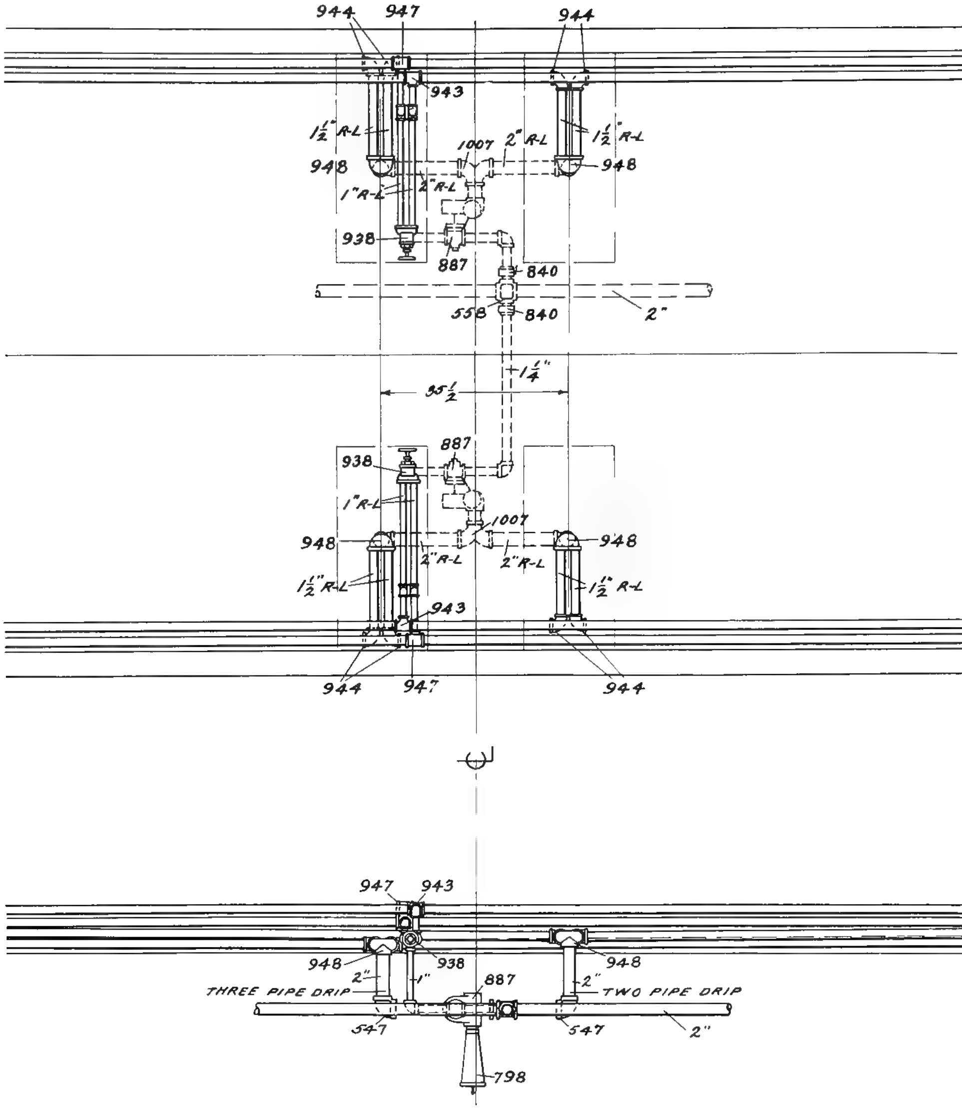


Fig. 2155—Gold's Vapor System of Car Heating.

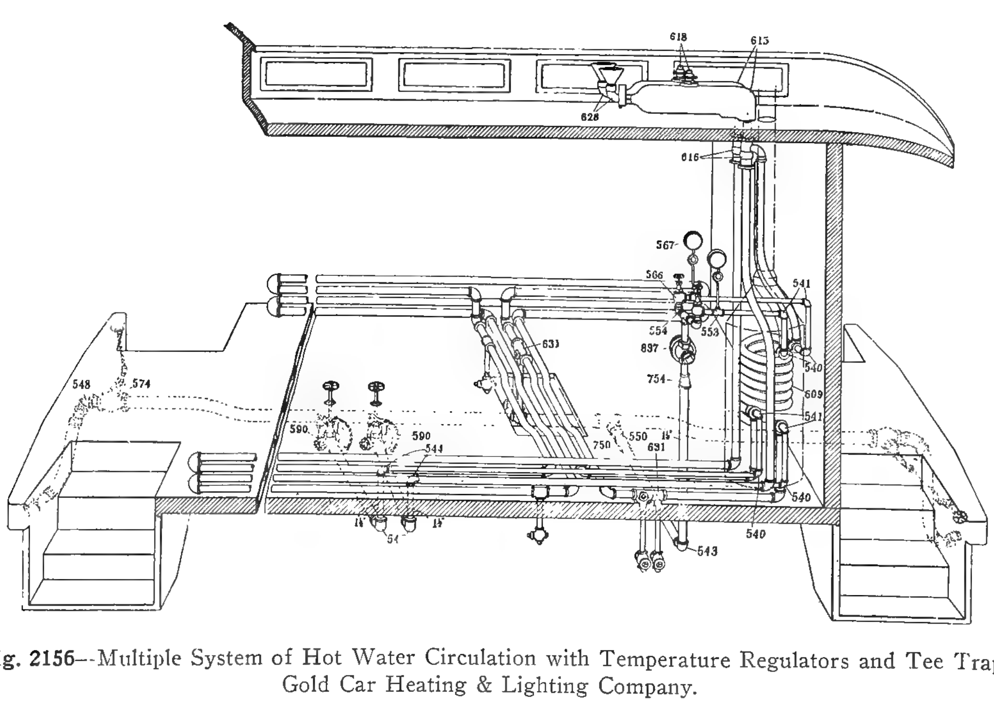


Fig. 2156—Multiple System of Hot Water Circulation with Temperature Regulators and Tee Traps. Gold Car Heating & Lighting Company.

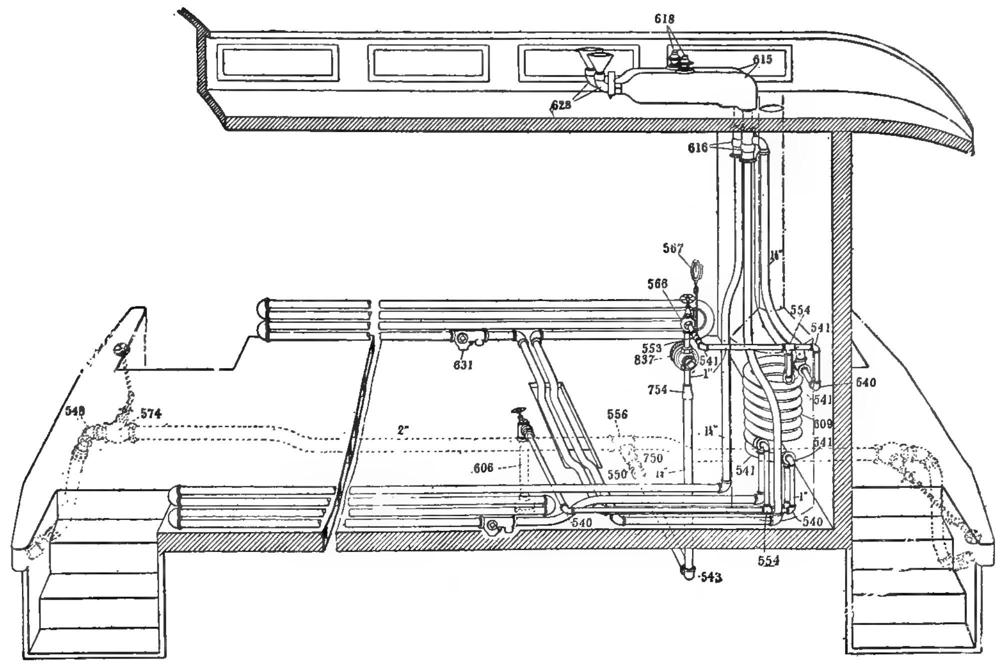


Fig. 2157—Gold's Hot Water Circulation System with Temperature Regulators and Vertical Traps.

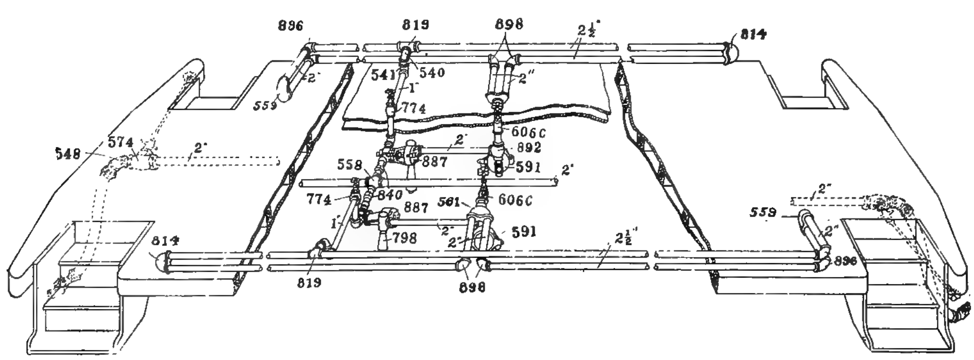


Fig. 2158—Gold's Combination Pressure and Vapor System for Steel Cars.

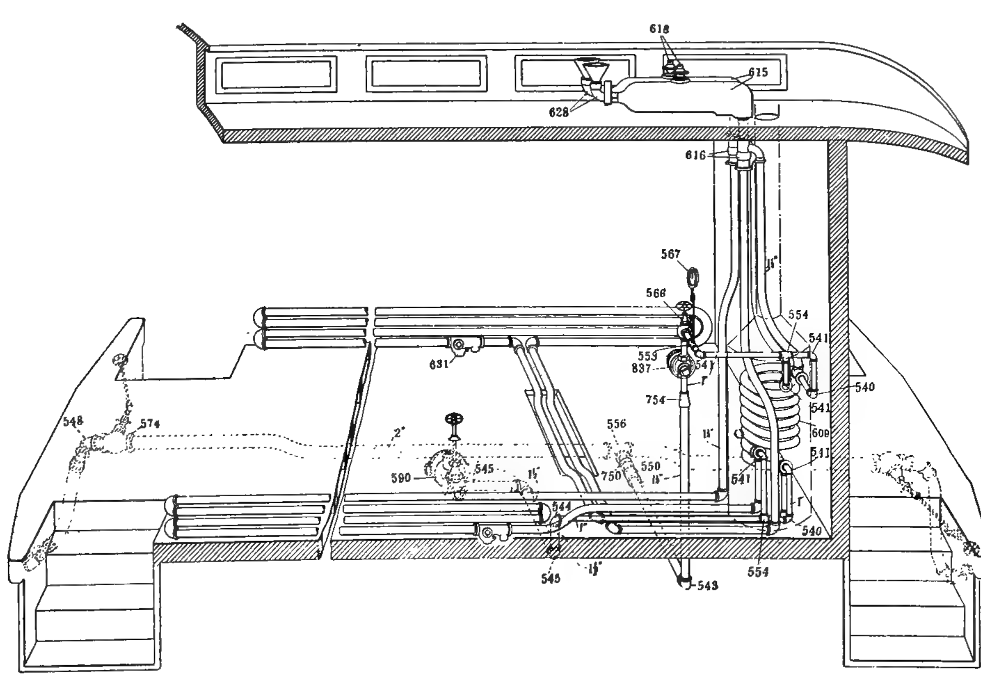


Fig. 2159—Hot Water Circulation System with Temperature Regulators and Tee Traps.
Gold Car Heating & Lighting Company.

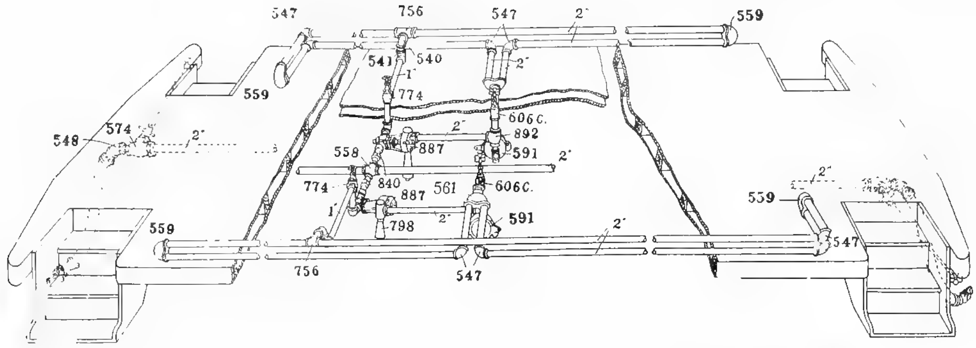


Fig. 2160—Gold's Combination Pressure and Vapor System for Wooden Cars.

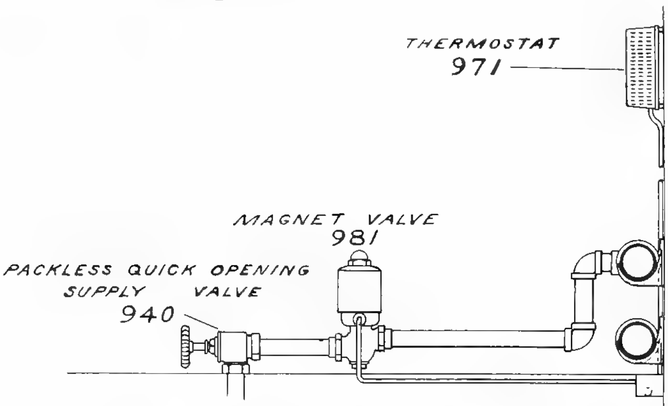


Fig. 2161—Application of Gold's Steam Thermostatic Control to a Straight Steam Equipment.

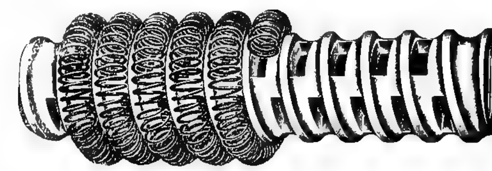


Fig. 2162—Gold's Ventilated Porcelain Core Supports Used in Electric Heater.

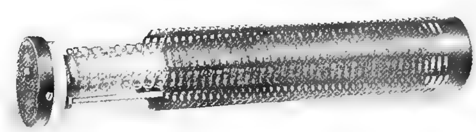


Fig. 2163—One-Coil Electric Cylinder Heater, No. 120E.

Fig. 2164—Two-Coil Electric Cross Seat Heater, No. 145-E, Type C.

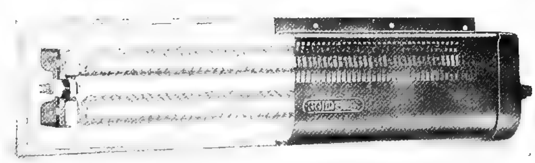


Fig. 2165—Two-Coil Electric Truss Plank Heater, No. 199-E.

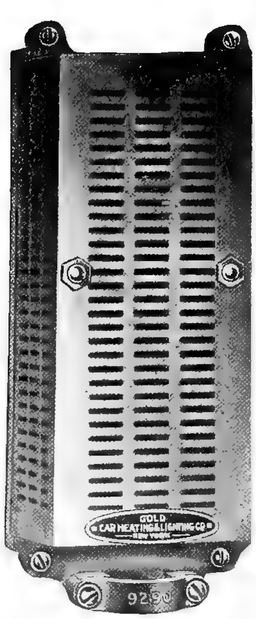


Fig. 2165A—Gold's Electric Thermostat, No. 929.

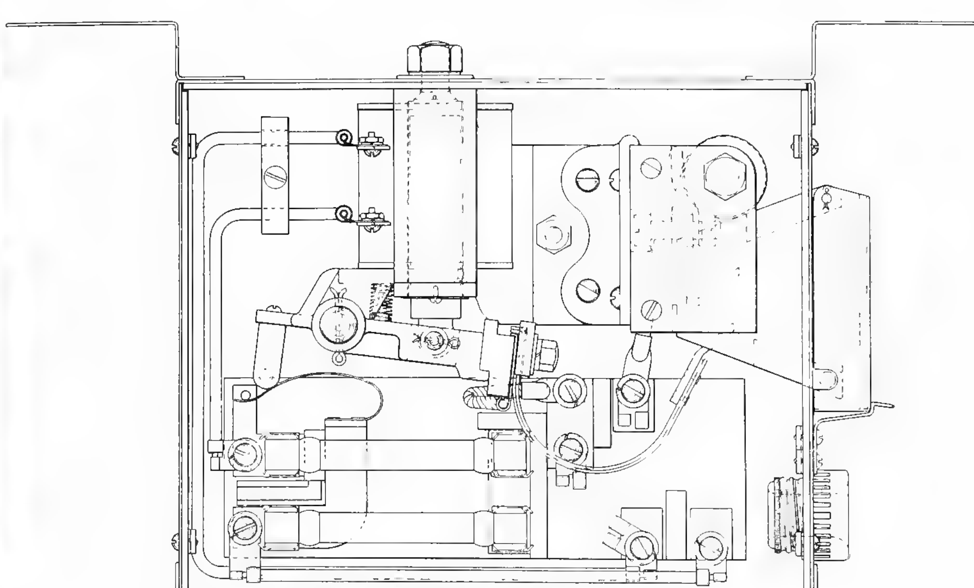


Fig. 2166—Gold's Magnetic Switch No. 1015.

Gold Car Heating & Lighting Company.

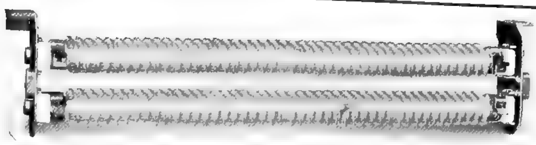


Fig. 2167—Two-Coil Electric Truss Plank Heater, No. 252-E.

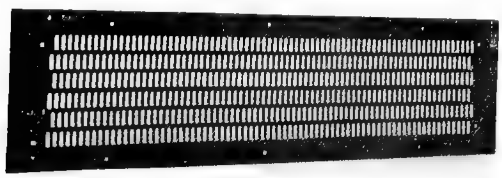


Fig. 2168—Gold's Panel Heater, Front Style, No. 177-E.

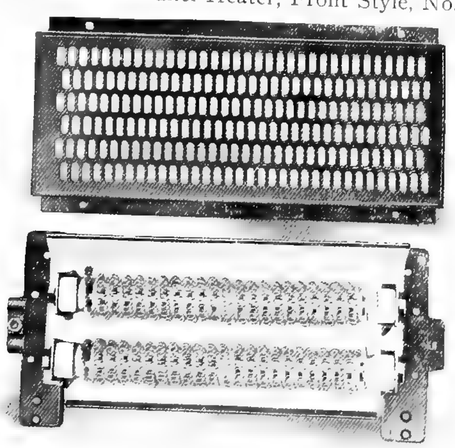


Fig. 2169—Two-Coil Electric Vestibule Heater, No. 217-E.

Fig. 2171—Two-Coil Electric Panel Heater, No. 322-E.

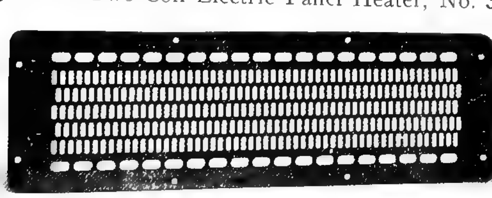


Fig. 2173—Gold's Panel Heater, Front Style, No. 329-E.

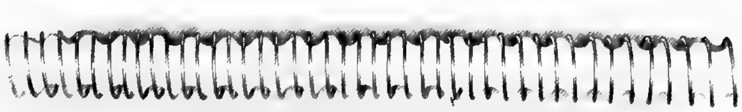


Fig. 2174—New Type Support and Coil for Older Type of Electric Heaters. Gold Car Heating & Lighting Company.

Fig. 2169A—One-Coil Electric Truss Plank Heater, No. 206-E.

Fig. 2170—Six-Coil Electric Heater, Portable Type.

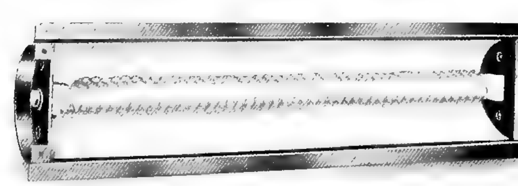


Fig. 2172—One-Coil Electric Panel Heater, No. 212-E.

Fig. 2175 — Gold's Electric Heater Switch, No. 114-E.

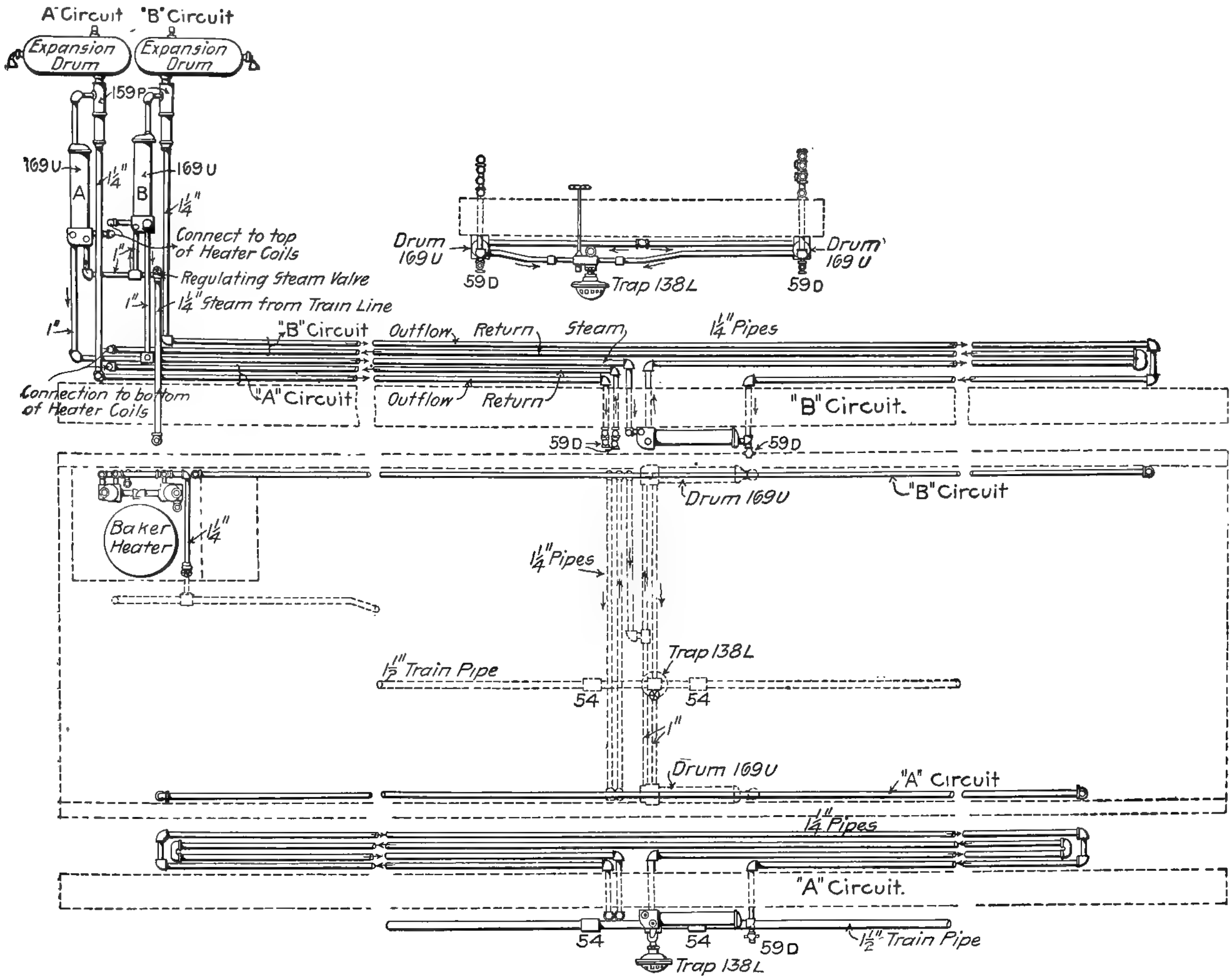


Fig. 2176—Piping Showing Application of Consolidated Steam Drum No. 169U to Double Circuit.

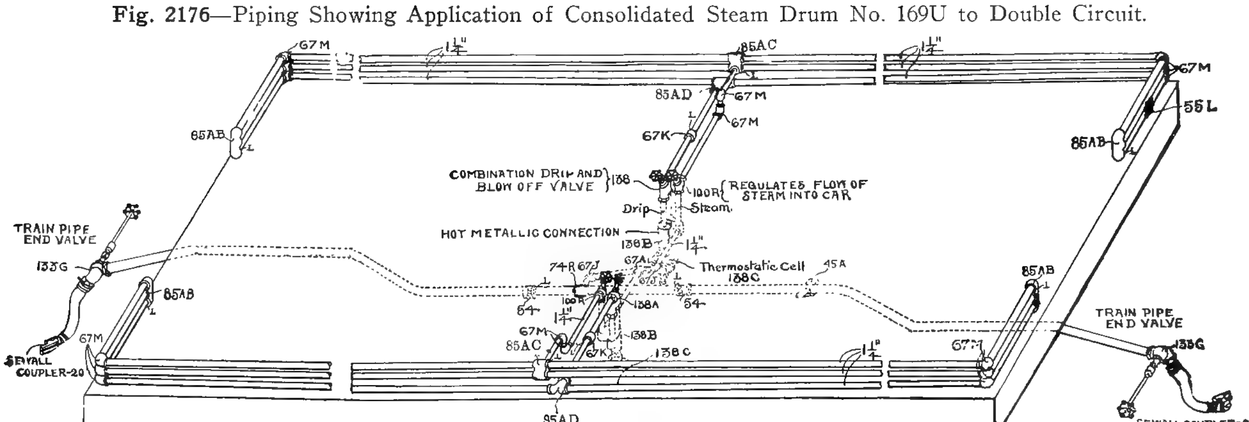


Fig. 2177—Piping for Direct Steam System C, Showing 3-Pipe System with Two Traps No. 138L.

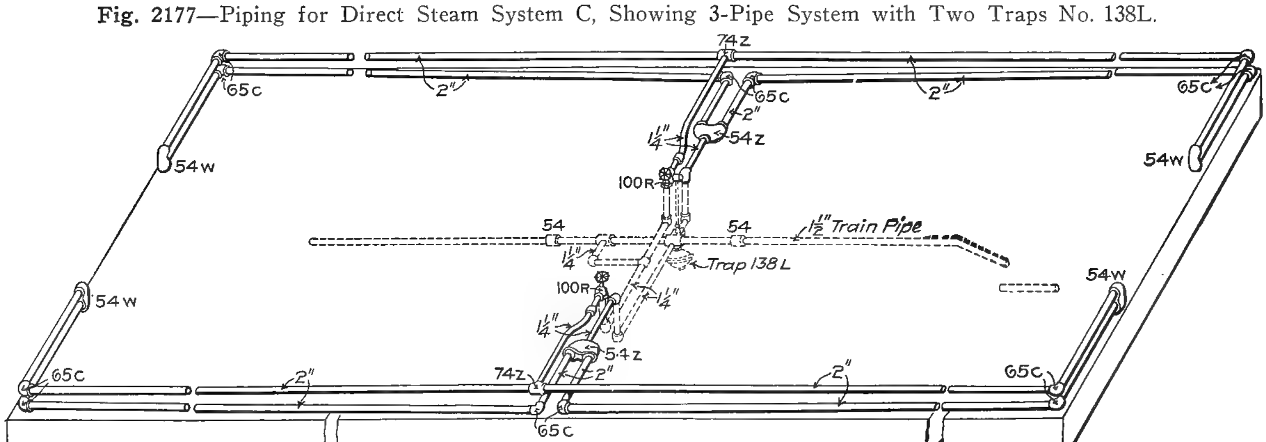


Fig. 2178—Piping for Direct Steam System B, with One Thermostatic Trap No. 138L.

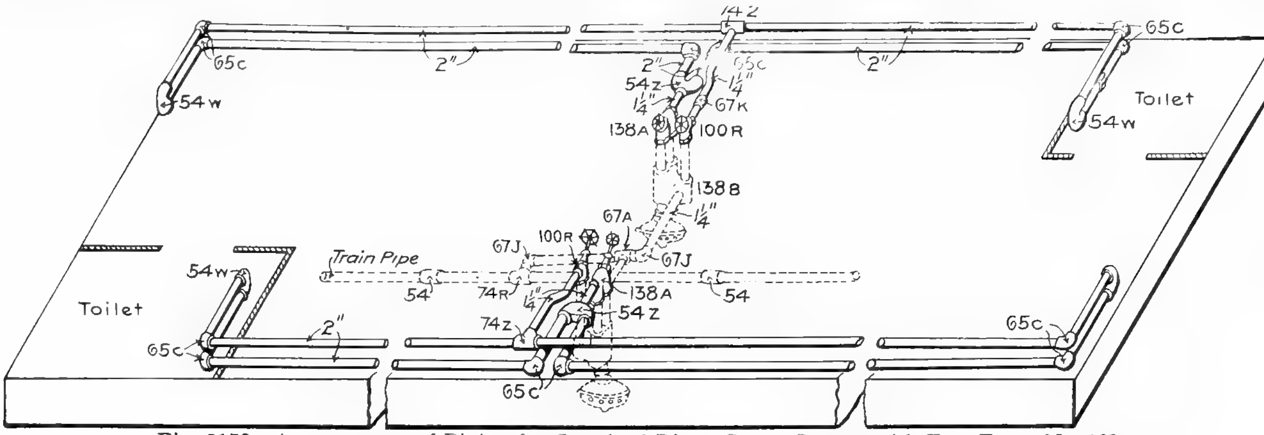


Fig. 2179—Arrangement of Piping for Standard Direct Steam System with Two Traps No. 138.

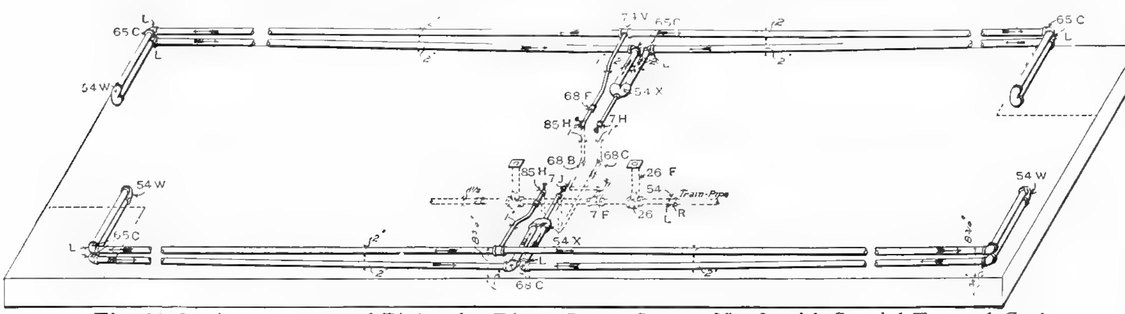


Fig. 2180—Arrangement of Piping for Direct Steam System No. 2, with Special Tee and Cock.

Parts of Heating Apparatus, Figs. 2176-2180.

7F	*Tee with Drip Connection*
7H	*Angle Trap Valve*
7J	*Eccentric Tee*
20	*Sewall Coupler*
26	*Asbestos Packed Cock*
26F	*Round Spindle*
26G	*Floor Plate for 26 F*
45A	*1½ in. Pipe Clamp*
54	*Coupling, R. & L.*
54W	*Return Bend*
54X	*Return Bend*
54Z	*Return Bend with Eccentric Outlet*
55L	*Expansion Bracket*
68C	*R. & L. Elbow*
67A	*Tee*
67J	*R. & L. Elbow*
67K	*R. & L. Couplings*
67M	*Elbow*
68B	*Elbow*
68C	*R. & L. Elbow.*
68F	*R. & L. Coupling*
74R	*Tee*
74V	*Tee*
74Z	*Tee*
85AB	*Three-Pipe Manifold*
85AC	*Center Tee*
85AD	*Return Tee*
85H	*Graduating Steam Angle Valve*
100R	*Graduating Steam Valve*
133G	*End Train Pipe Valve*
138	*Steam Trap*
138A	*Steam Trap*
138B	*Steam Trap*
138C	*Steam Trap*
138L	*Steam Trap*

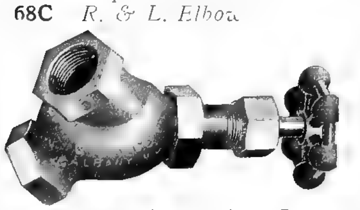


Fig. 2181—Graduating Steam Valve No. 85H.

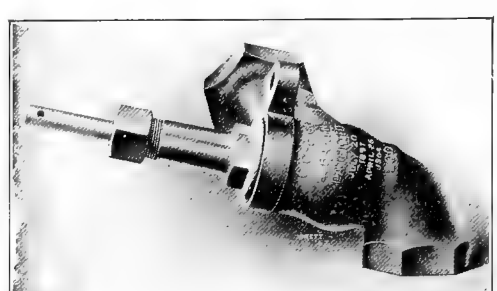


Fig. 2182—End Train Pipe Valve No. 200

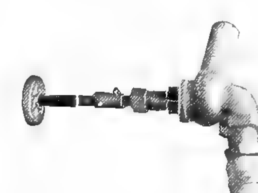


Fig. 2183—End Train Pipe Valve No. 133G.

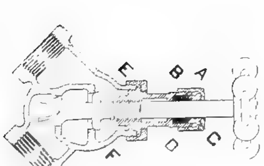


Fig. 2184 — Graduating Steam Valve No. 85H.

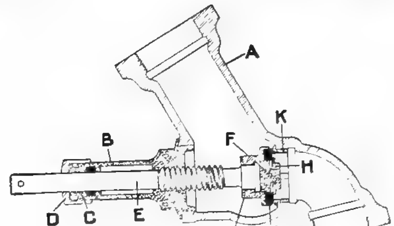


Fig. 2185—End Train Pipe Valve No. 200.

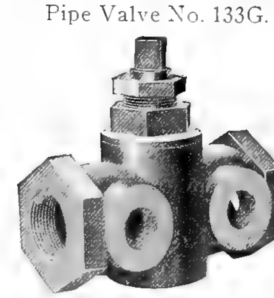


Fig. 2186 — Filler Cock No. 121.

Parts of Valve, Fig. 2185.

A	*Body Casting*	200*A*
B	*Bonnet*	195*B*
C	*Gland*	133*GC*
D	*Gland Nut*	133*GD*
E	*Stem*	133*GE*
F	*Swivel Head*	133*GG*
G	*Swivel Head Nut*	133*GH*
H	*Gasket Nut*	133*GJ*
J	*Gasket*	133*GK*
K	*Brass Seat*	195*D*

Consolidated Car Heating Company.

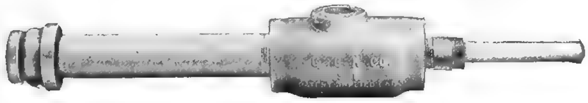


Fig. 2187—Current Director No. 59R.

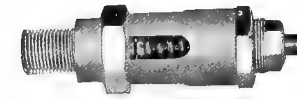


Fig. 2188—Safety Valve No. 59C.

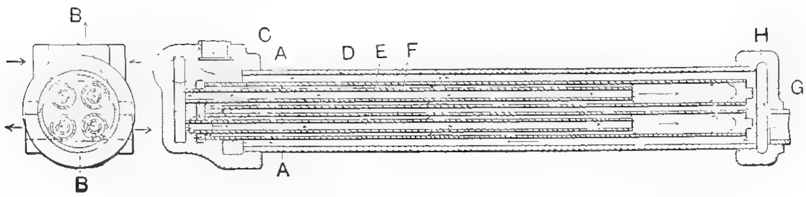


Fig. 2189—Section Through Steam Drum No. 169U.

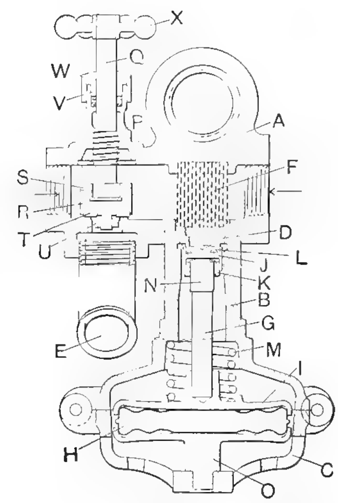


Fig. 2191—Section Through Steam Trap No. 138R.

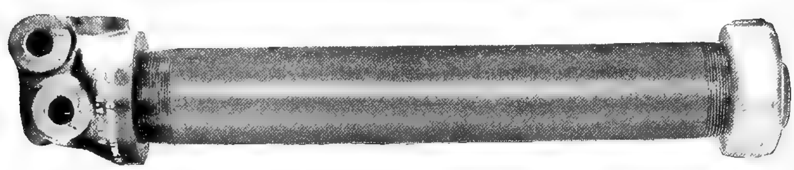


Fig. 2190—Steam Drum No. 169U.

Parts of Steam Drum, Fig. 2189.

C	*Head Casting*	169*V*	**F**	1 *in. Brass Pipe*	169*P*
D	3½ *in. Iron Pipe*	169*N*	**G**	*Plug for F*	169*L*
E	1½ *in. Brass Pipe*	169*R*	**H**	*Cap Casting*	169*K*

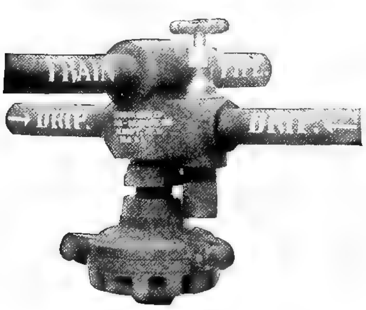


Fig. 2192—Steam Trap No. 138L.

Parts of Steam Trap, Fig. 2191.

A	*Body Casting*	138*RA*	**L**	*Swivel Head Gasket*	138*CL*
B	*Upper Basket Casting*	138*RB*	**M**	*Spring*	138*CM*
C	*Lower Basket Casting*	138*CU*	**N**	*Cap for Valve Stem*	138*CR*
D	*Brass Seat for Thermostatic Valve*	138*RC*	**O**	*Lower Spider Plate*	138*CW*
E	*Curved Nipple for Blow-off*	138*RD*	**P**	*Bonnet*	100*B*
F	*Strainer*	138*LC*	**Q**	*Valve Stem*	100*C*
G	*Stem or Rod*	138*LD*	**R**	*Swivel Head*	100*D*
H	*Diaphragm*	138*CA*	**S**	*Swivel Head Nut*	100*E*
I	*Upper Spider Plate*	138*CE*	**T**	*Gasket*	100*G*
J	*Swivel Head*	138*CJ*	**U**	*Nut for T*	100*H*
K	*Swivel Heat Nut*	138*CK*	**V**	*Gland*	100*J*
			W	*Gland Nut*	100*K*
			X	*Hand Wheel*	7*R*

Fig. 2193—Steam Inlet Valve No. 100L.

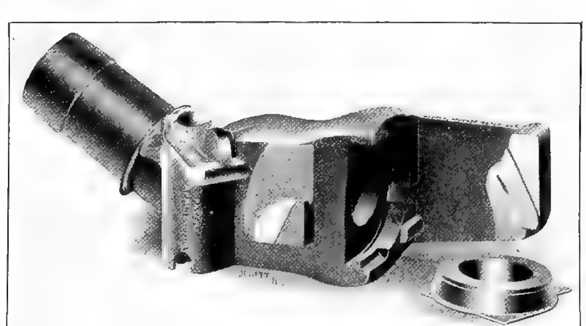


Fig. 2194—Consolidated Steam Coupler No. 33.

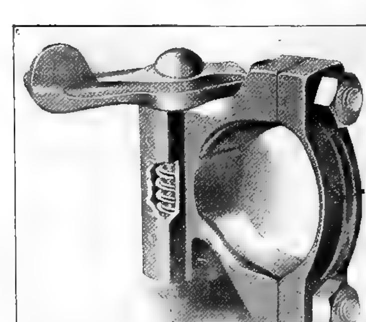


Fig. 2195—Clamp Lock for Steam Couplers No. 9S.

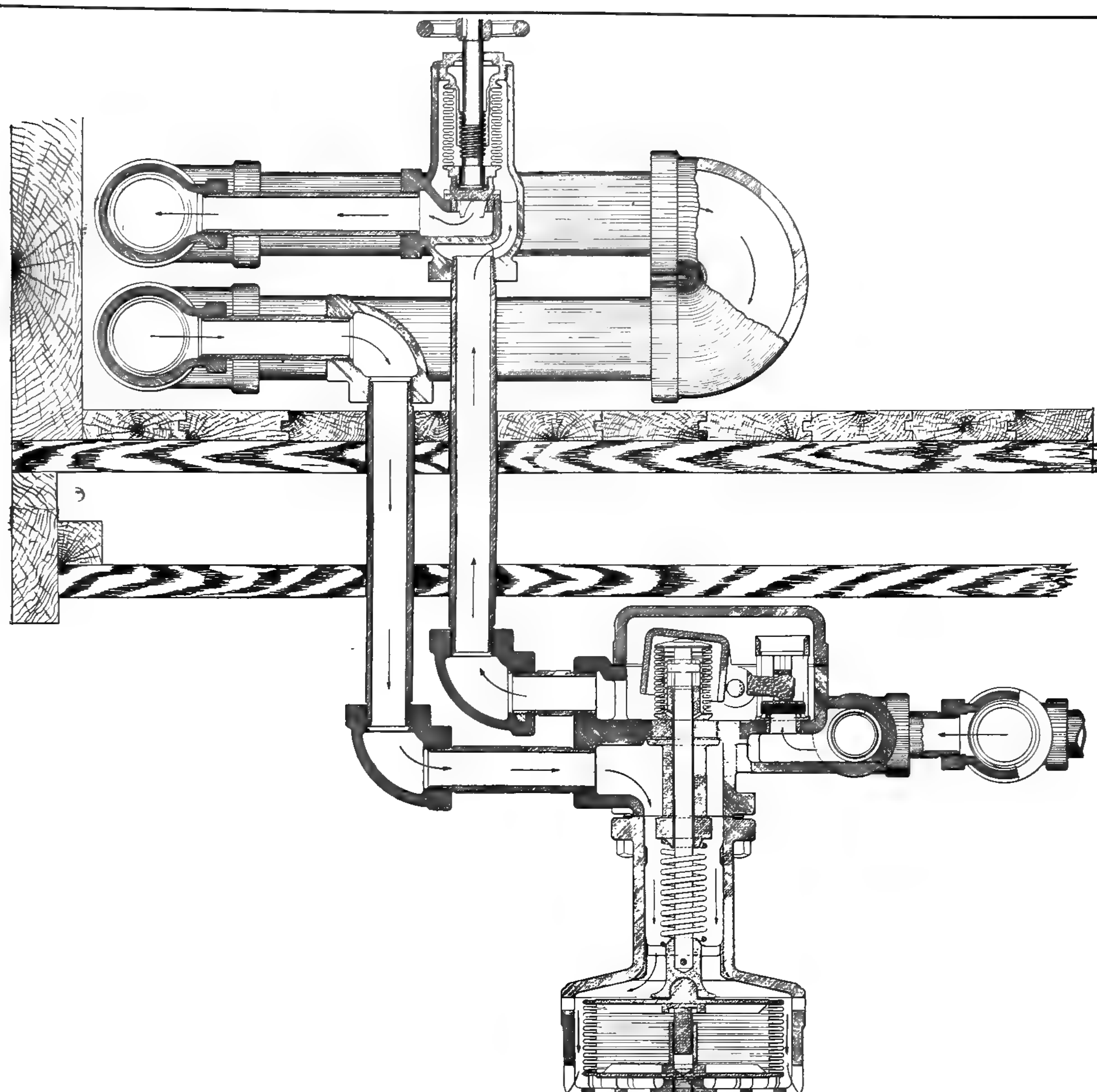


Fig. 2196—Cross Section Through Piping Showing Packless Vapor Trap No. 333 and Packless Admission Valve No. 533.

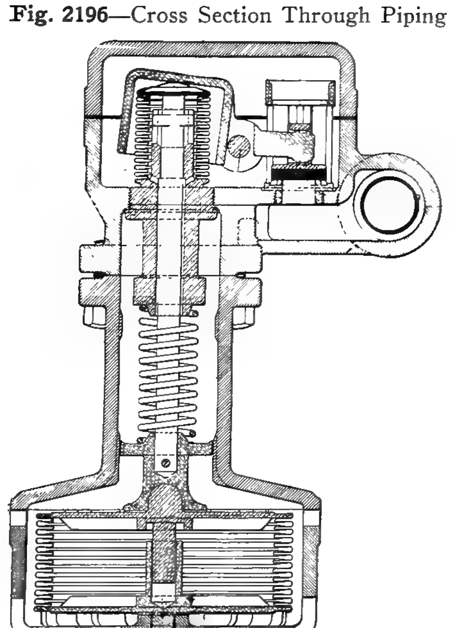


Fig. 2197—Packless Vapor Trap with Sylphon Diaphragm.

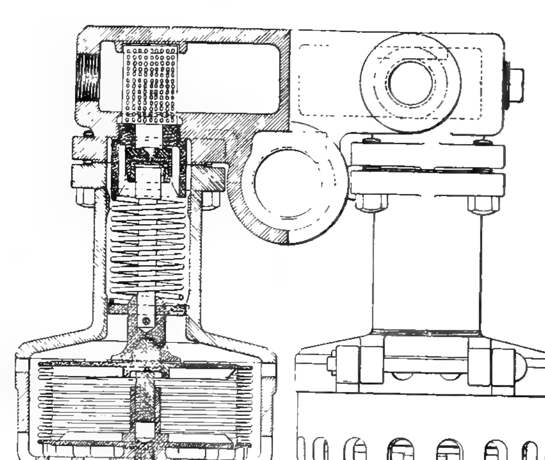


Fig. 2198—Twin Pressure Trap with Sylphon Diaphragm.

Consolidated Car Heating Company.

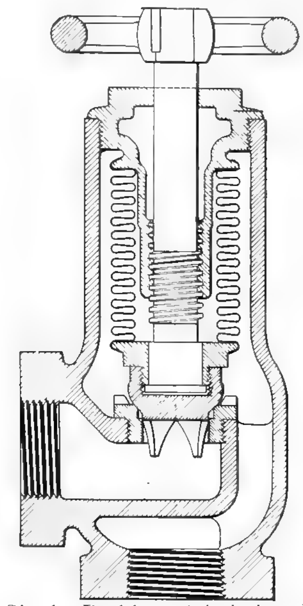


Fig. 2199—Single Packless Admission Valve No. 633.

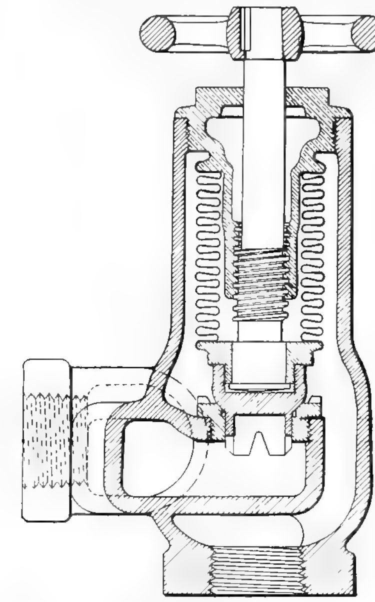


Fig. 2200—Twin Packless Admission Valve No. 633T.

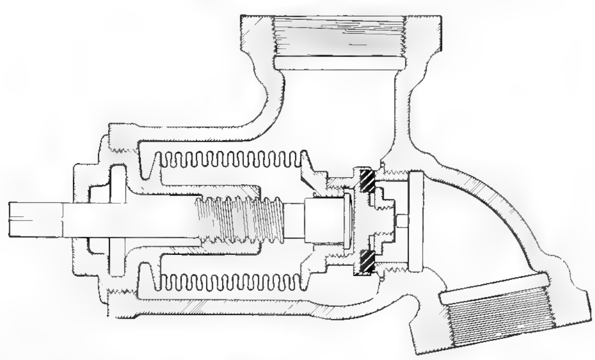


Fig. 2201—Packless Train Line End Valve No. 433

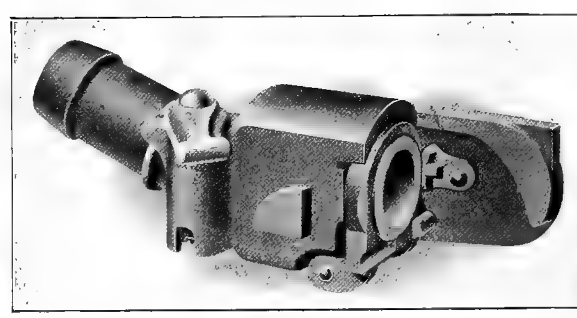


Fig. 2202—Consolidated Steam Coupler No. 9C.

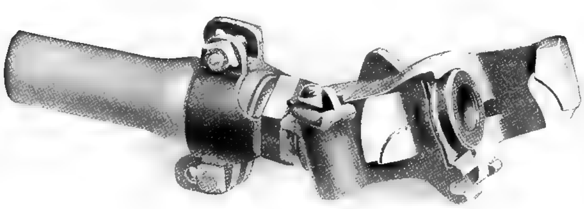


Fig. 2203—No. 33TD Steam Coupler with Two-Piece Hose Clamp.

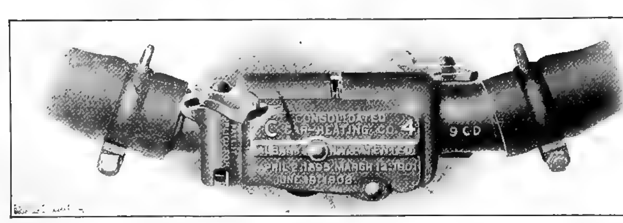


Fig. 2204—Pair of Consolidated Steam Couplers (No. 9C), Locked.

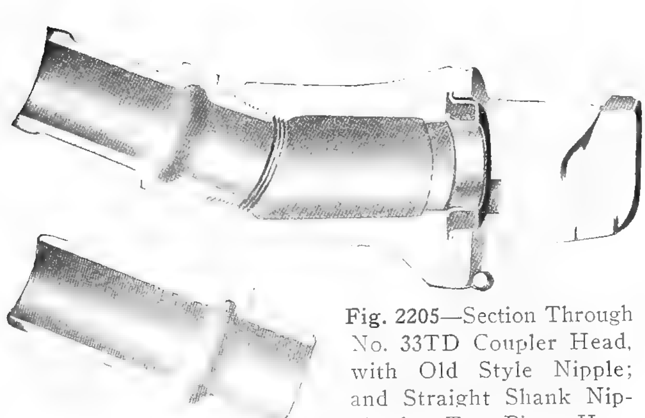


Fig. 2205—Section Through No. 33TD Coupler Head, with Old Style Nipple; and Straight Shank Nipple for Two-Piece Hose Clamp.

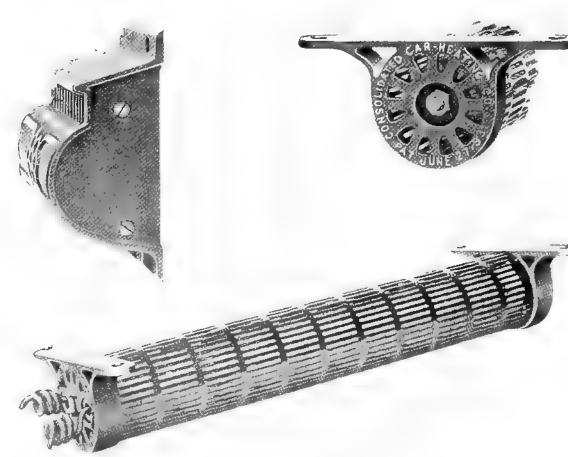


Fig. 2206—Single Coil Electric Heater, Drop Pattern No. 192, for Cross Seats.

Consolidated Car Heating Company.

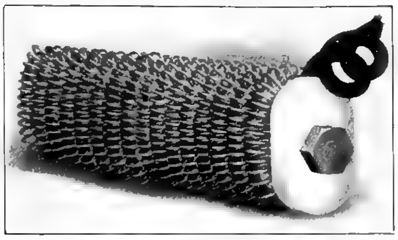


Fig. 2207—Resistance Coil for Electric Heater.

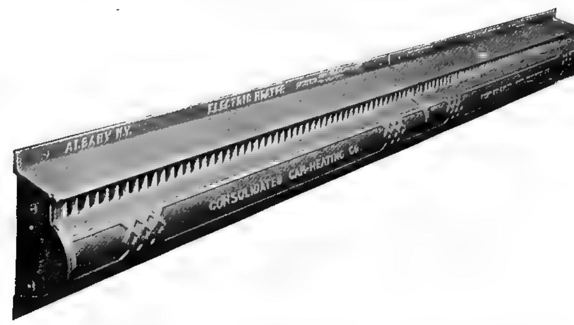


Fig. 2208—Continuous Panel, Single Coil, Electric Heater No. 93T.

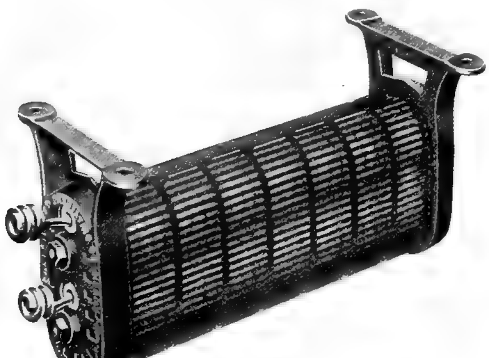
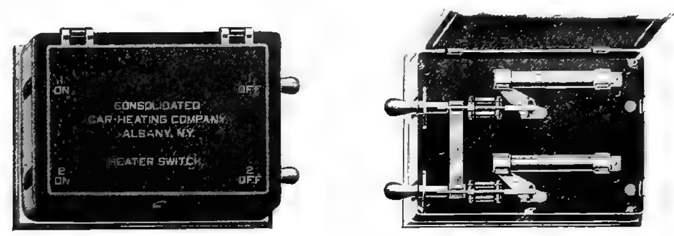


Fig. 2209—Double Coil Electric Heater, Drop Pattern, No. 1921I.



Closed. Open.

Fig. 2210—Heater Switch No. 204.

Consolidated Car Heating Company.

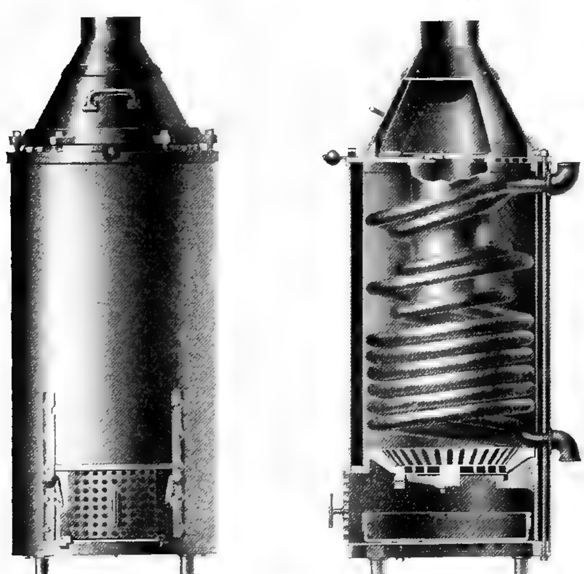


Fig. 2211—Car Heater.

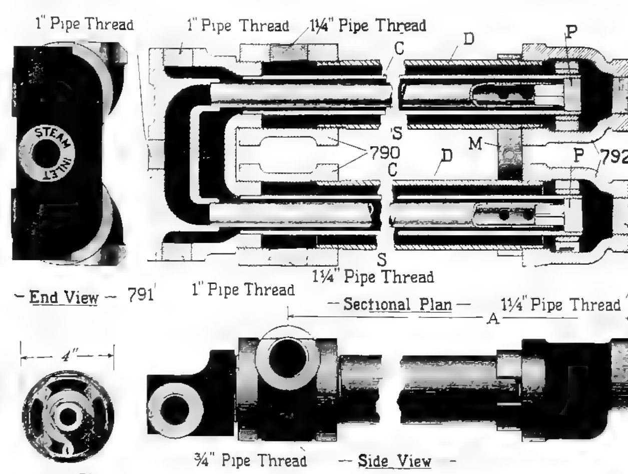


Fig. 2212 -Double Jackets Nos. 702x and 702y.

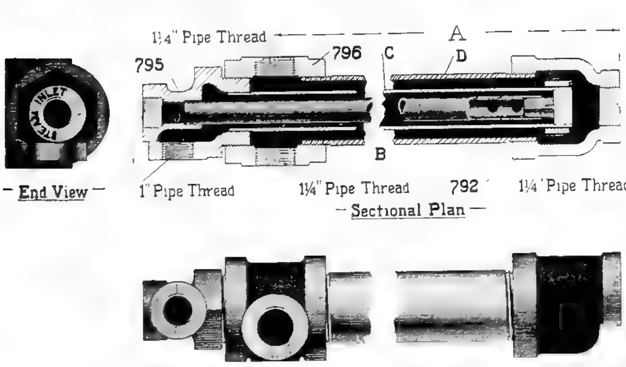


Fig. 2213—Single Jackets Nos. 702p and 702q.

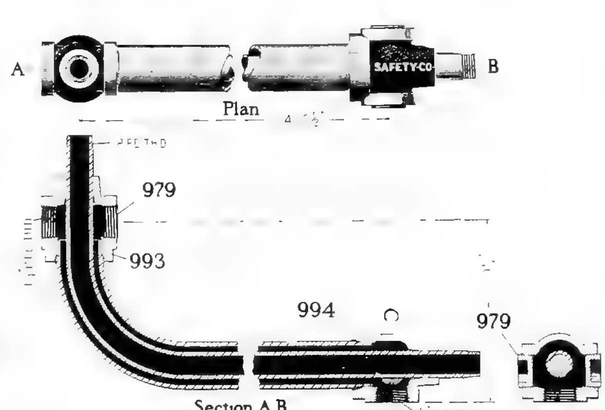


Fig. 2214—Jacket No. 972.

Standard Heat & Ventilation Company.

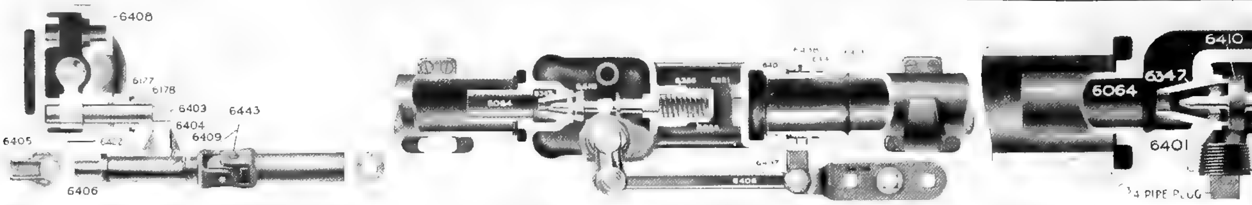


Fig. 2215—Injector No. 6400.

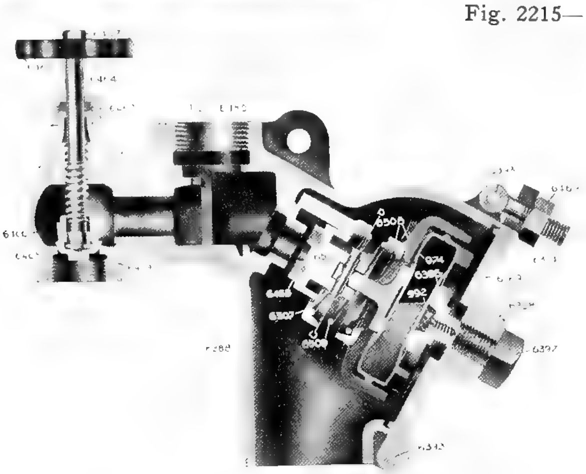
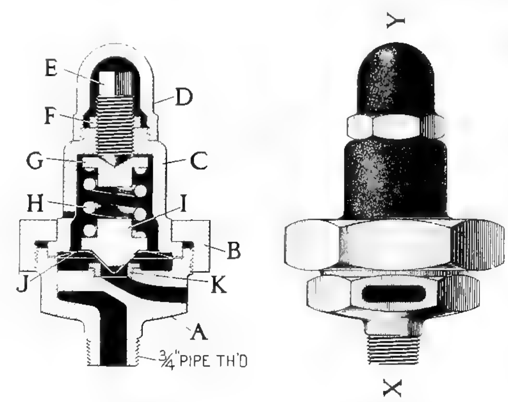


Fig. 2216—Steam Trap No. 975X and Blow-off Valve.



Section X-Y Elevation

Fig. 2217—Safety Valve.

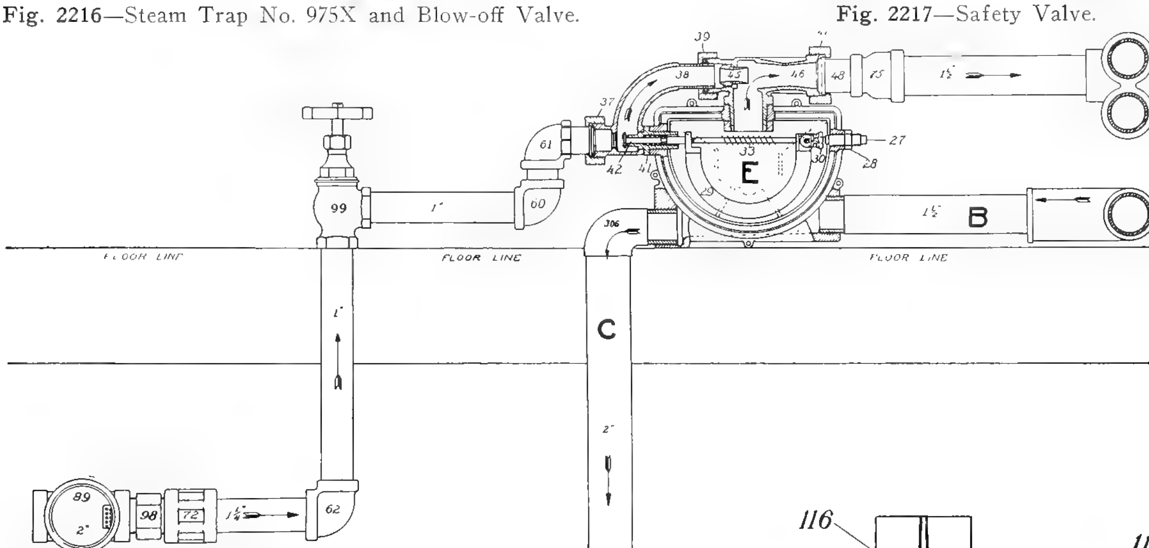


Fig. 2218—Unotherm and Piping Connections as Arranged Under Seat at Center of Coach.

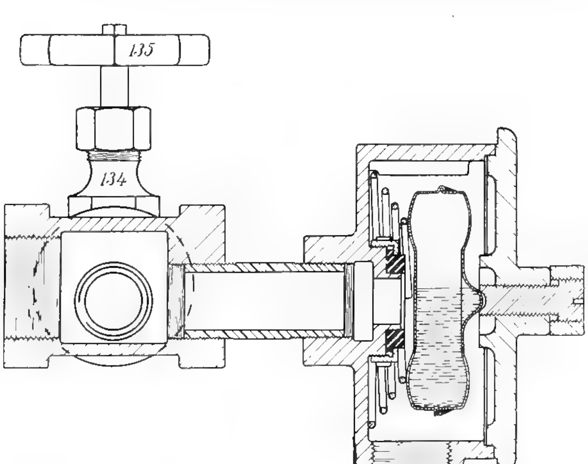


Fig. 2219—Section Through Automatic Steam Trap.

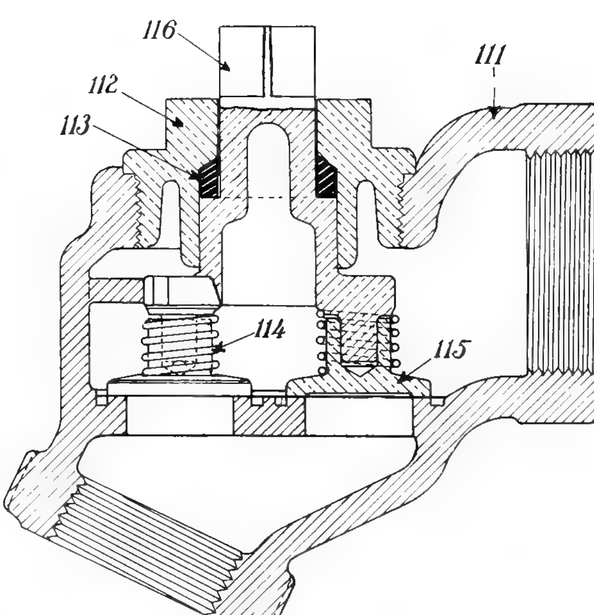


Fig. 2220—End Train Line Valve.

Standard Heat & Ventilation Company.

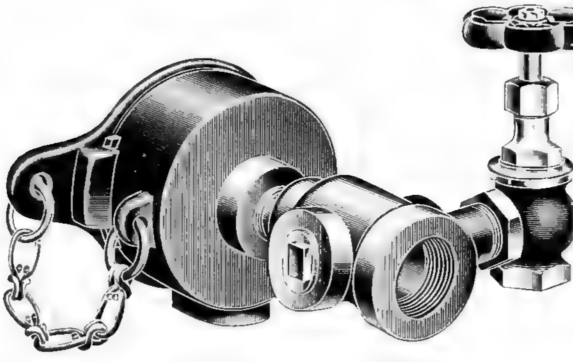


Fig. 2221—Automatic Steam Trap.

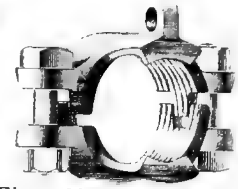


Fig. 2222—Clamp for S-4 Steam Coupler.

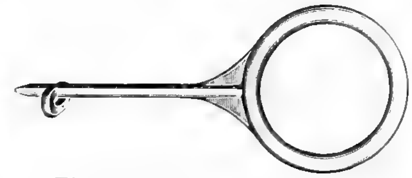


Fig. 2223—Steam Hose Gasket Remover.

Fig. 2224—Gasket and Retaining Ring for Couplers.

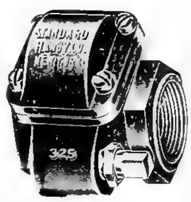


Fig. 2225 — Special Quick-Opening Valve.

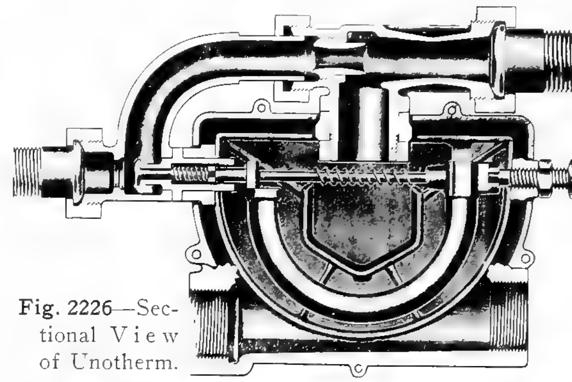


Fig. 2226—Sectional View of Unotherm.

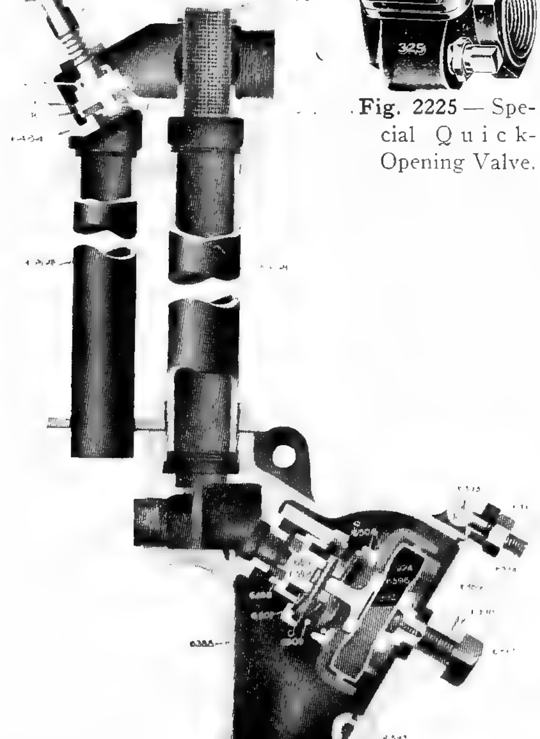


Fig. 2227—Trap No. 975X with Blow-off Valve.

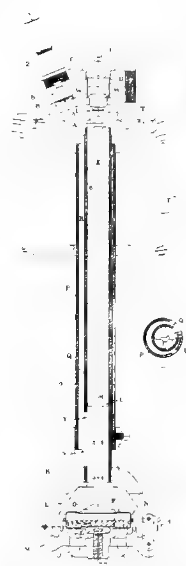


Fig. 2228 — Section Through Steam Trap No. 141.

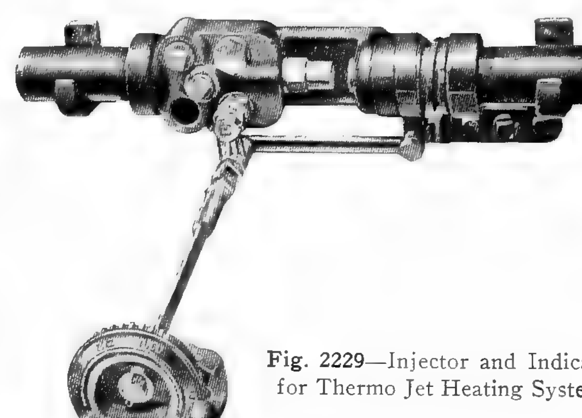


Fig. 2229—Injector and Indicator for Thermo Jet Heating System.

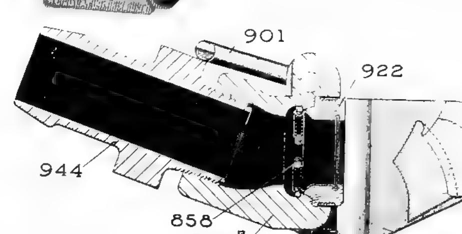


Fig. 2230—Section Through Steam Hose Coupler.

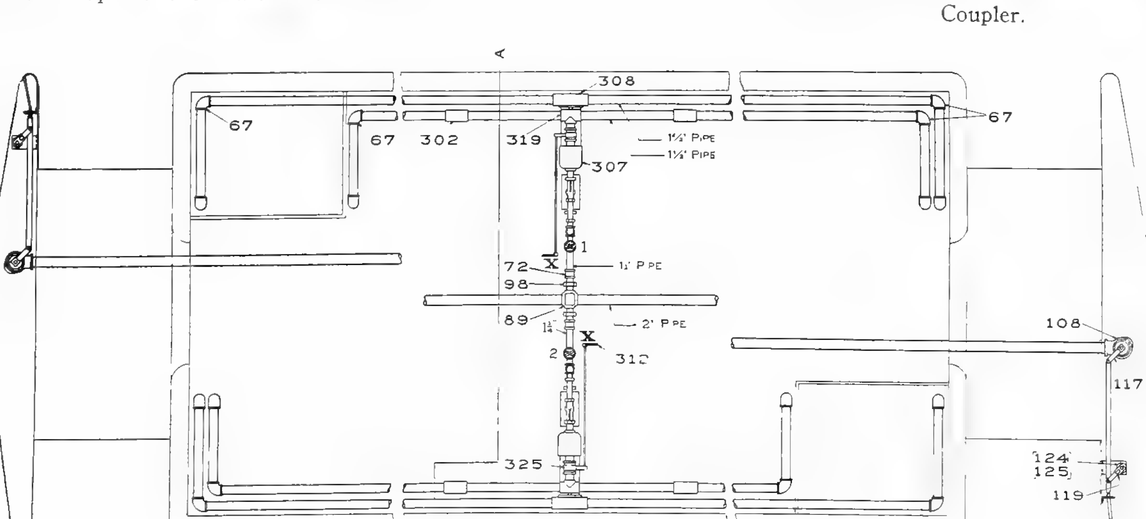


Fig. 2231—Unotherm Steam Heating System as Applied to a Steel Coach, Using Four Admission Valves. Standard Heat & Ventilation Company.

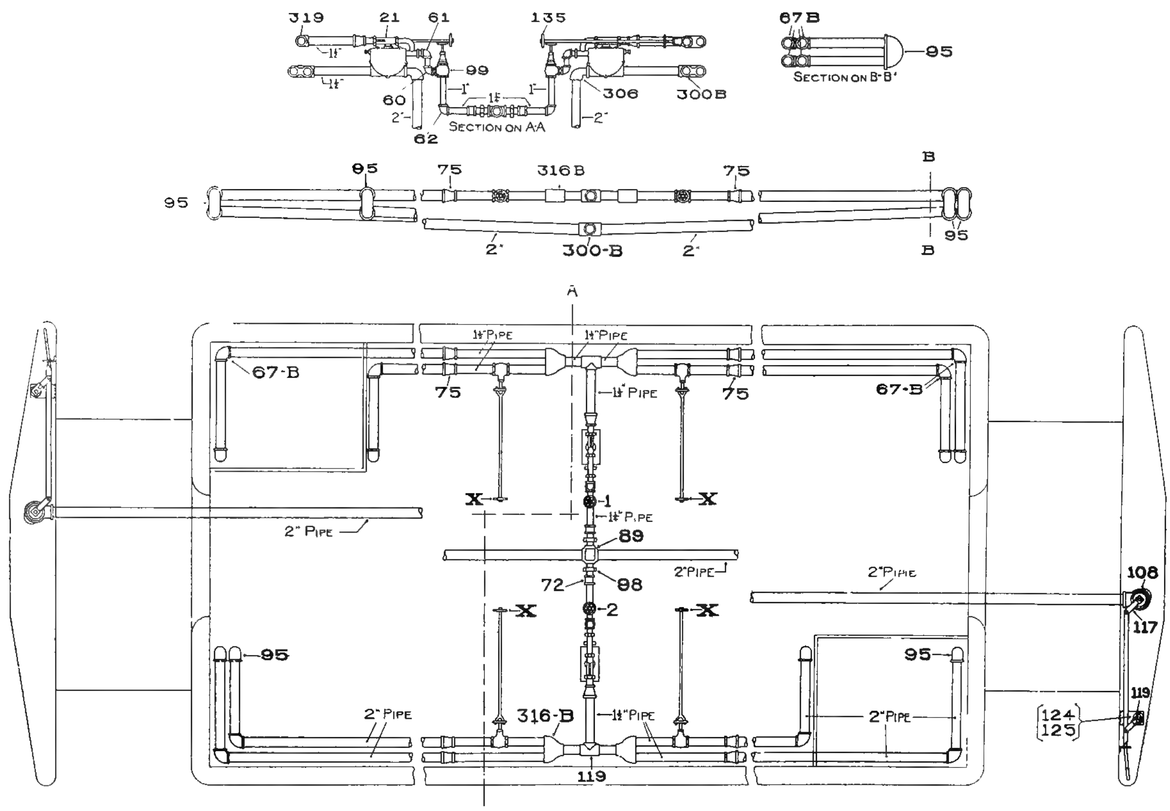


Fig. 2232—Unotherm System of Steam Heating as Applied to a Steel Coach, Using Six Admission Valves.

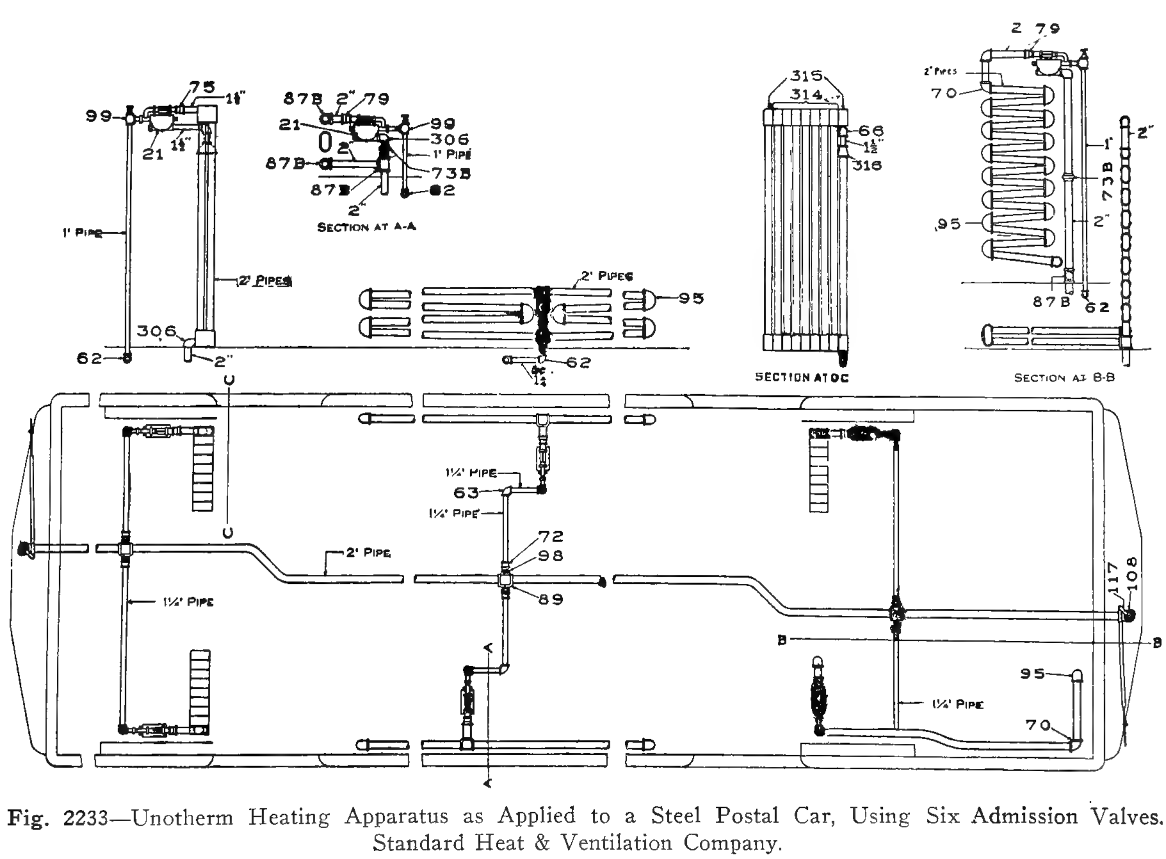


Fig. 2233—Unotherm Heating Apparatus as Applied to a Steel Postal Car, Using Six Admission Valves.
Standard Heat & Ventilation Company.

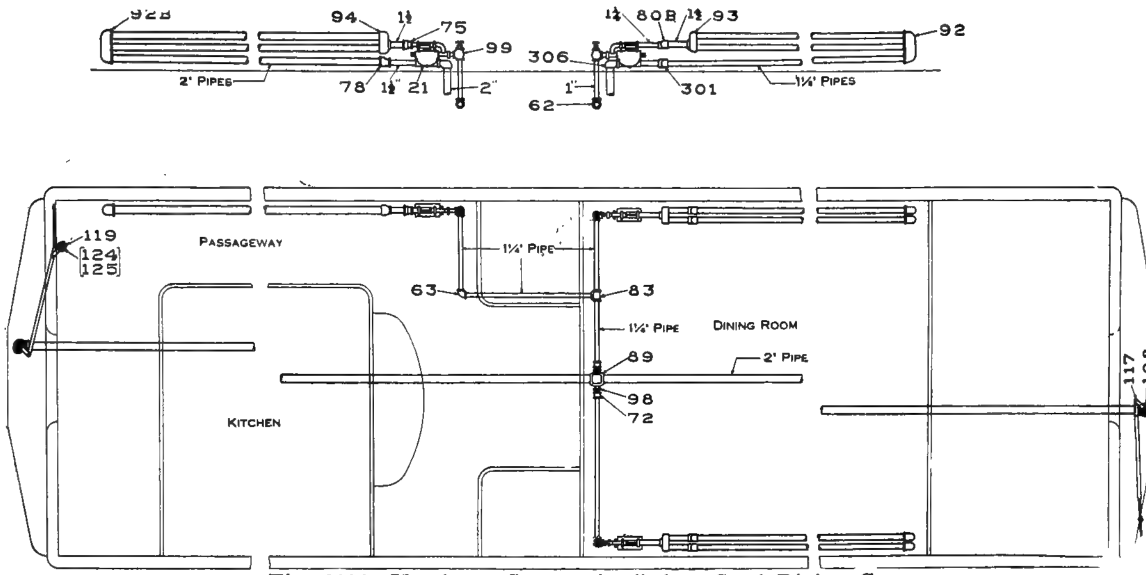
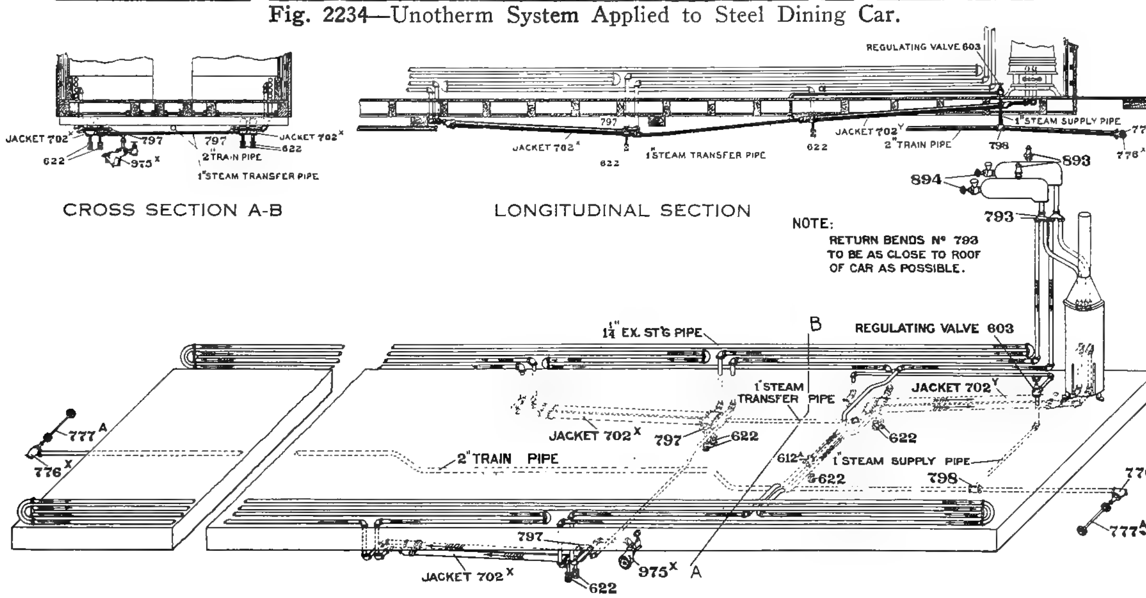


Fig. 2234—Unotherm System Applied to Steel Dining Car.



L-84F

Fig. 2235—Hot Water Heating System; Double Circulation with Six Heating Points.

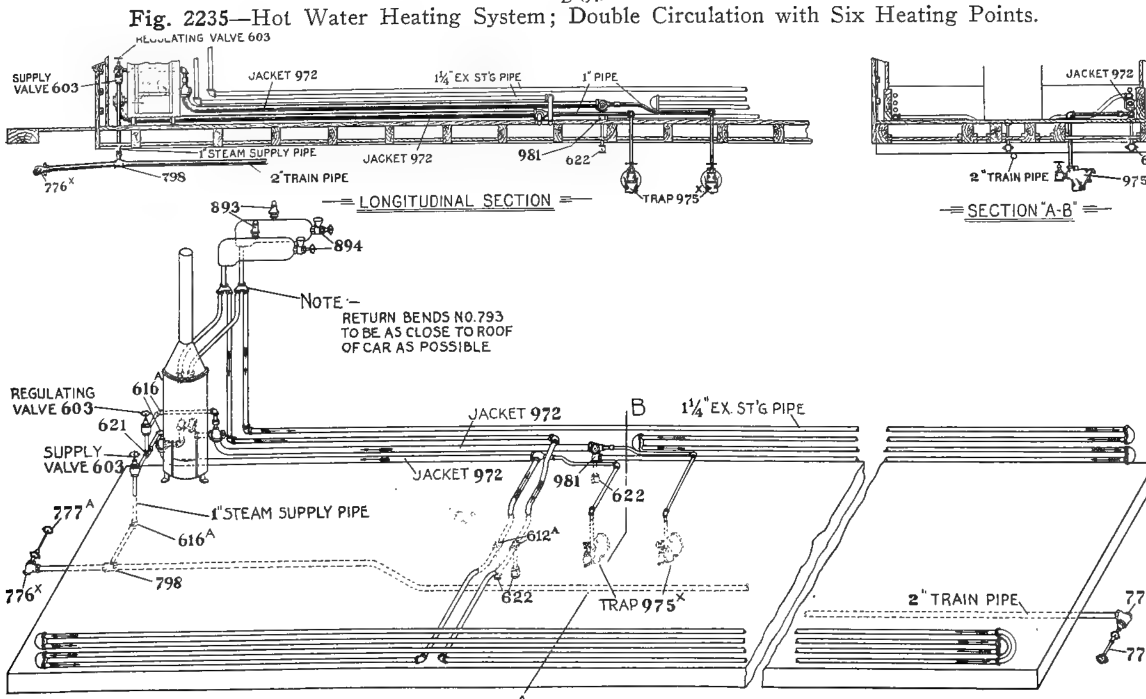


Fig. 2236—Hot Water Heating System; Double Circulation with Two Heating Points.
Standard Heat & Ventilation Company.

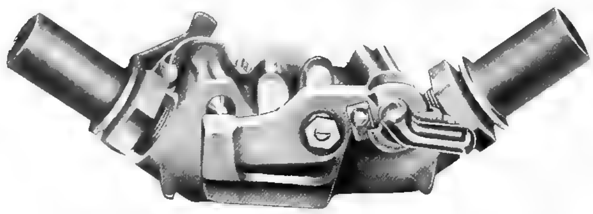
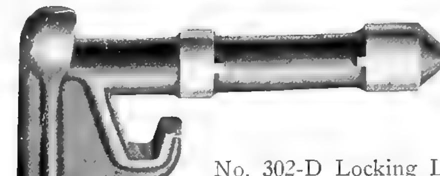
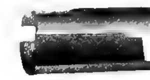


Fig. 2237—No. 302-S Couplers, Locked.

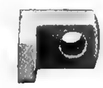


No. 302-D Locking Lever.



No. 302-E Spring.

Spring Bolt Bushing.



No. 302-G Lever Stop.

No. 302-H Cotter Pin for Stop.

Fig. 2238—Parts of No. 302-S Steam Coupler.

Fig. 2239—Two-Piece Hose Clamp.

Fig. 2240 — Gasket for No. 302-S Hose Coupler.

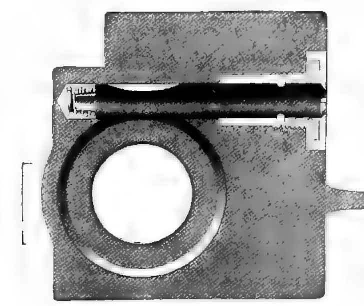


Fig. 2241—Cross Section Showing Gasket Locked in Place by Retaining Bolt, No. 302-S Hose Coupler.

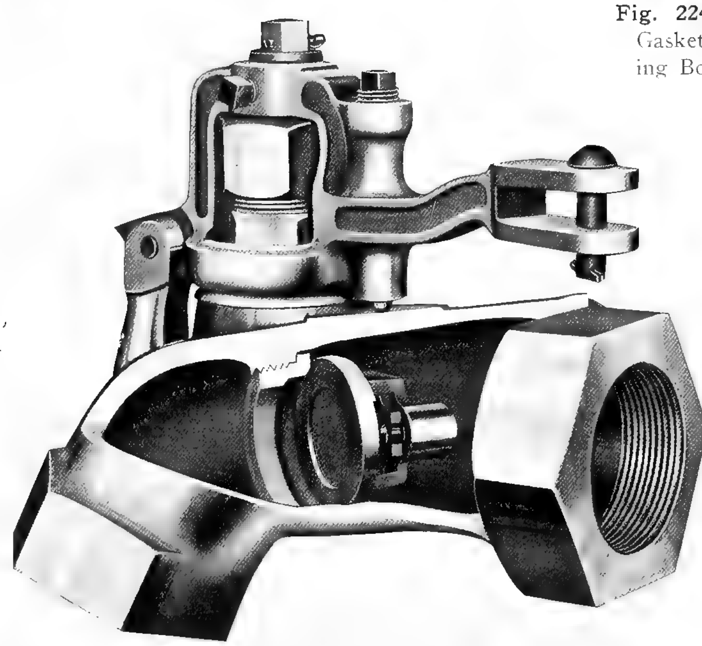


Fig. 2242—Interior of No. 104 End Train Pipe Valve.

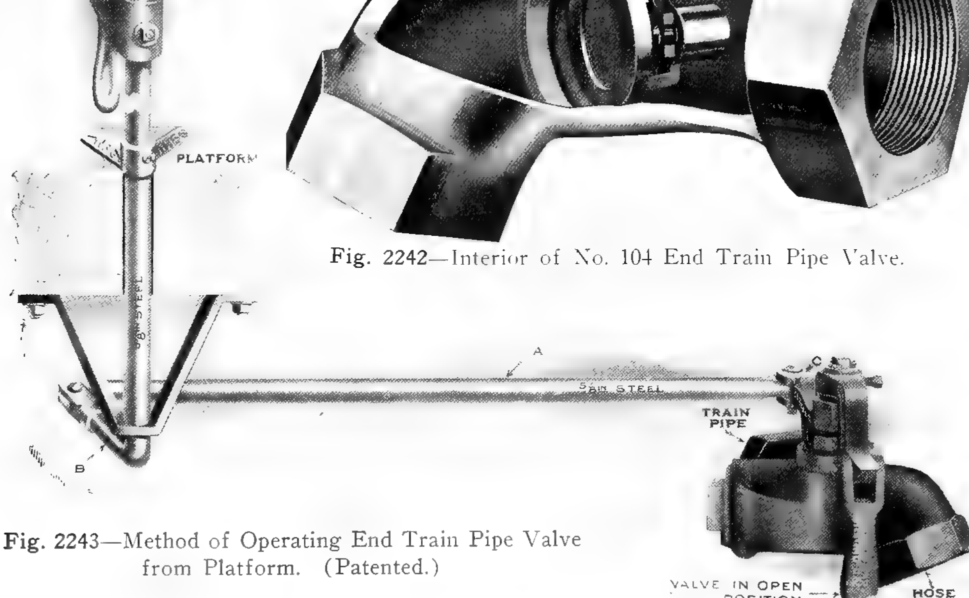


Fig. 2243—Method of Operating End Train Pipe Valve from Platform. (Patented.)

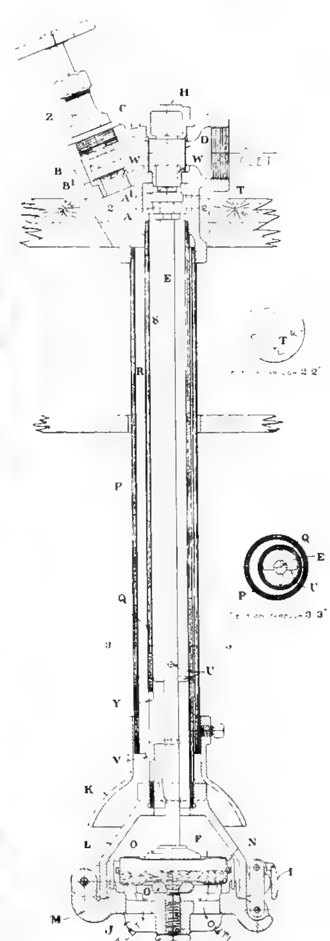


Fig. 2244—Vertical Steam Trap.

Fig. 2246—Extension Rod for No. 48 End Train Pipe Valve.

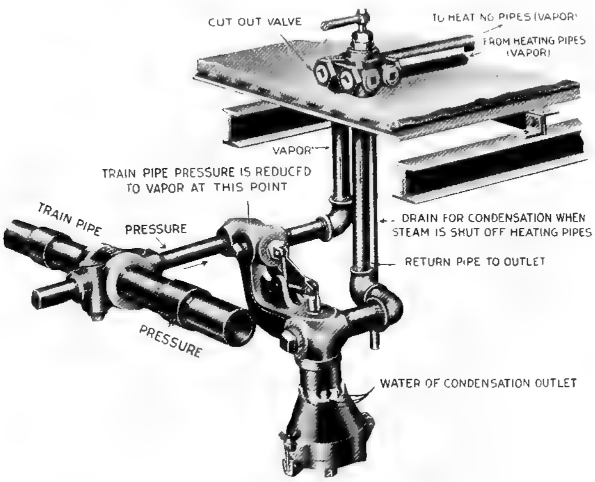


Fig. 2247—Vapor Regulator Under Car.

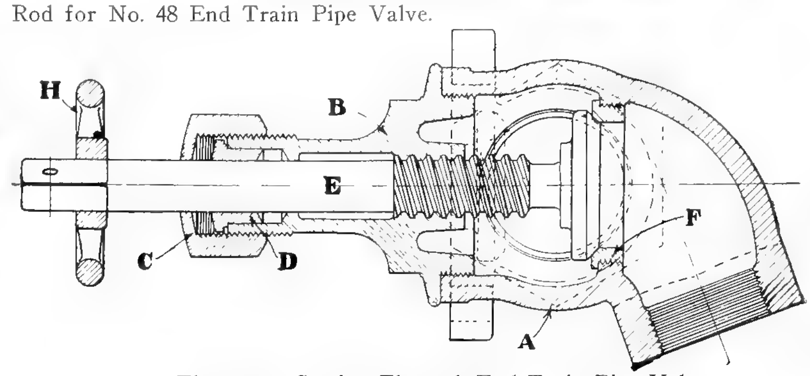


Fig. 2248—Section Through End Train Pipe Valve.

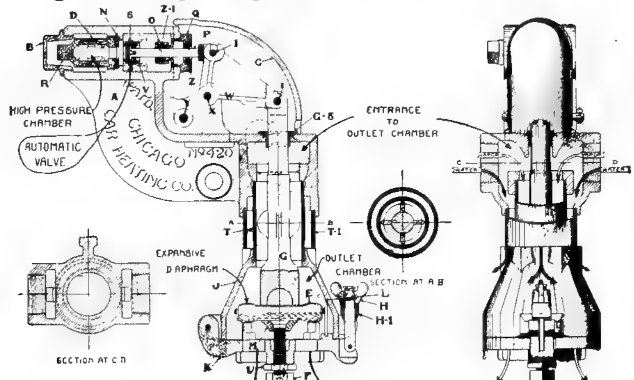


Fig. 2249—No. 420 Vapor Regulator.

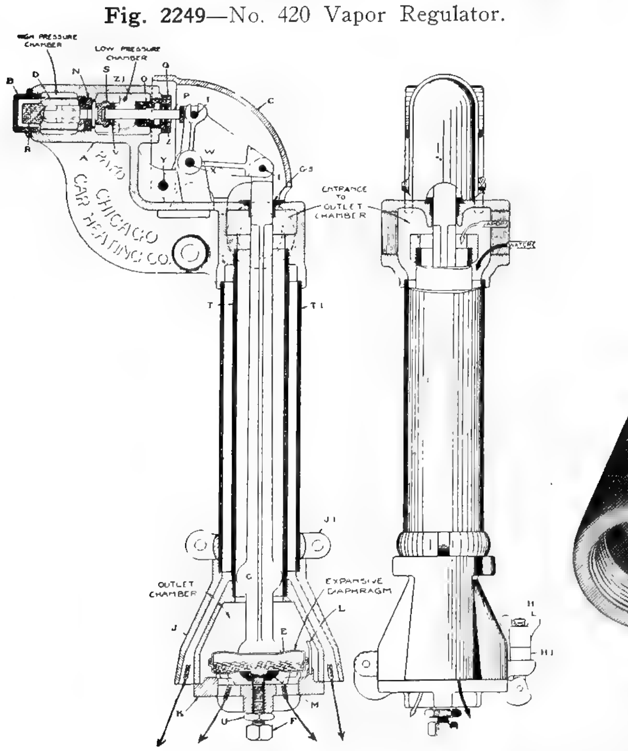


Fig. 2250—No. 440 Vapor Regulator.

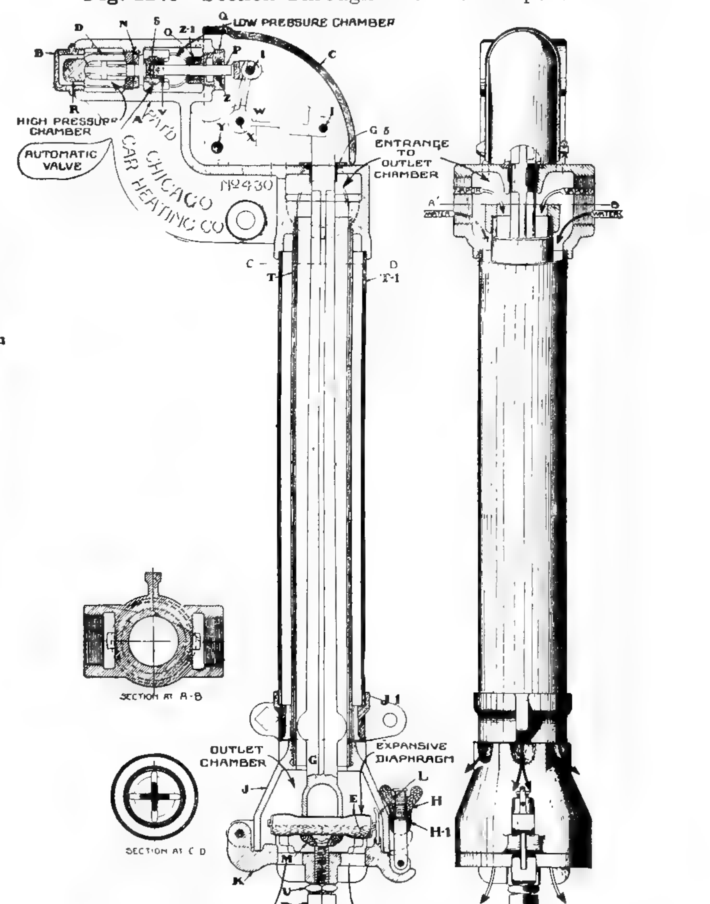


Fig. 2251—No. 430 Vapor Regulator.

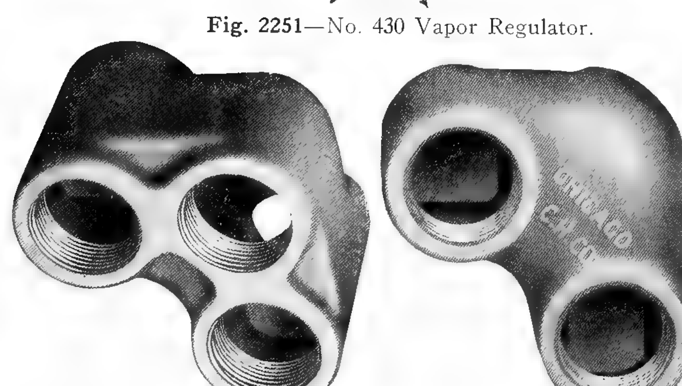


Fig. 2252—Angle Manifold.

Chicago Car Heating Company.

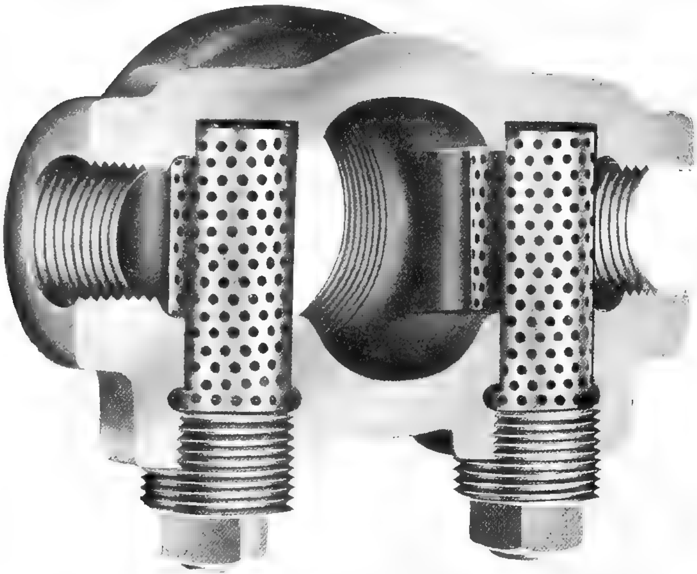


Fig. 2253—Strainer Cross.

Fig. 2254—Strainer Tee.

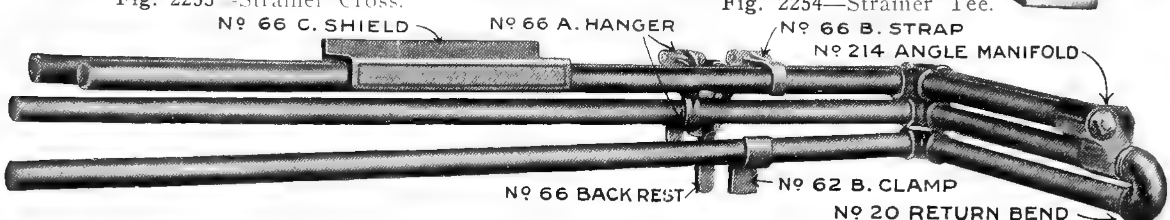


Fig. 2255—Method of Connecting at Corners for Four-pipe 1¼-in. Coil.

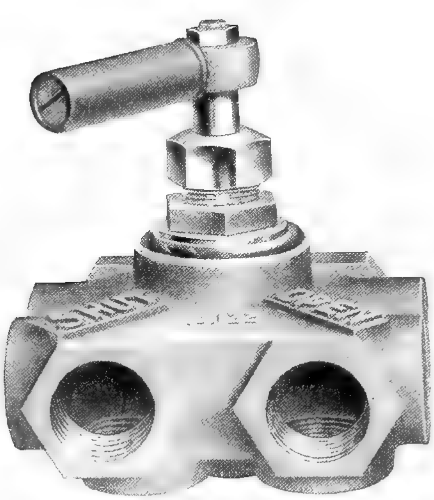


Fig. 2256—Vapor Cut-Out Valve.

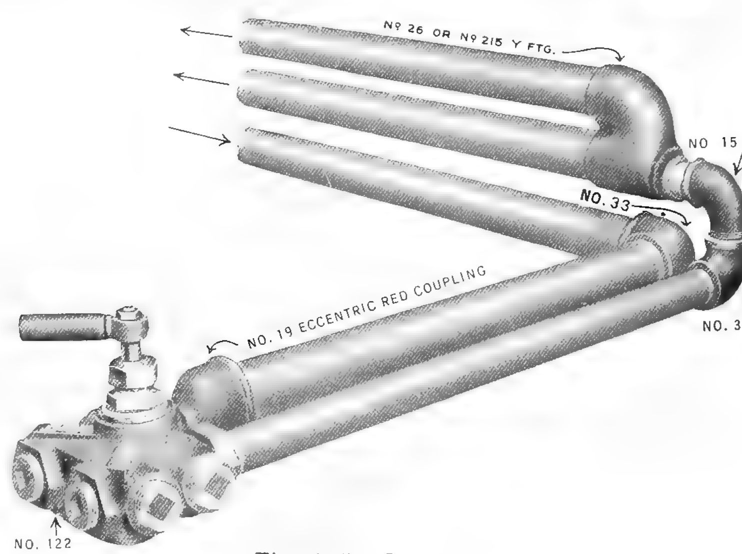


Fig. 2257—One Method of Connecting a Three-Pipe Coil Feeding at the End.

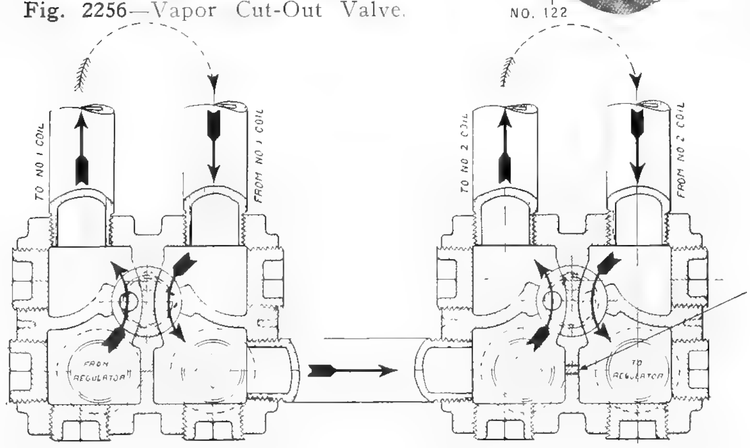


Fig. 2258—Section Through Vapor Cut-Out Valves Arranged in Multiple. Chicago Car Heating Company.

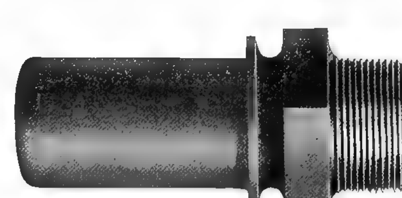


Fig. 2259—Straight Shank Nipple.

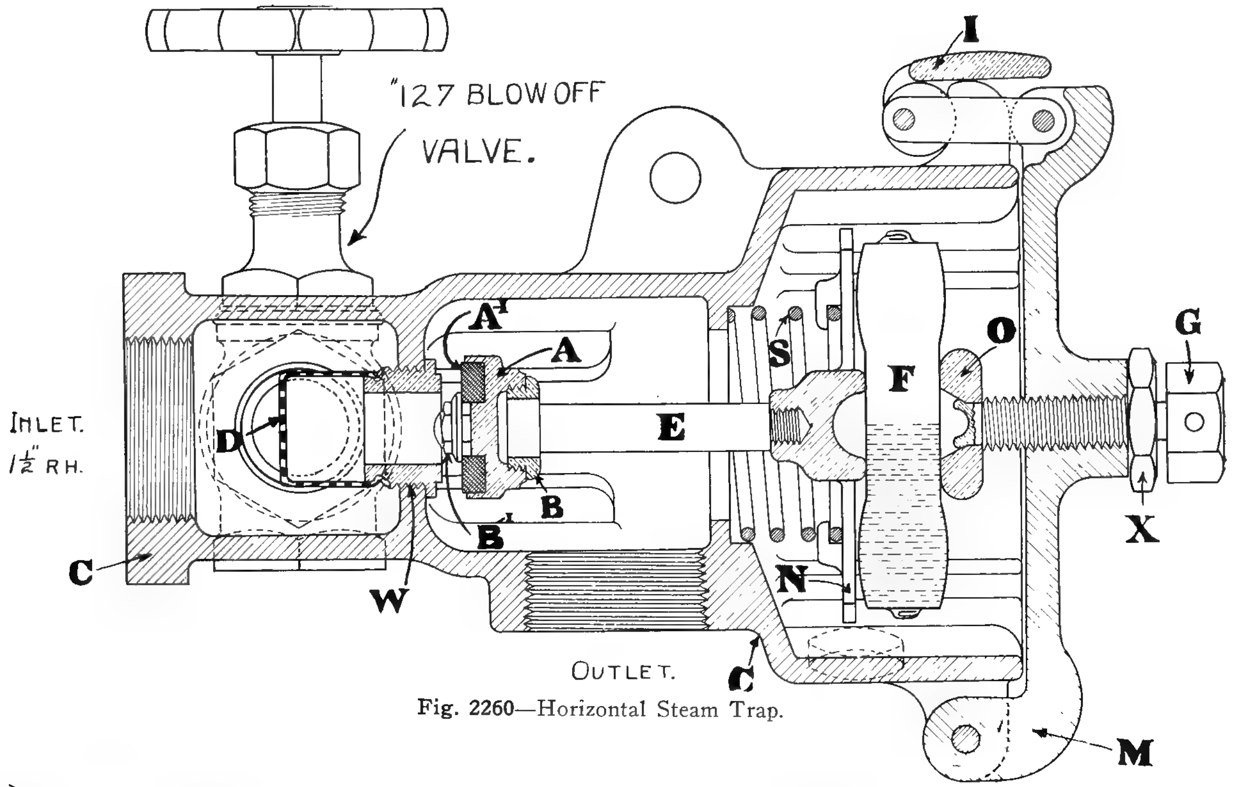


Fig. 2260—Horizontal Steam Trap.

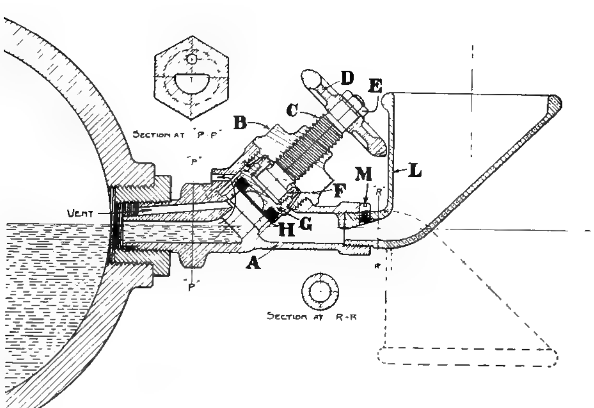


Fig. 2261—Combination Valve for Expansion Drum of Hot Water Circulating System.

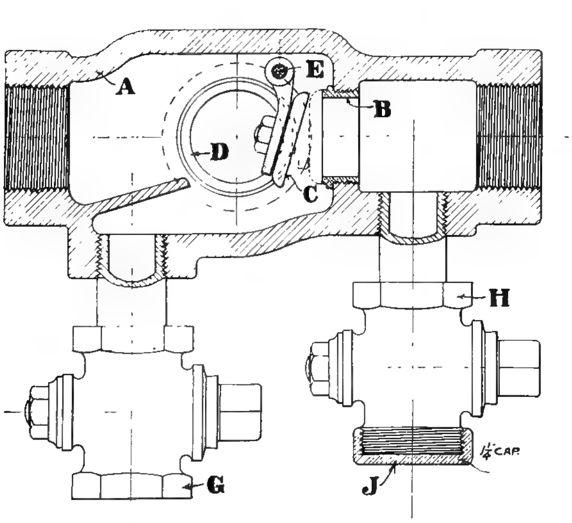
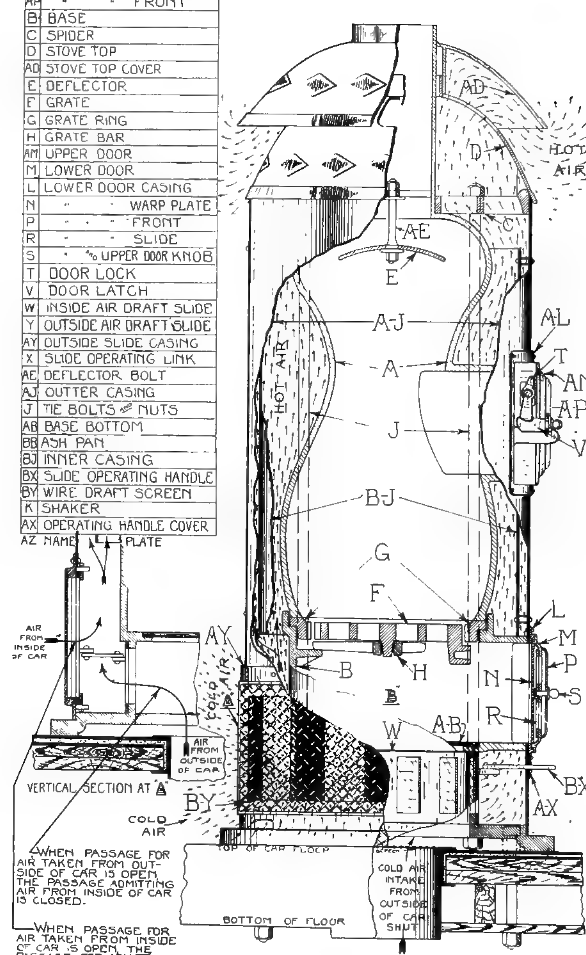


Fig. 2262—Section Through Hot Water Filling Device.



	LIST OF PARTS
A	BODY
AL	UPPER DOOR CASING
AN	" " WARP PLATE
AP	" " FRONT
B	BASE
C	SPIDER
D	STOVE TOP
AD	STOVE TOP COVER
E	DEFLECTOR
F	GRATE
G	GRATE RING
H	GRATE BAR
AM	UPPER DOOR
M	LOWER DOOR
L	LOWER DOOR CASING
N	" " WARP PLATE
P	" " " FRONT
R	" " SLIDE
S	" & UPPER DOOR KNOB
T	DOOR LOCK
V	DOOR LATCH
W	INSIDE AIR DRAFT SLIDE
Y	OUTSIDE AIR DRAFT SLIDE
AY	OUTSIDE SLIDE CASING
X	SLIDE OPERATING LINK
AE	DEFLECTOR BOLT
AJ	OUTTER CASING
J	TIE BOLTS AND NUTS
AB	BASE BOTTOM
BB	ASH PAN
BJ	INNER CASING
BX	SLIDE OPERATING HANDLE
BY	WIRE DRAFT SCREEN
K	SHAKER
AX	OPERATING HANDLE COVER

AZ NAME PLATE

Fig. 2263—Emergency Heating Stove.

Chicago Car Heating Company.

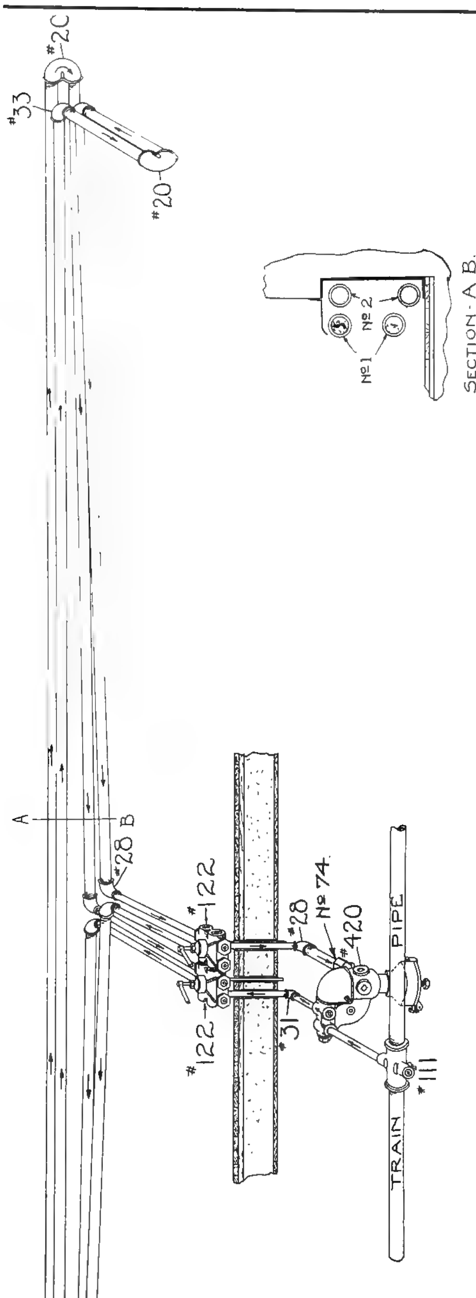


Fig. 2265—Piping Arrangement for Multiple Regulation Vapor System in Passenger Cars.

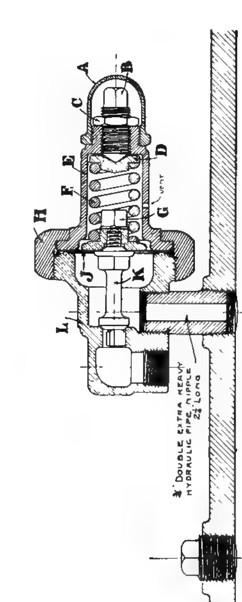


Fig. 2264—Salt Water Safety Valve Applied to Expansion Drum.

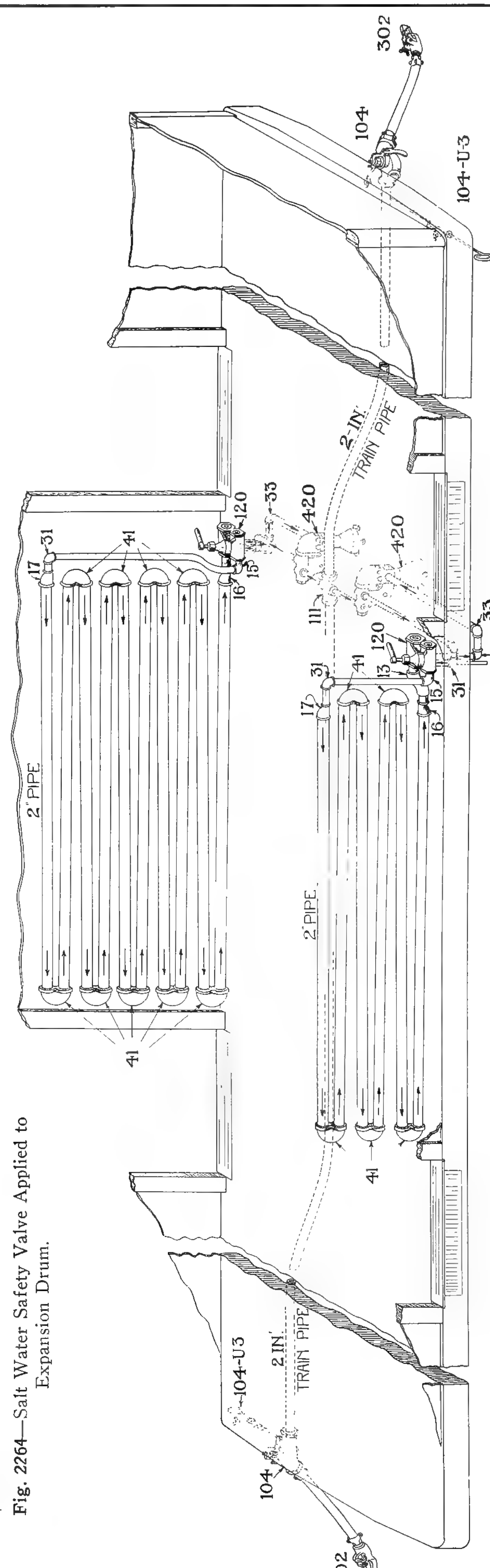


Fig. 2266—Baggage Car; Single Unit Coil Arrangement. Chicago Car Heating Company.

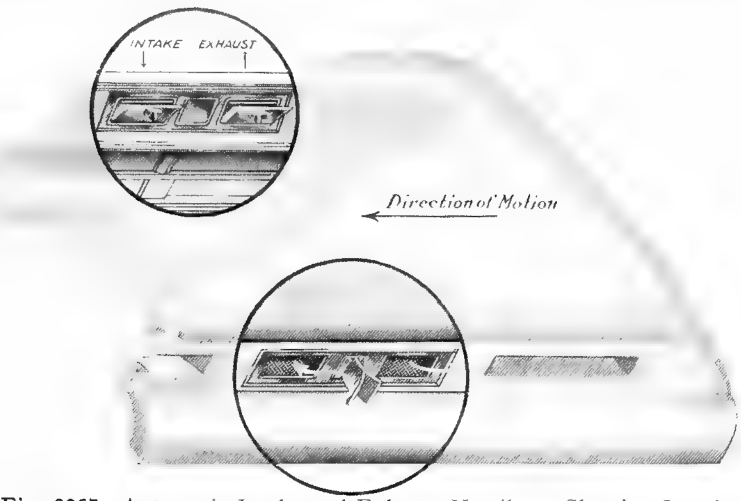


Fig. 2267—Automatic Intake-and-Exhaust Ventilator Showing Interior Diffusion Boxes and Exterior Deflectors.

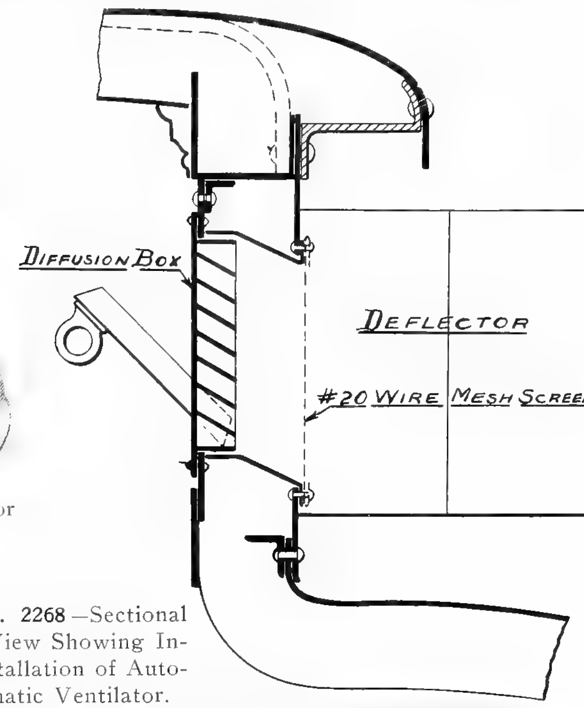


Fig. 2268—Sectional View Showing Installation of Automatic Ventilator.

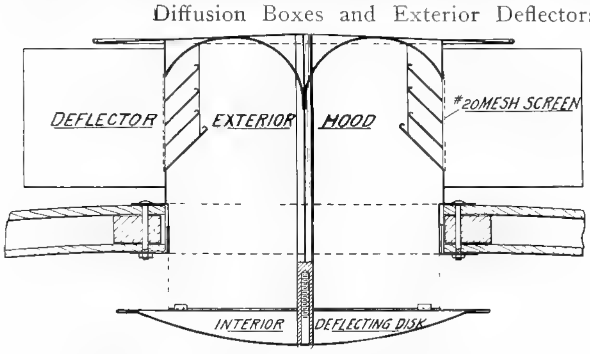


Fig. 2269—Automatic Ventilator Applied at Crown of Arch Roof.

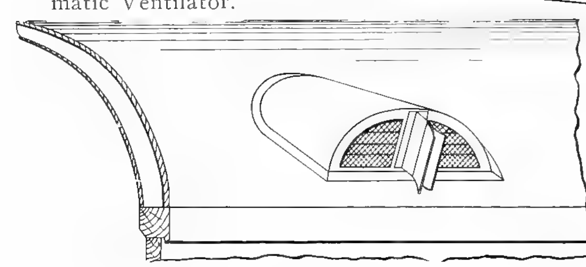


Fig. 2270—Appearance of Automatic Ventilator Hood on Car Roof.

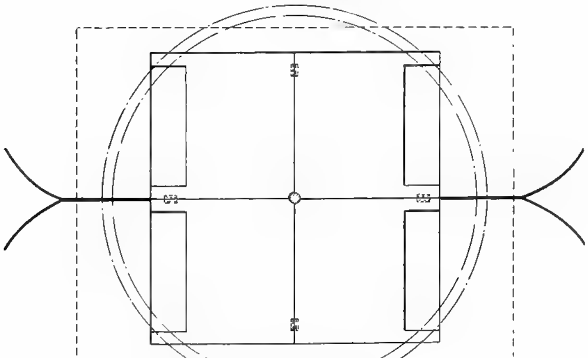


Fig. 2271—Cross Section Through Double Exterior Hood of EB Type Automatic Ventilator.

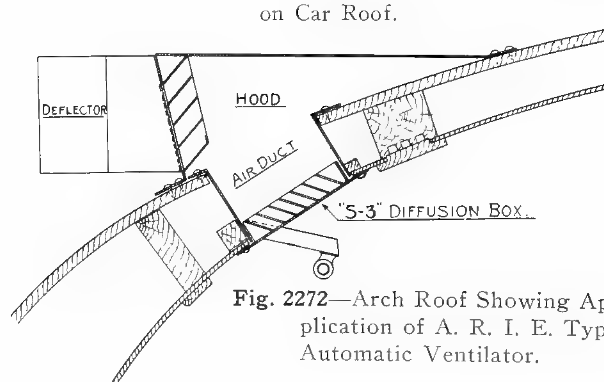


Fig. 2272—Arch Roof Showing Application of A. R. I. E. Type Automatic Ventilator.

Automatic Ventilator Company.

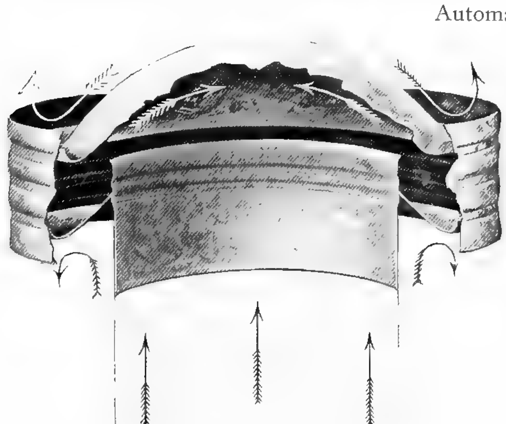
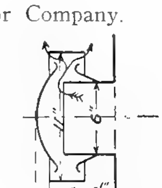
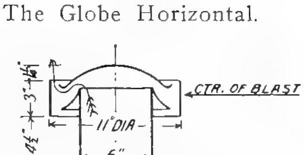


Fig. 2273—The Globe Ventilator. Globe Ventilator Company.



The Globe Horizontal.



The Globe Erect.

Fig. 2274—Two Types of Globe Ventilators. Globe Ventilator Company.

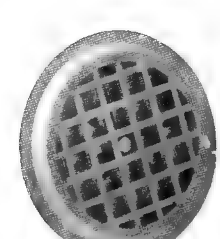


Fig. 2275—Register for Ventilator Pipe. James L. Howard & Company.

Fig. 2276—Combination Electric Fan.

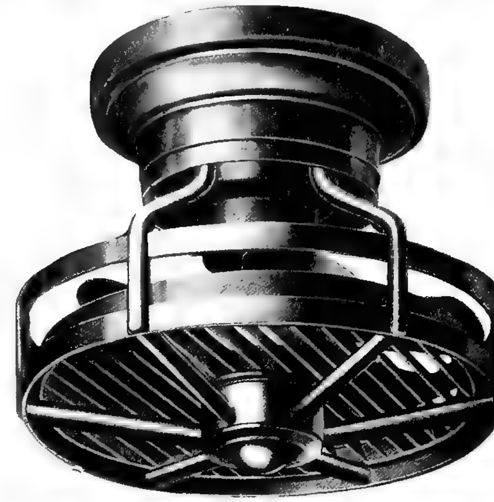


Fig. 2277—Electric Fan.

Safety Car Heating & Lighting Company.

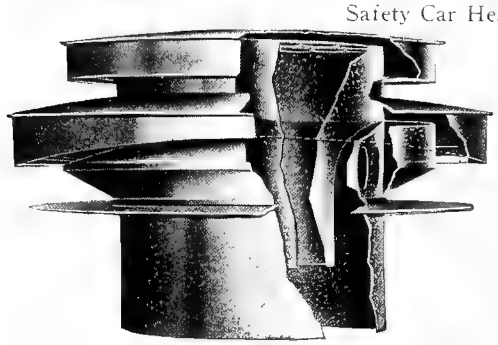


Fig. 2278—Combined Ventilator and Lamp Jack.

Fig. 2279 -Direct Type Ventilator.

Scully-Jones & Company.

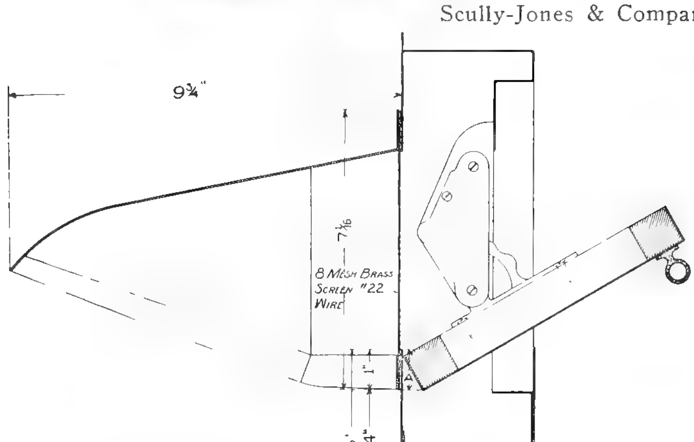


Fig. 2280—Standard Ventilating Hood, Cross Section, Steel Car.

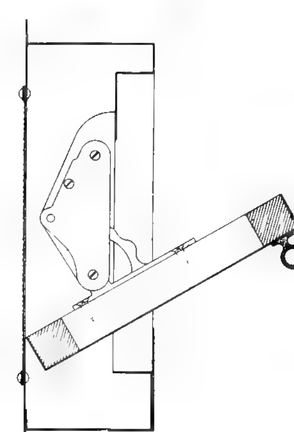


Fig. 2281—Standard Fresh-Air Intake, Cross Section, Steel Car.

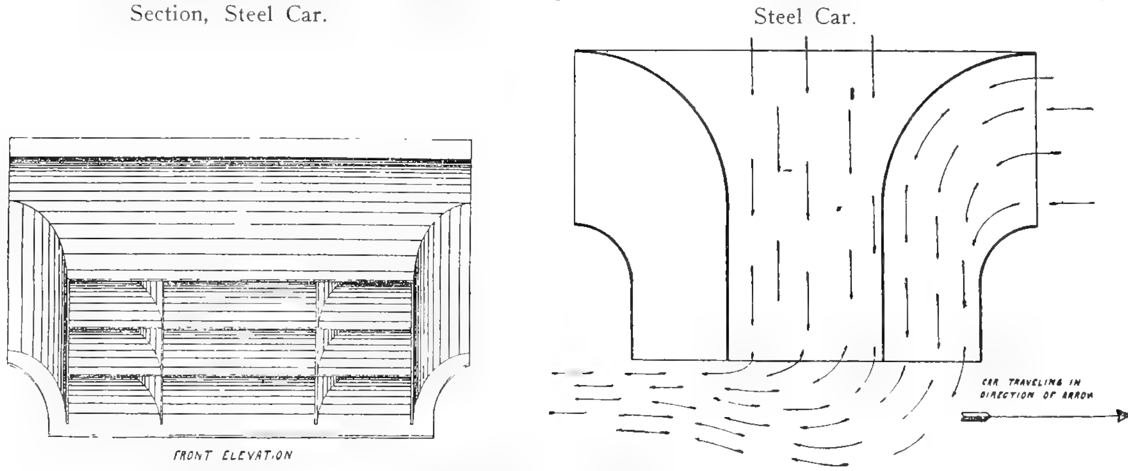


Fig. 2282—Garland Ventilator, Showing Construction and Direction of Air Currents.
Ross-Wortham Company.

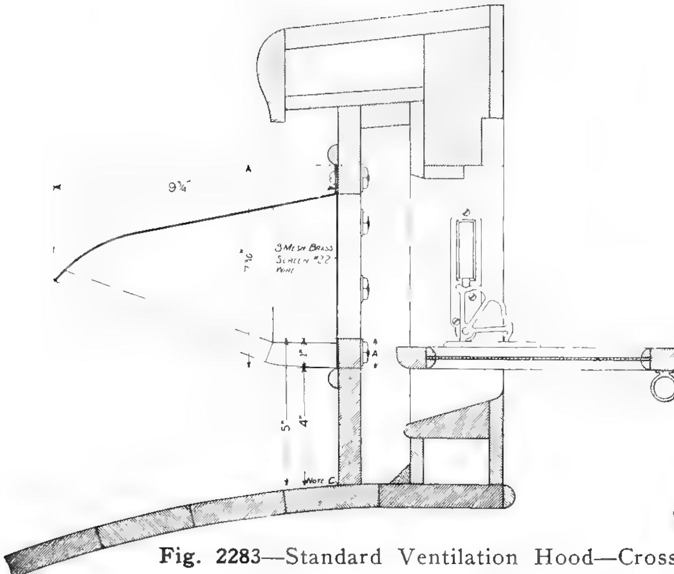


Fig. 2283—Standard Ventilation Hood—Cross Section, Wood Car.

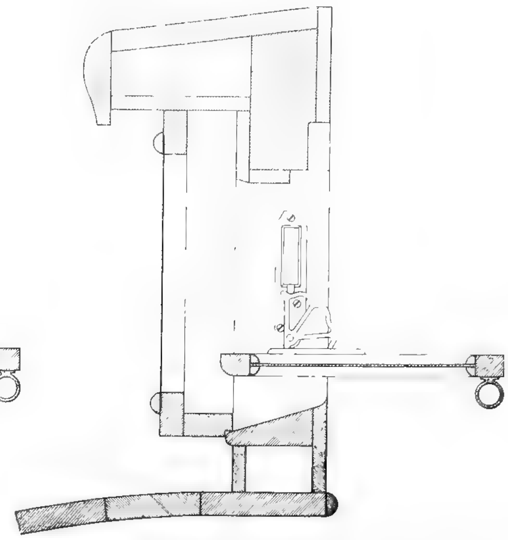


Fig. 2285—Standard Fresh Air Intake—Cross Section, Wood Car.

Standard Heat and Ventilation Company

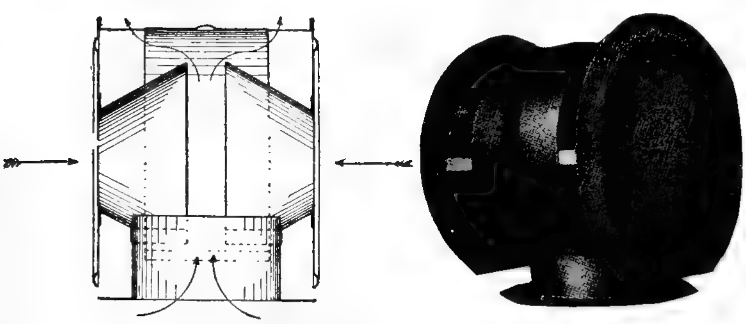


Fig. 2286—Gold's Cyclone Ventilator. Gold Car Heating & Lighting Company.

Fig. 2287—Gold's Curtain Window Ventilator. Gold Car Heating & Lighting Company.

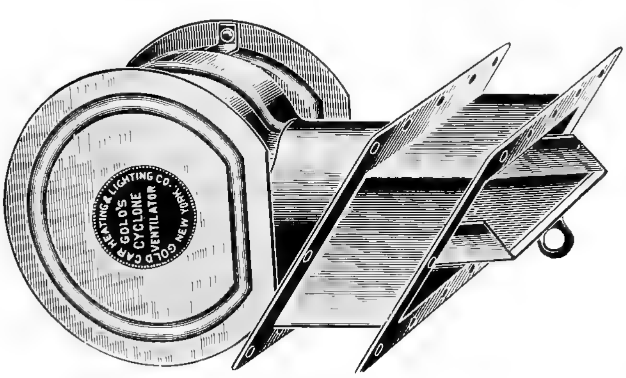


Fig. 2288—Application of Ventilator to Oval Deck Cars.

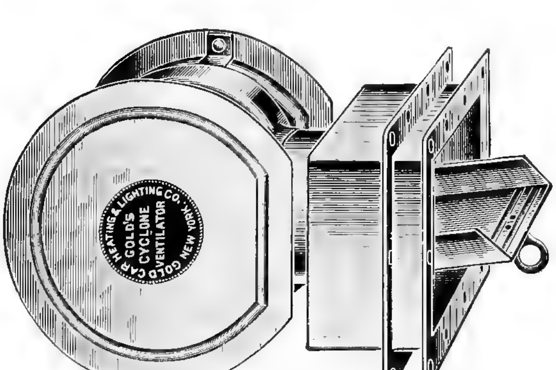


Fig. 2289—Application of Ventilator to Straight Deck Cars. Gold Car Heating and Lighting Company.

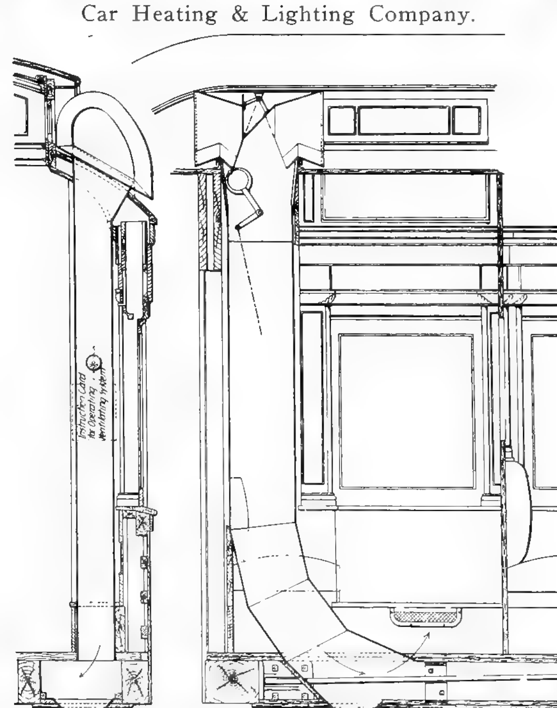


Fig. 2290—Pennsylvania Railroad Ventilating Apparatus for Passenger Train Cars.

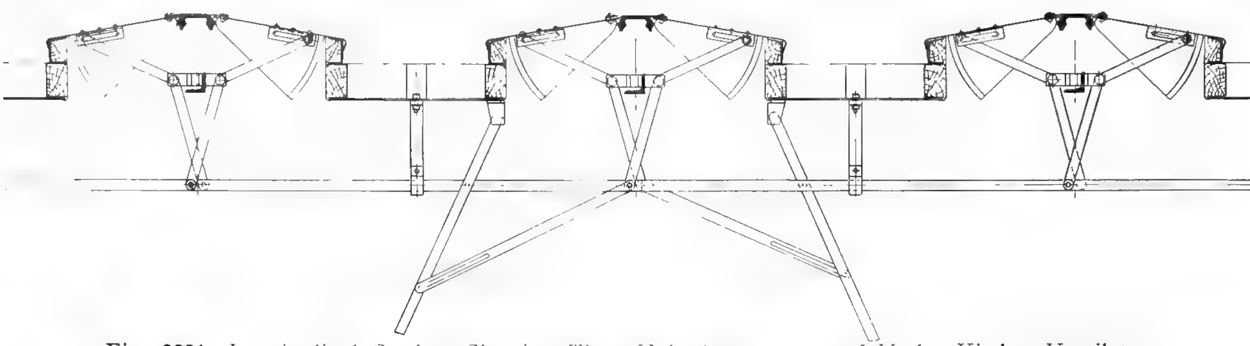


Fig. 2291—Longitudinal Section, Showing Three-Unit Arrangement of Mudge Kitchen Ventilators.

Fig. 2292—Interior View of Dining Car Kitchen, Showing Mudge Kitchen Ventilator.

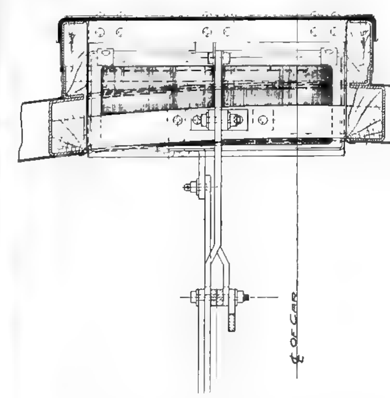


Fig. 2293—Cross Section Through Mudge Kitchen Ventilator.

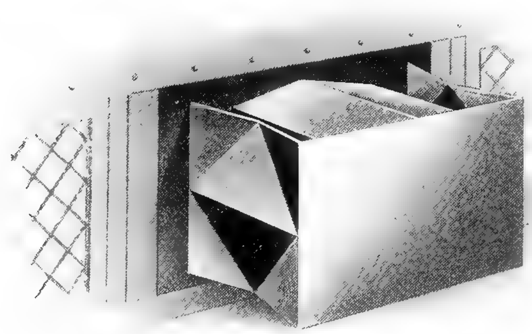


Fig. 2294—Mudge Peerless Ventilator as Applied to Screen Board by Machine Screws.

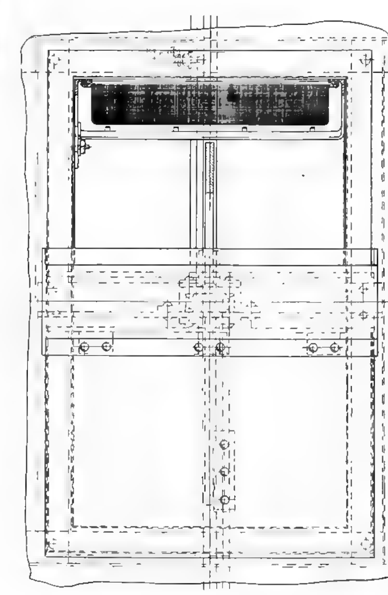


Fig. 2295—Top View of Fig. 2293, With and Without Hood.

Fig. 2296—Dining Car Equipped with Mudge Kitchen Ventilator.
Mudge & Company.

Fig. 2297—Utility Ventilator. Railway Utility Company.

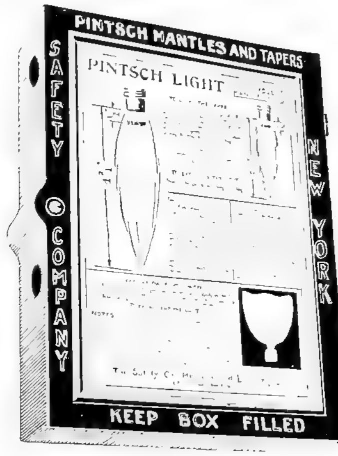


Fig. 2298—Box for Pintsch Gas Mantle Supply. Safety Car Heating & Lighting Company.

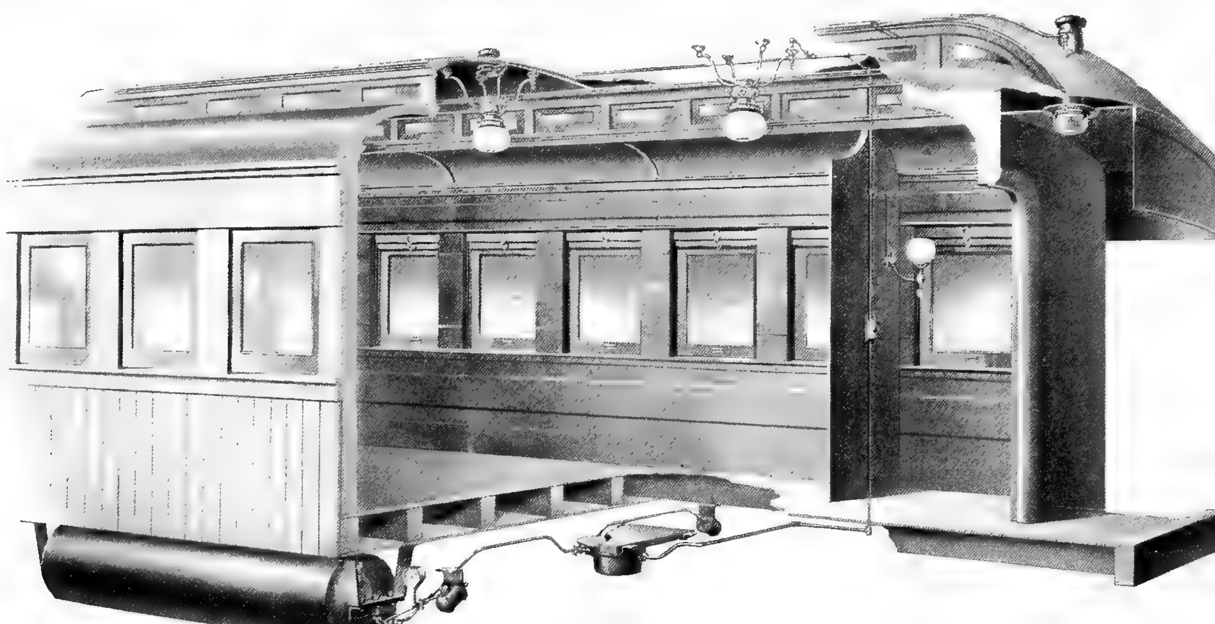
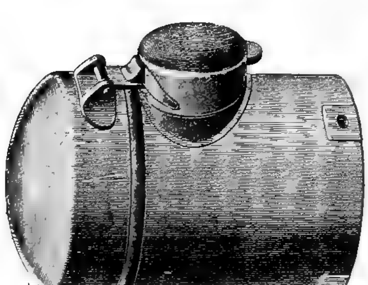
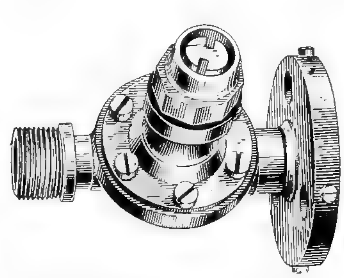


Fig. 2299—Method of Application of Pintsch System of Gas Lighting to Passenger Cars. Safety Car Heating and Lighting Company.

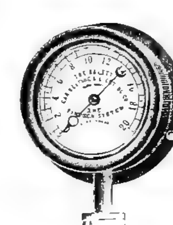


Filling Valve Cover.

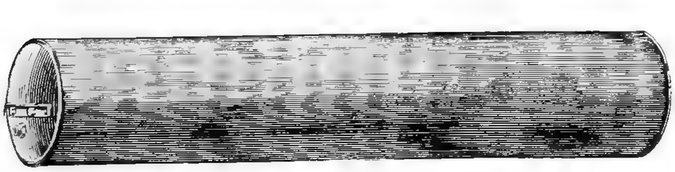


No. 65, Filling Valve for Cars.

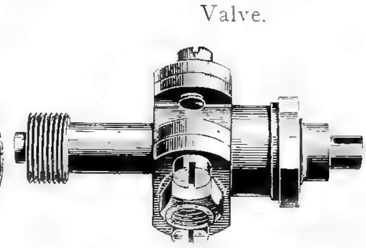
No. 118a, Bracket for Filling Valve.



Gage.



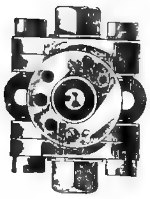
Holder.

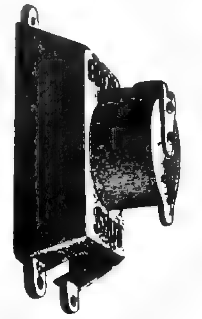


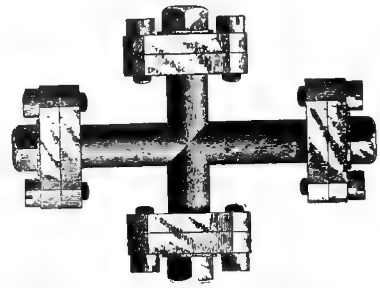
No. 53b, Holder Valve.

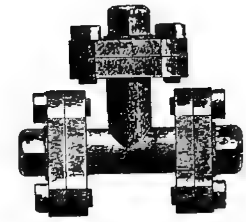
No. 214a, Gage for Car.

Fig. 2300—Details Used in Pintsch System of Gas Lighting. Safety Car Heating & Lighting Company.


Main Cock; ¼, ⅜ and ½ in.


Cover for Main Cocks.

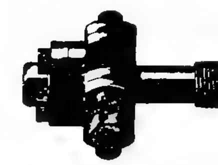

No. 55a, Flanged Cross, ¼ in.


Nos. 54-55, Flanged Tees, ¼ in.


No. 9 Connection Piece, ¼ in.

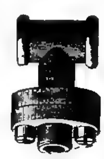

Regulator.
No. 244 2 in. Water Pressure.
No. 254 2 lb. Pressure.
No. 1844 6 in. Water Pressure.
No. 1954 1 lb. Pressure.


No. 49, **Flange** Tee for Regulator, ¼ in.


Flange Cross.


Nos. 12-13, Tee Flange Unions; ¼ by ⅛ in. ¼ by ¼ in.


No. 17a, Angle Flange, ⅛ in.


Nos. 16a, b and c, Tee Flanges.


Nos. 3 and 3a, Flange for Nos. 49, 53b, 53a and 120.

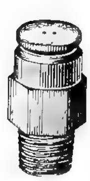

Nos. 27-56, Lock Nuts; ⅜ in.; ½ in.


No. 167, Bracket Back; ⅛ in.


Nipple to Support Lamp; ⅜ in.

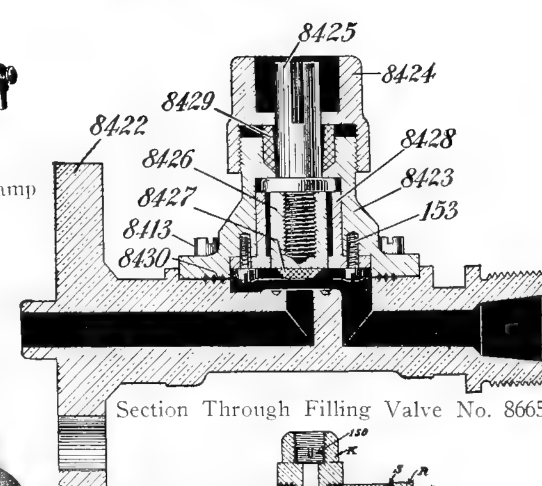

Regulator Strap.


Pipe Strap.

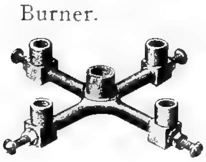

No. 222a, Burner.


Keys for Lamps and Valves.


Shade Holder No. 80b for Lamp No. 102.

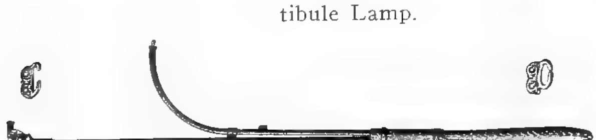


Section Through Filling Valve No. 8665.


Four-Flame Cluster.


Cluster for Vestibule Lamp.


Two-Flame Cluster.


Torch and Key.

Cover for Main Cocks.

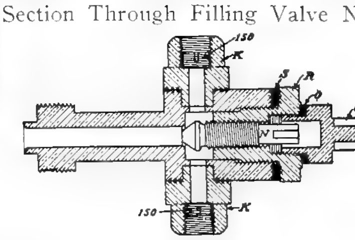

Section Through Holder Valve No. 53b.

Fig. 2301—Details Used in Pintsch System of Gas Lighting.
Safety Car Heating and Lighting Company.

Fig. 2302—Drop Bracket Lamp No. 377.

Fig. 2303—Drop Bracket Lamp No. 86.

Fig. 2304—Combination Gas and Electric Bracket Lamp No. 1910a.

Fig. 2305—Combination Gas and Electric Bracket Lamp No. 1920a.

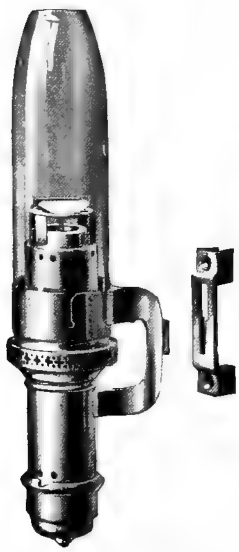


Fig. 2306—Removable Candle Bracket Lamp No. 282.

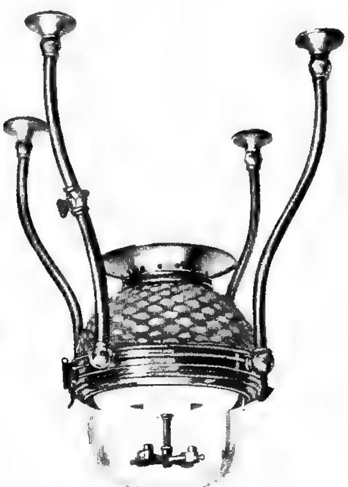


Fig. 2307—Lamp No. 211.

Fig. 2308—Bracket Mantle Lamp No. 2536.

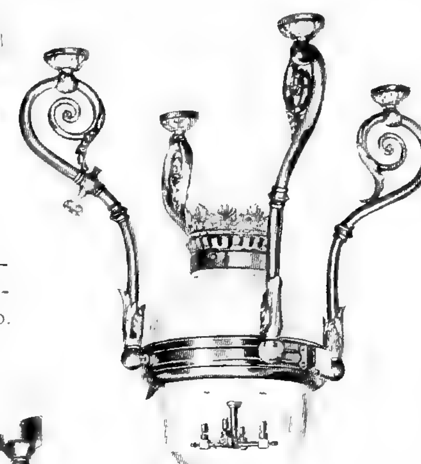


Fig. 2309—Lamp No. 196.

Fig. 2310—Lamp No. 191.

Fig. 3211—Mantle Lamp No. 8531, for Letter Cases in Postal Cars.

Fig. 2312—Deck Mantle Lamp No. 8582A.

Fig. 2313—Deck Mantle Lamp No. 8511 for Baggage Cars.

Fig. 2314—Two and Four-Flame Vestibule Lamp No. 194.

Fig. 2315—Bracket Lamp No. 373.

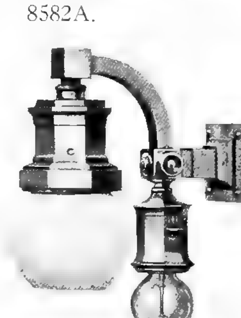


Fig. 2316—Combination Bracket Mantle Lamp No. 2569A.

Safety Car Heating & Lighting Company.

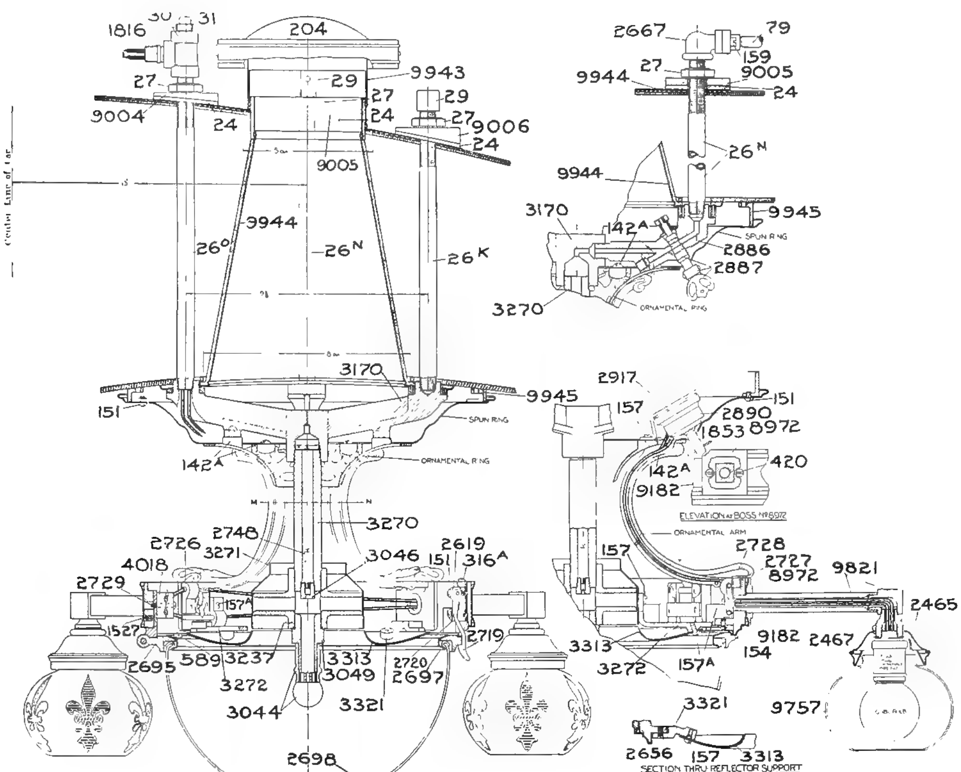


Fig. 2317—Section Through Combination Deck Lamp No. 8582A.

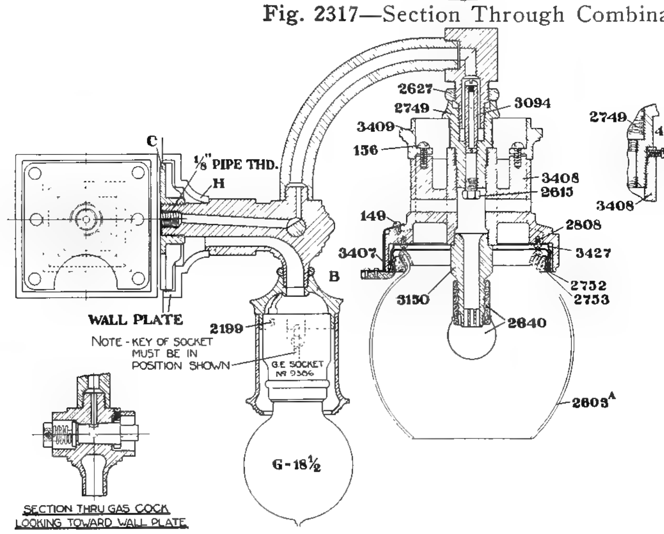


Fig. 2318—Section Through Combination Bracket Mantle Lamp No. 2569A.

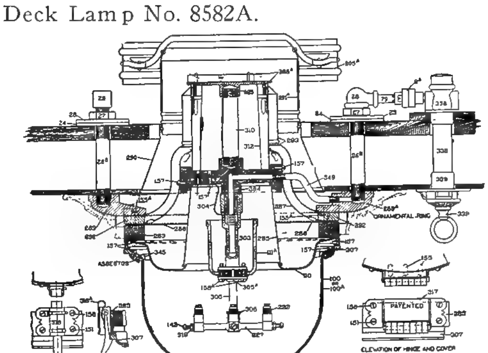


Fig. 2319—Section Through Combination Deck Lamp Nos. 431 and 218.

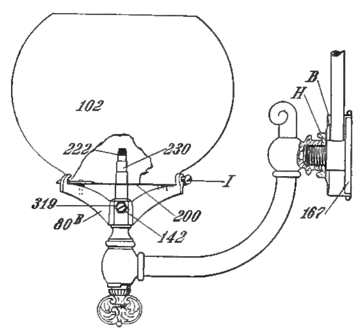


Fig. 2320—Section Through Bracket Lamp No. 86a.

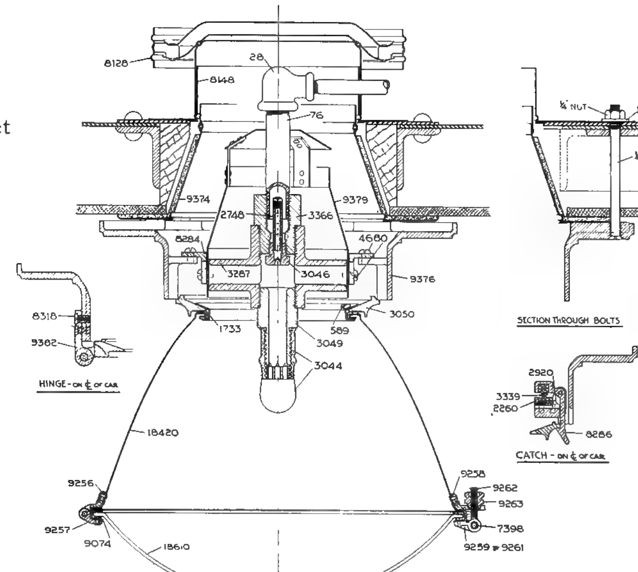
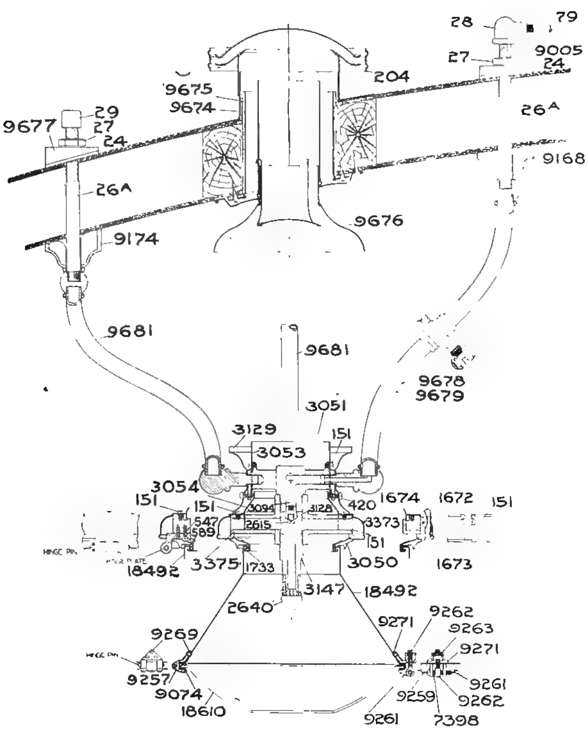


Fig. 2321—Section Through Mantle Deck Lamp No. 8511.

Safety Car Heating & Lighting Company.



SECTION OF LAMP NO. 8531

Fig. 2322—Section Through Mantle Lamp No. 3520.

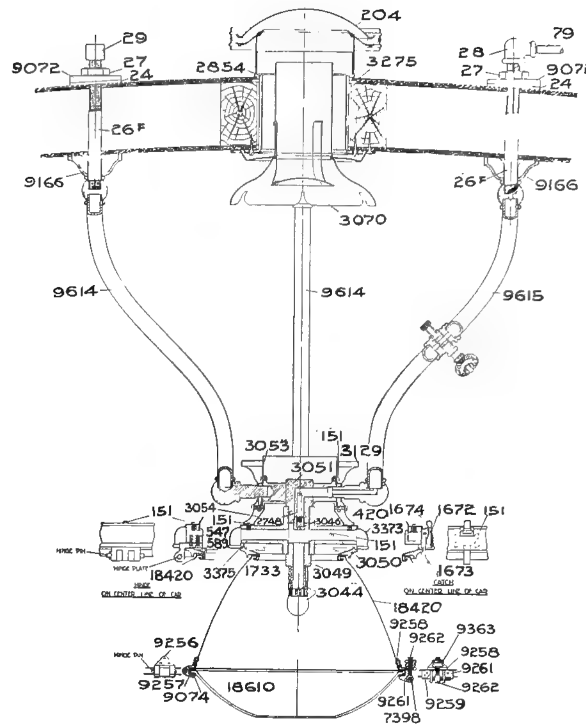


Fig. 2323—Section Through Mantle Lamp No. 8531.

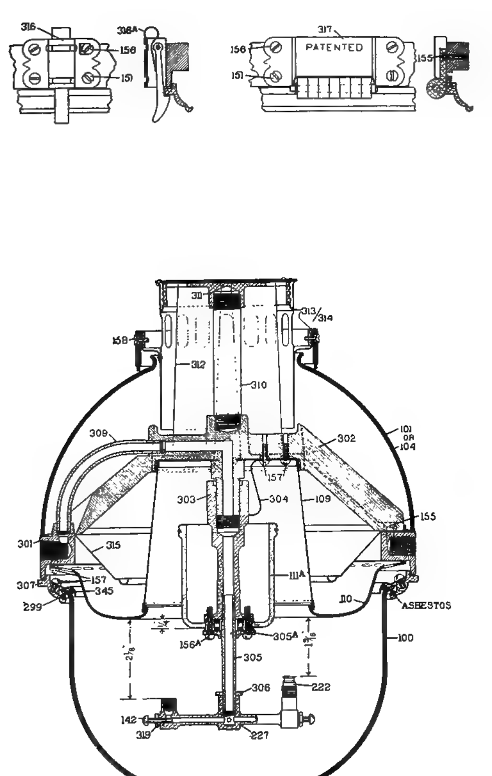


Fig. 2324—Section Through Standard Lamp Body.

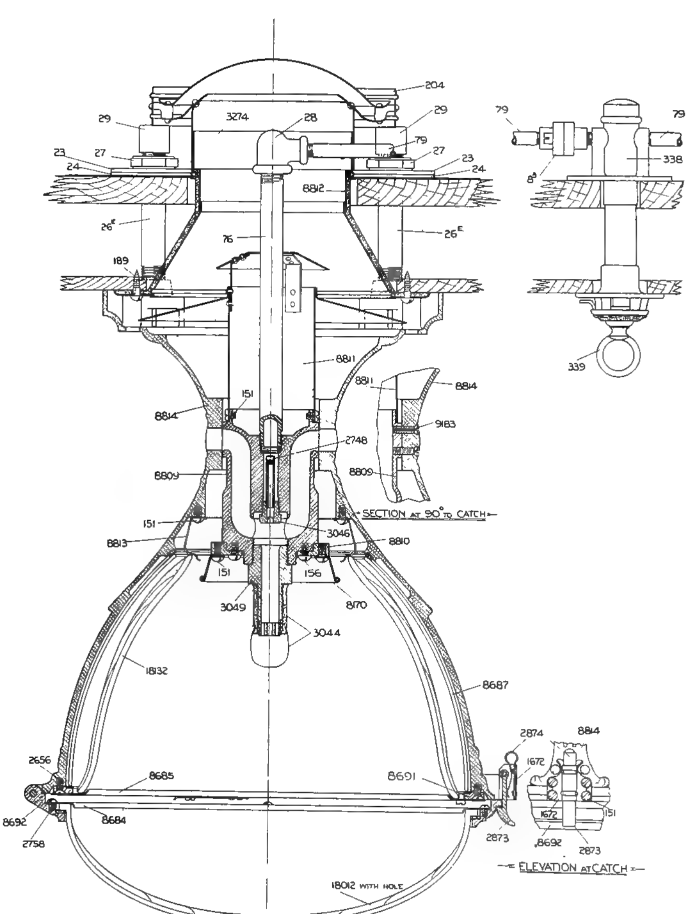


Fig. 2325—Section Through Mantle Deck Lamp.

Safety Car Heating & Lighting Company.

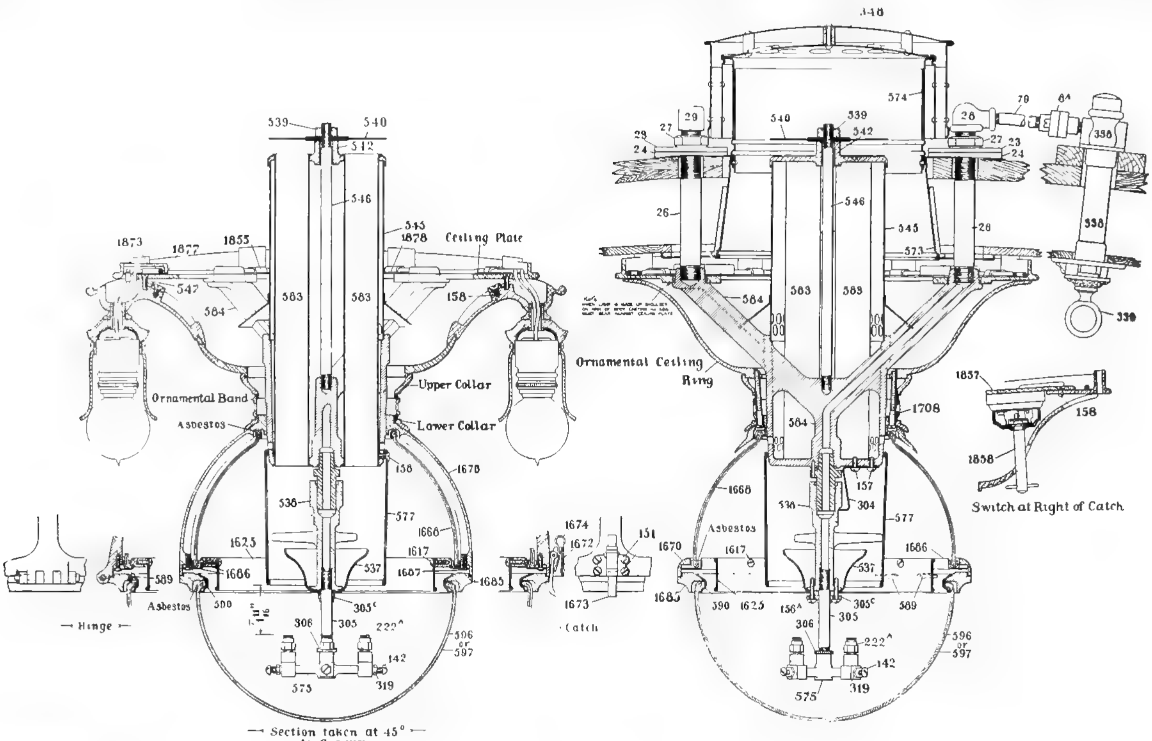
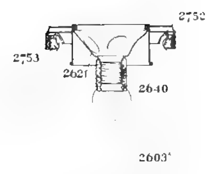


Fig. 2326—Section Through Combination Deck Lamp No. 440a.



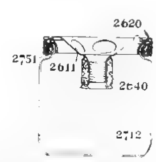


Fig. 2327—Sections Through Mantle Lamp Bulbs.

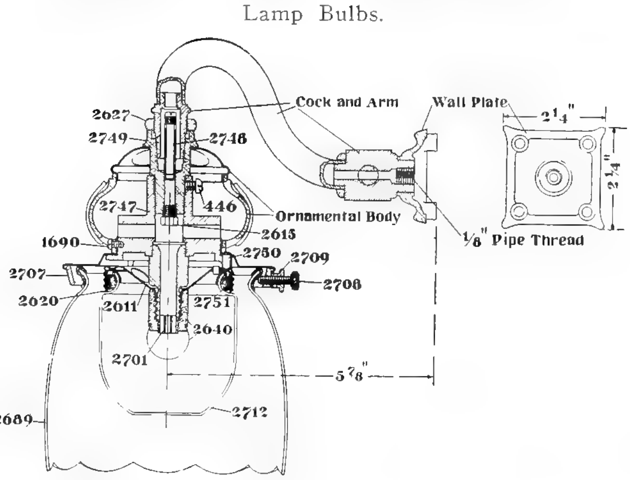


Fig. 2328—Section Through Bracket Mantle Lamp No. 2515.

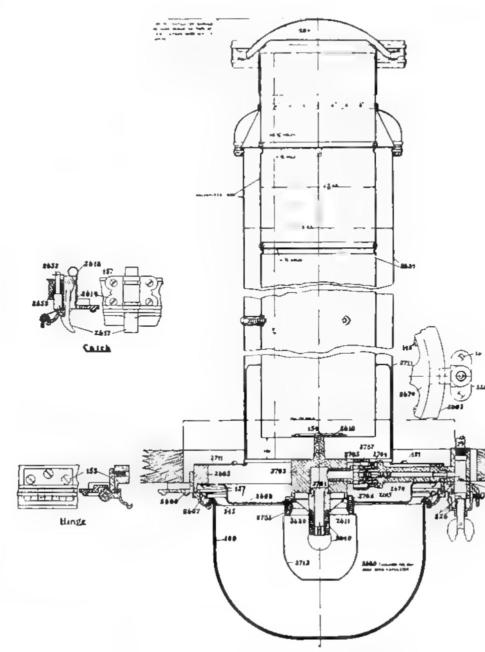


Fig. 2329—Section Through Vestibule Mantle Lamp No. 2594.

Fig. 2330 Deck Mantle Lamp No. 2532.

Fig. 2331—Bracket Mantle Lamp No. 2515.

Fig. 2332—Combination Deck Mantle Lamp No. 2511a.

Fig. 2333—Deck Mantle Lamp No. 2511.

Safety Car Heating & Lighting Company.

Fig. 2334—Combination Bracket Mantle Lamp No. 2556a.

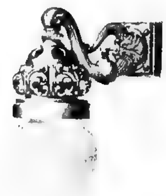


Fig. 2335—Bracket Mantle Lamp No. 2556.

Fig. 2336—Bracket Mantle Lamp No. 2534.

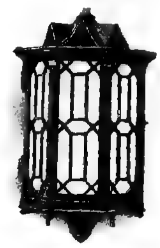


Fig. 2337—Wall Mantle Lamp No. 2513.

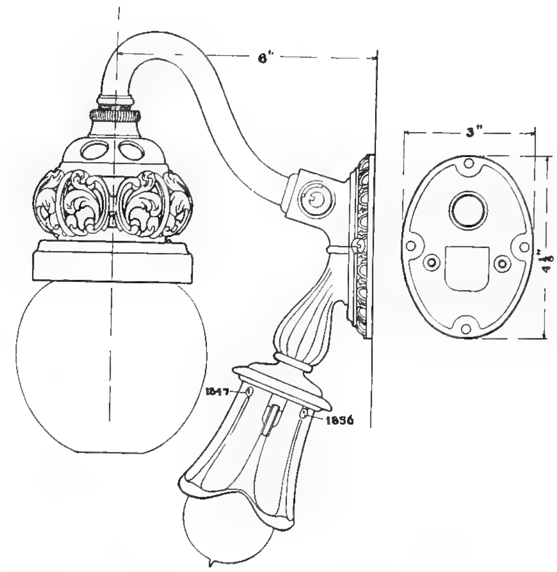


Fig. 2338—Combination Bracket Mantle Lamp No. 2550a.

Fig. 2339—Mantle Lamp No. 3599.

Fig. 2340—Mantle Lamp No. 3572.

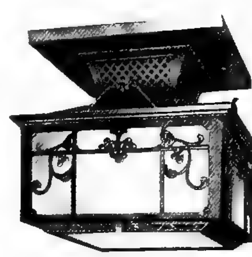


Fig. 2341—Mantle Lamp No. 3577A.

Fig. 2342—Bracket Mantle Lamp No. 2563.

Fig. 2343—Mantle Lamp No. 3583B.

Fig. 2344—Mantle Lamp No. 3581A.

Fig. 2345—Mantle Lamp No. 3534.

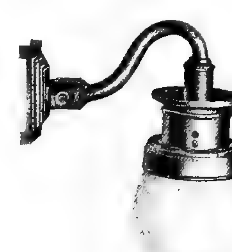


Fig. 2346—Bracket Mantle Lamp No. 2587.

Fig. 2347—Mantle Lamp No. 3542A.

Fig. 2348—Mantle Lamp No. 3598A.

Fig. 2349—Mantle Lamp No. 3540.

Fig. 2350—Mantle Lamp No. 3566A.

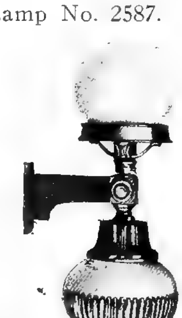


Fig. 2351—Combination Bracket Mantle Lamp **No.** 8500A.

Parts for Mantle Lamps, Figs. 2317, 2318, 2321, 2325 and 2327-2329.

8A	*Flange Union*
16C	*1/2-in. by 1/8-in. Flange*
23	*Iron Washer*
24	*Rubber Washer*
26E	*3/8-in. Nipple, 4 1/2 in. Long*
26H	*3/8-in. Nipple, 7 in. Long*
26K	*3/8-in. Nipple, 11 in. Long*
26N	*3/8-in. Nipple, 12 in. Long*
26O	*3/8-in. Nipple, 12 1/2 in. Long*
27	*3/8-in. Locknut*
28	*3/8-in by 1/8-in. Elbow*
29	*3/8-in. Cap*
30	*3/8-in. Tee*
31	*3/8-in. Plug*
75	*1/2-in. Pipe*
76	*3/8-in. Pipe*
79	*1/8-in. Pipe*
100	*Glass Bowl*
142A	*Screw for Ornamental Ring*
151	*Screw for Catch, Flue, Etc.*
154	*Screw for Lock Deflecting Plate, Etc.*
155	*Screw for Hinge*
156	*Screw for Bracket, Reflector Support, Etc.*
157	*Screw for Bracket Switch, Reflector, Etc.*
157A	*Screw for Insulator*
159	*Screw for Angle Flange*
204	*Ventilator*
204A	*Ventilator*
316A	*Spring for Catch*
326	*Cock Complete*
338	*Cock and Sleeve*
339	*Thumb Piece and Socket for Cock*
417	*Screw for Bracket*
420	*Screw for Boss*
421	*Screw for Ornamental Cage*
446	*Set Screw for Extension Pillar*
589	*Screw for Spun Globe Holder*
1527	*Screw for Cock and Side Pieces of Bezel*
1672	*Cover for Catch*
1690	*Screw for Ornamental Body*
1733	*Spun Globe Holder*
1816	*3/8-in. Close Nipple*
1853	*Key for Switch*
2199	*Screw for Husk*
2204	*Screw for Husk*
2465	*Shadeholder Clamp*
2467	*Cap Nut*
2603A	*Opal Bowl*
2605	*Body Ring*
2606	*Ceiling Ring*
2608	*Reflector*
2610	*Deflecting Plate*
2611	*Mantle and Globeholder*
2615	*Gas Tip*
2617	*Catch*
2618	*Spring for Catch*
2619	*Cover for Cap*
2620	*Globe Ring*
2621	*Mantle and Globeholder*
2627	*Locknut*
2634	*Ventilating Chimney*
2635	*Screen for Gas Tip*
2640	*Mantle*
2656	*Screw for Bracket and Dome Support*
2667	*Angle Flange*
2689	*Etched Glass Shade*
2694	*Air Shield*
2695	*Bezel*
2697	*Spun Globeholder*
2698	*11-in. Spherical Bowl (Etched)*
2700	*Incandescent Bowl and Globe Complete*
2701	*Burner Nozzle*
2702	*Spring Lock*
2703	*Lamp Body*
2704	*Washer*
2705	*Air Mixer*
2706	*Burner Nozzle*
2707	*Shadeholder*
2708	*Thumb Screw*
2709	*Thumb Screw Locknut*
2711	*Thimble and Flange*
2712	*Clear Glass Bowl*
2719	*Catch*
2720	*Brace for Catch*
2726	*Porcelain Clamp*
2727	*Vulca Beston Washer*
2728	*Screw for Ornamental Arm*
2729	*Screw for Porcelain Clamp*
2748	*Gas Strainer*
2749	*Extension Pillar*
2750	*Spring Lock*
2751	*Inner Globe Ring*
2752	*Outer Globe Ring*
2753	*Inner Globe Ring*
2758	*Screws for Bowl Holder*
2767	*Air Shield*
2819	*Apron*
2873	*Catch*
2874	*Spring for Catch*
2886	*Gas Way Bracket*
2887	*Thumb Piece and Plug for Cock*
2890	*Electric Switch*
2917	*Bracket for Switch*
2958	*Screw for Hinge Plate*
3044	*Mantle*
3046	*Gas Tip*
3049	*Burner Nozzle*
3050	*Bezel*
3094	*Gas Strainer*
3150	*Burner Nozzle*
3170	*Body Casting*
3237	*Body*
3270	*Extension Pillar*
3271	*Flue*
3272	*Lock*
3274	*Roof Thimble*
3287	*Center Casting*
3313	*Reflector*
3321	*Bracket for Reflector*
3339	*Spring for Catch*
3366	*Bushing*
3407	*Spring Lock*
3408	*Ornamental Body*
3409	*Top Piece for Ornamental Body*
3427	*Shadeholder*
4018	*Wire Cleat*
4680	*Screws for Lock*
7398	*Screws for Catch*
8128	*Ventilator*
8148	*Roof Thimble*
8170	*Enameled Reflector*
8318	*Screw for Hinge Plate*
8684	*Bowl Holder*
8685	*Reflector Support*
8692	*Bezel*
8809	*Body Casting*
8810	*Reflector Support*
8811	*Flue and Cinder Shields*
8812	*Ceiling Thimble*
8813	*Reflector Guide*
8814	*Ornamental Dome*
8972	*Boss*
9004	*Iron Washer*
9005	*Iron Washer*
9006	*Iron Washer*
9074	*Spun Ring*
9182	*Body Ring*
9183	*Screws for Ornamental Dome*
9256	*Hinge Plate for Reflector*
9257	*Hinge Plate for Bowl*
9258	*Catch Plate*
9259	*Catch Bracket*
9261	*Catch Bracket*
9262	*Catch Bolt*
9263	*Thumb Nut*
9374	*Ceiling Thimble*
9376	*Ceiling Plate*
9379	*Flue*
9382	*Hinge Plate for Bezel*
9757	*Glass Shade*
9821	*Electric Arm*
9943	*Roof Thimble*
9944	*Ceiling Thimble*
9945	*Ceiling Ring*
18012	*Prismatic Bowl*
18132	*Prismatic Reflector*
18420	*Reflector*
18360	*Reflector Bowl Unit*

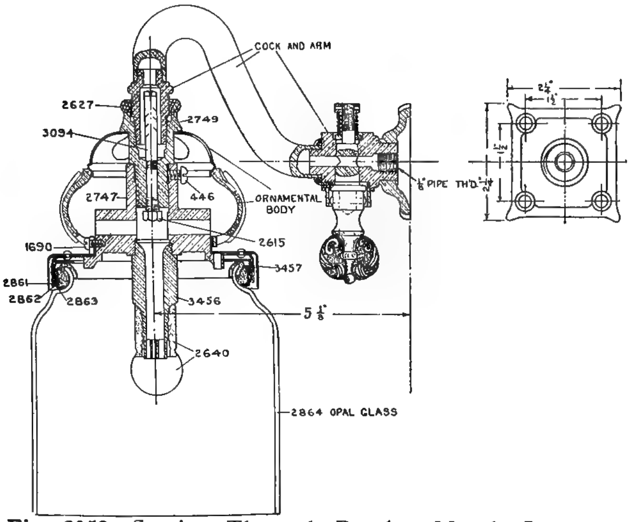


Fig. 2352—Section Through Bracket Mantle Lamp No. 2506.

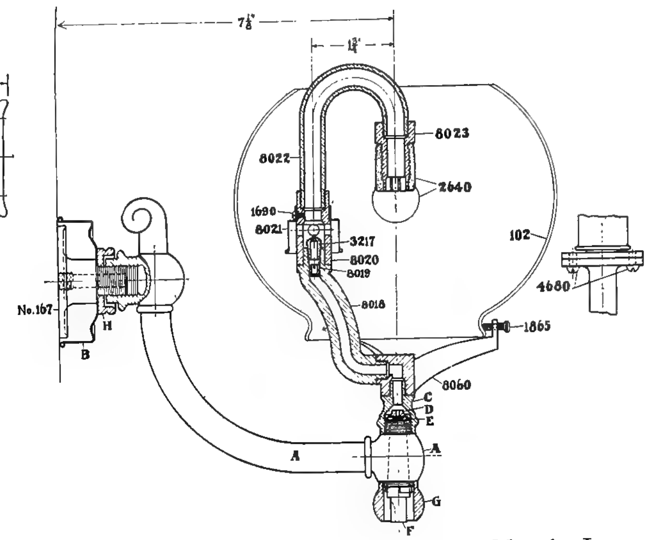


Fig. 2353—Section Through Bracket Mantle Lamp No. 8586.

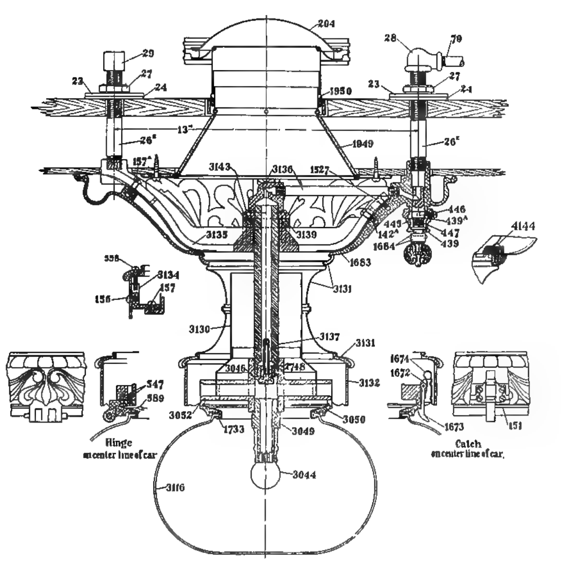


Fig. 2354—Section Through Mantle Lamp No. 3512.

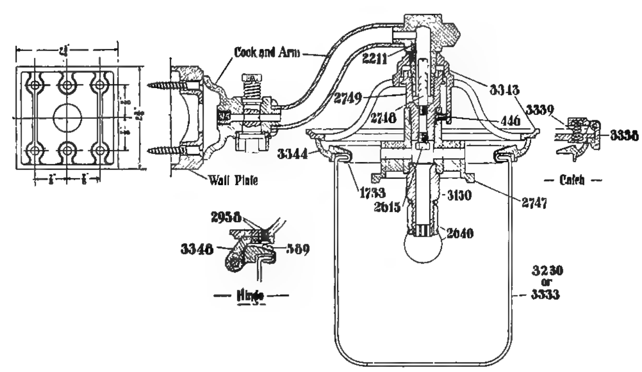
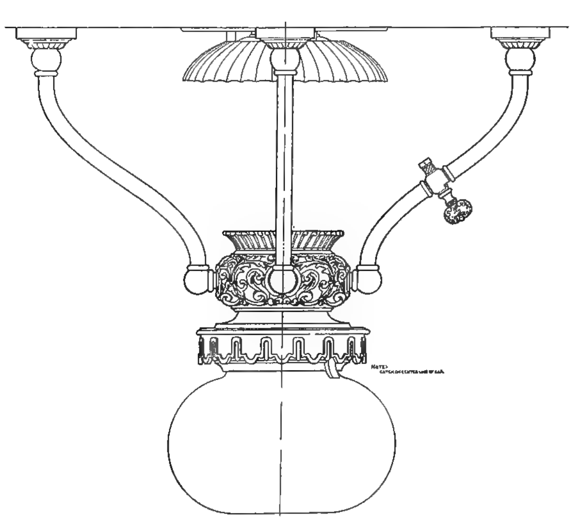


Fig. 2355—Section Through Bracket Mantle Lamp No. 2563.



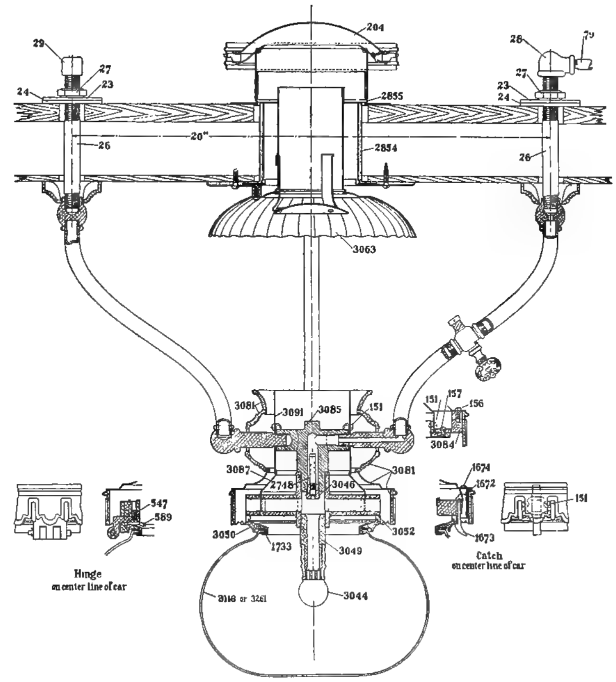


Fig. 2356—Mantle Lamp No. 3508.

Safety Car Heating & Lighting Company.

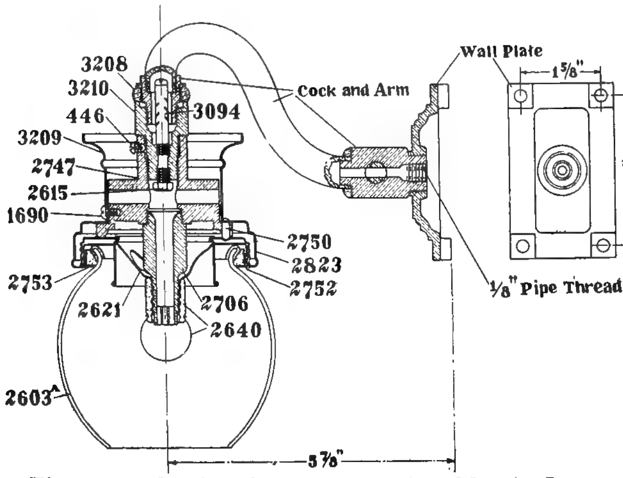


Fig. 2357—Section Through Bracket Mantle Lamp No. 2587.

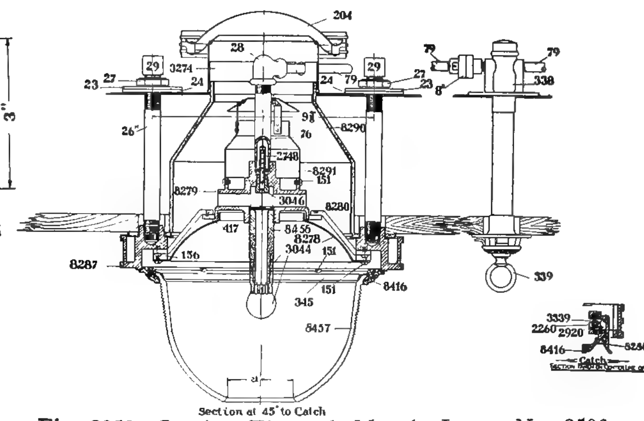


Fig. 2358—Section Through Mantle Lamp No. 8503.

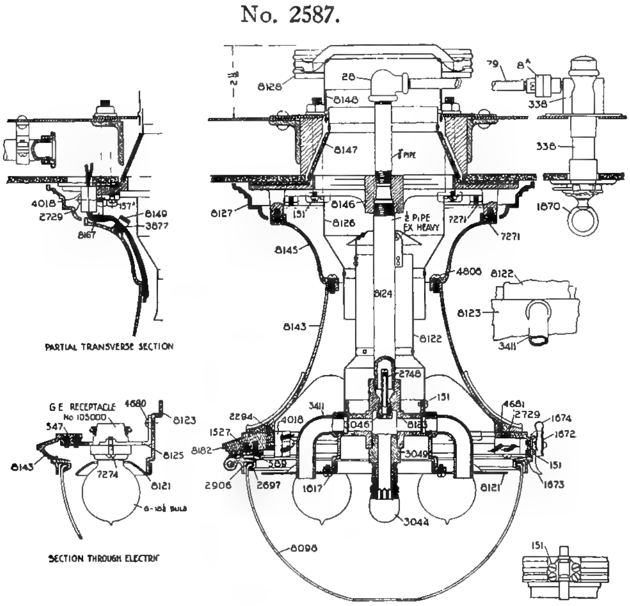


Fig. 2359—Section Through Combination Mantle Lamp No. 3566A.

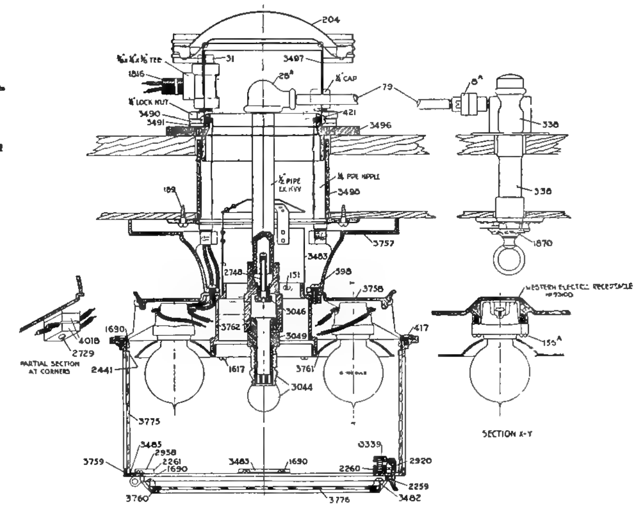


Fig. 2360—Section Through Deck Mantle Lamp No. 3577A.

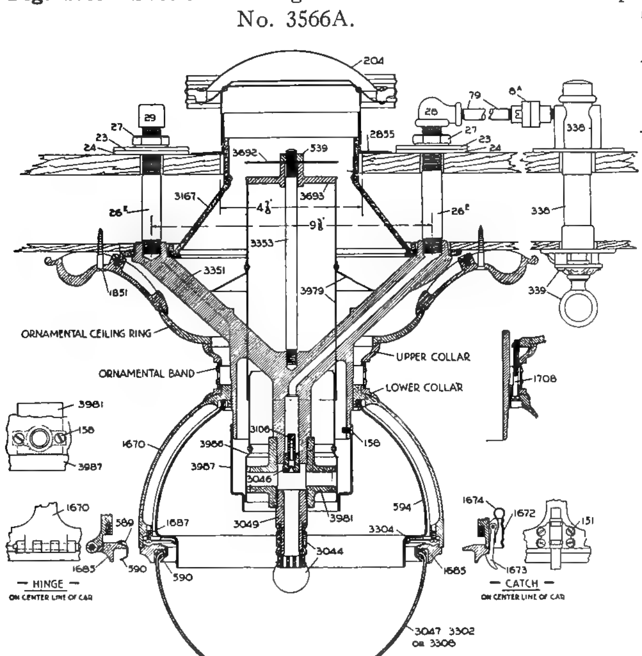


Fig. 2361—Section Through Mantle Lamp No. 3540.

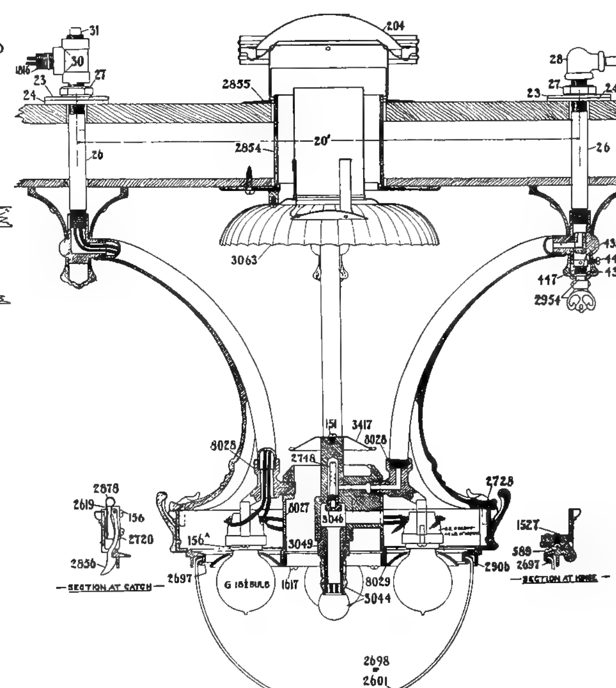


Fig. 2362—Section Through Combination Mantle Lamp No. 3598A.

Safety Car Heating & Lighting Company.

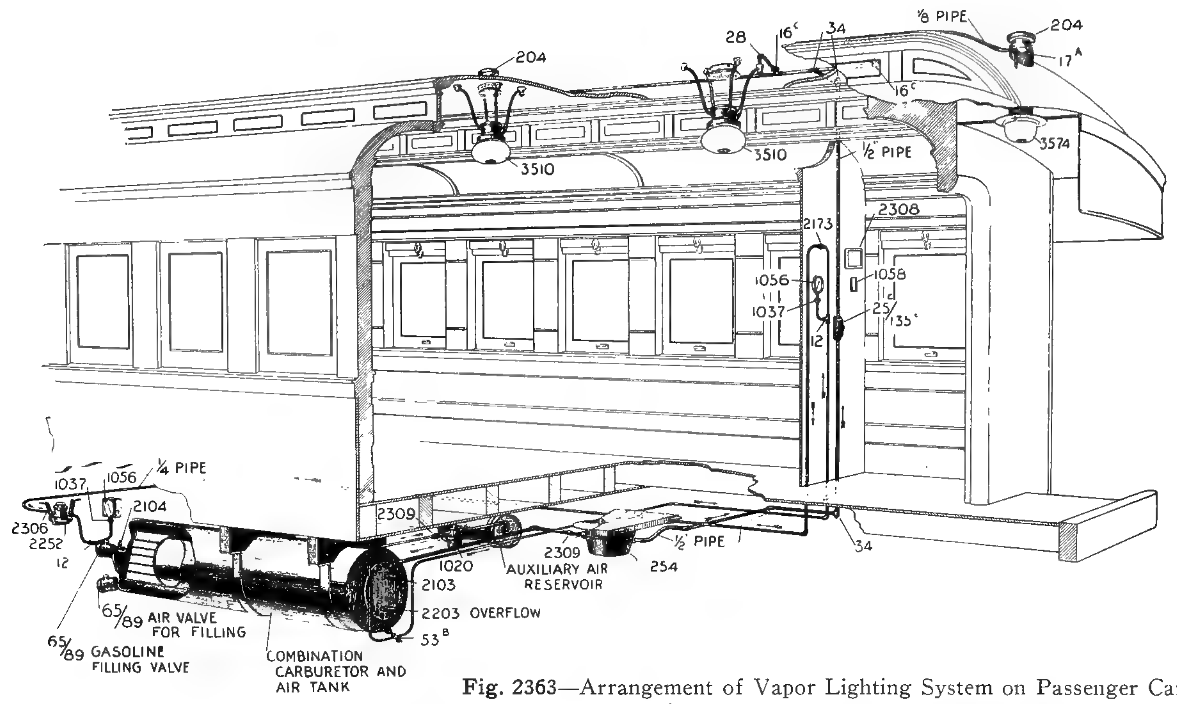


Fig. 2363—Arrangement of Vapor Lighting System on Passenger Car.

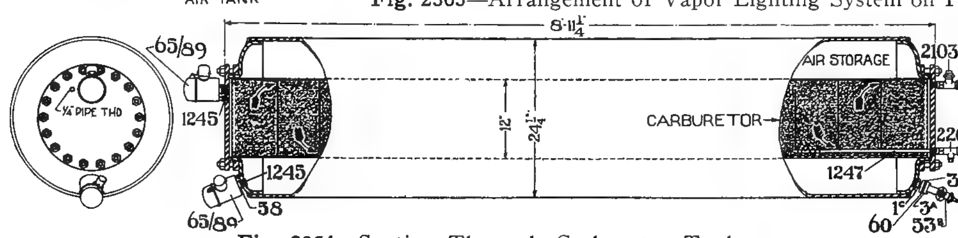


Fig. 2364—Section Through Carburetor Tank.

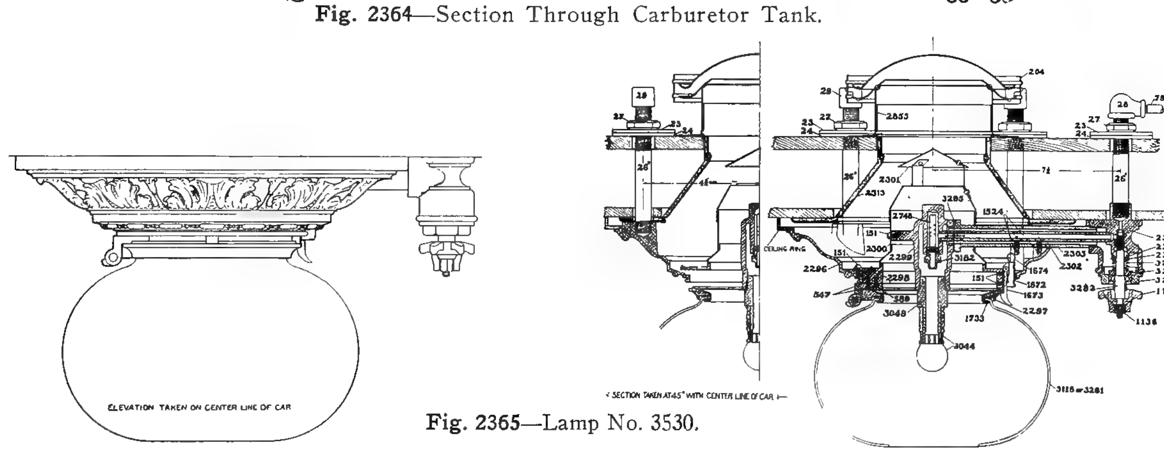


Fig. 2365—Lamp No. 3530.

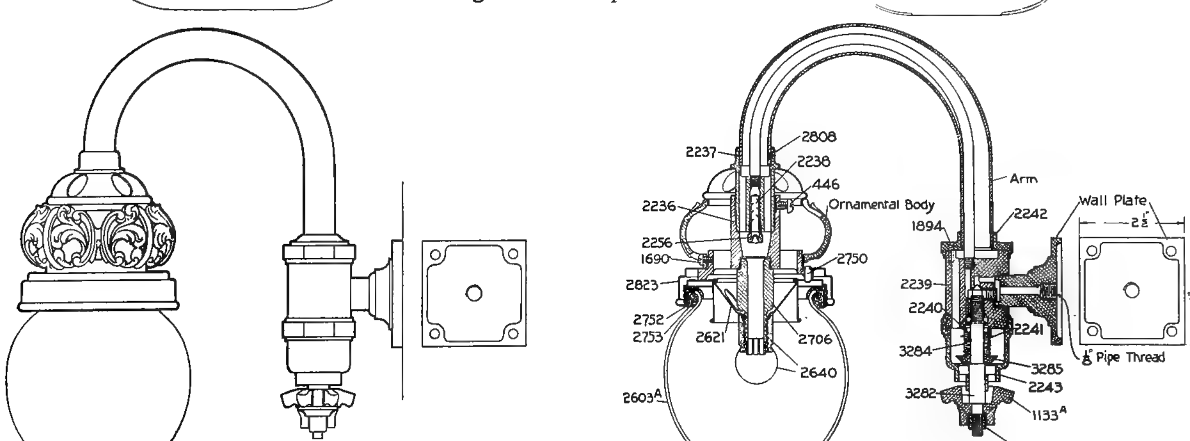


Fig. 2366—Lamp No. 2598.
Safety Car Heating & Lighting Company.

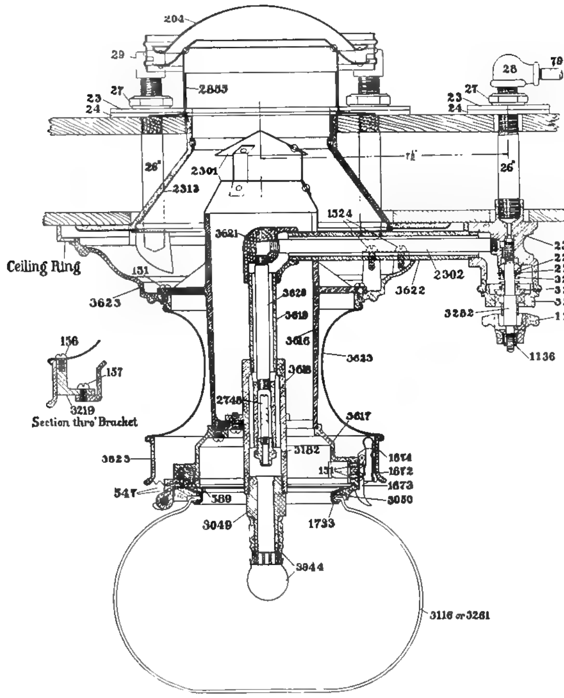


Fig. 2367—Section Through Lamp No. 3546.

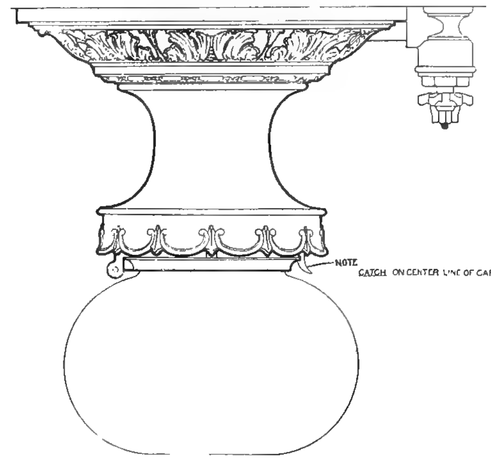


Fig. 2368—Lamp No. 3546.

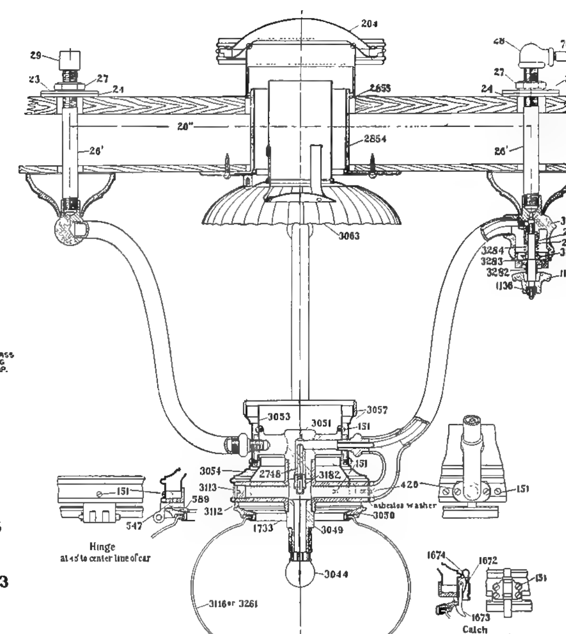


Fig. 2370—Section Through Lamp No. 3510.

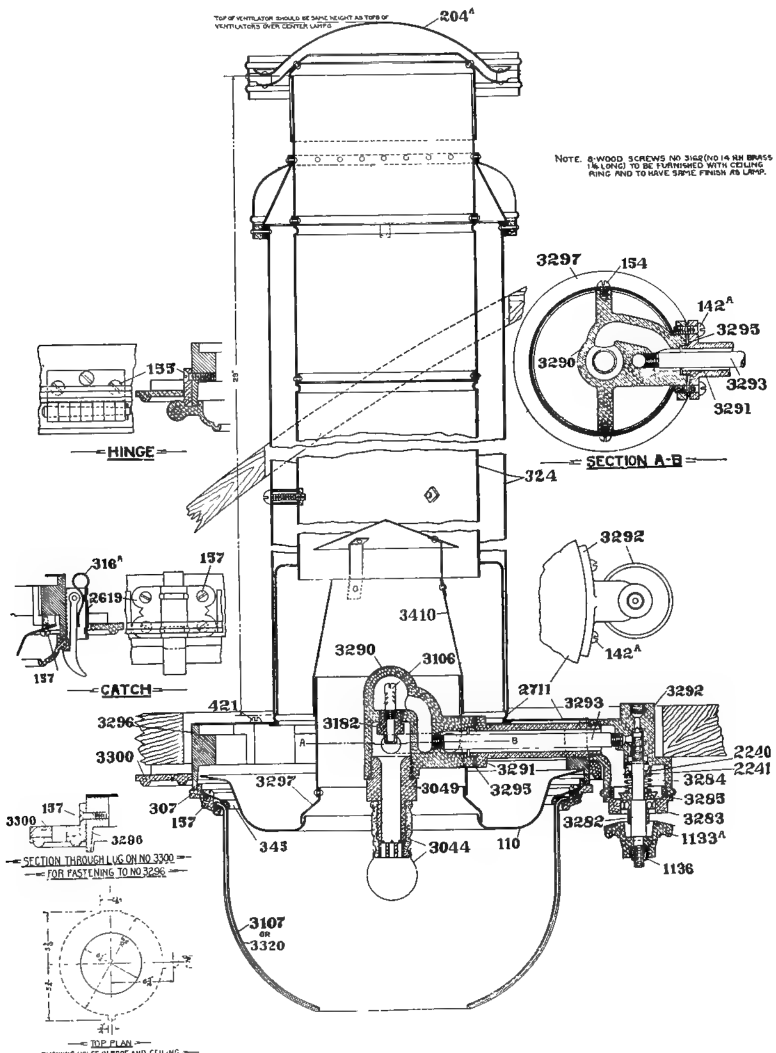


Fig. 2369—Section Through Vestibule Lamp No. 3574.

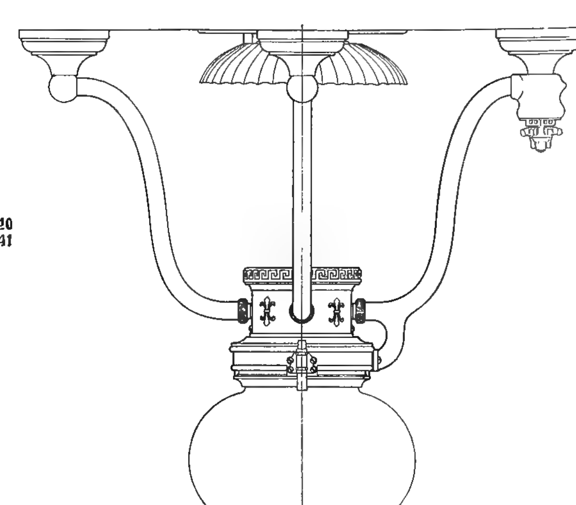


Fig. 2371—Lamp No. 3510.

Safety Car Heating & Lighting Company.

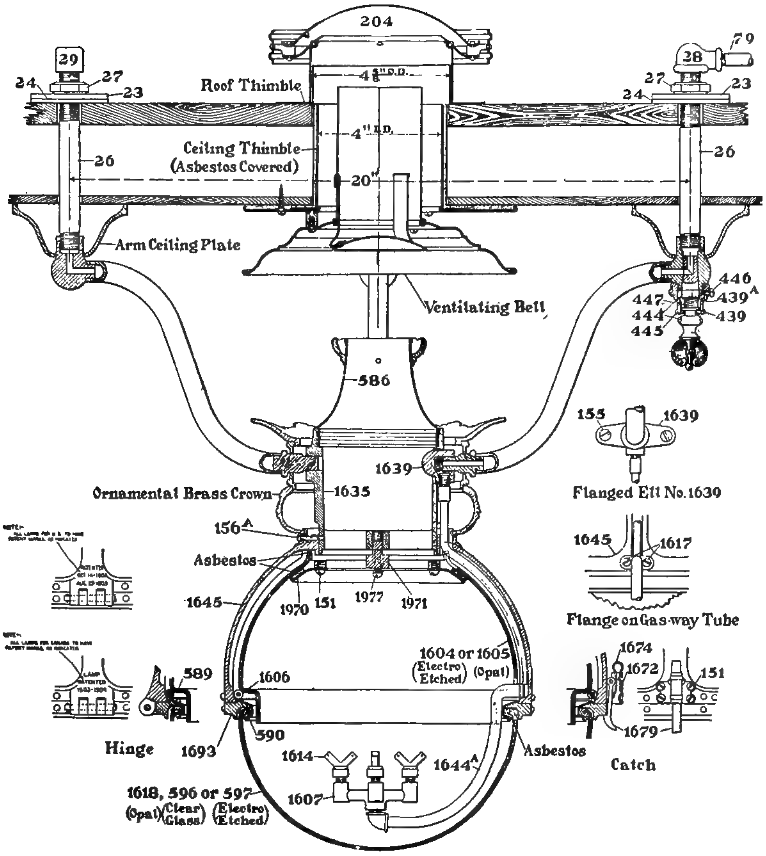


Fig. 2372—Section Through Acetylene Lamp No. 1627.

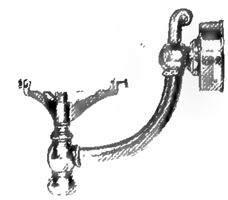


Fig. 2373—Acetylene Lamp No. 86a.

Fig. 2374—Acetylene Lamp No. 2096.

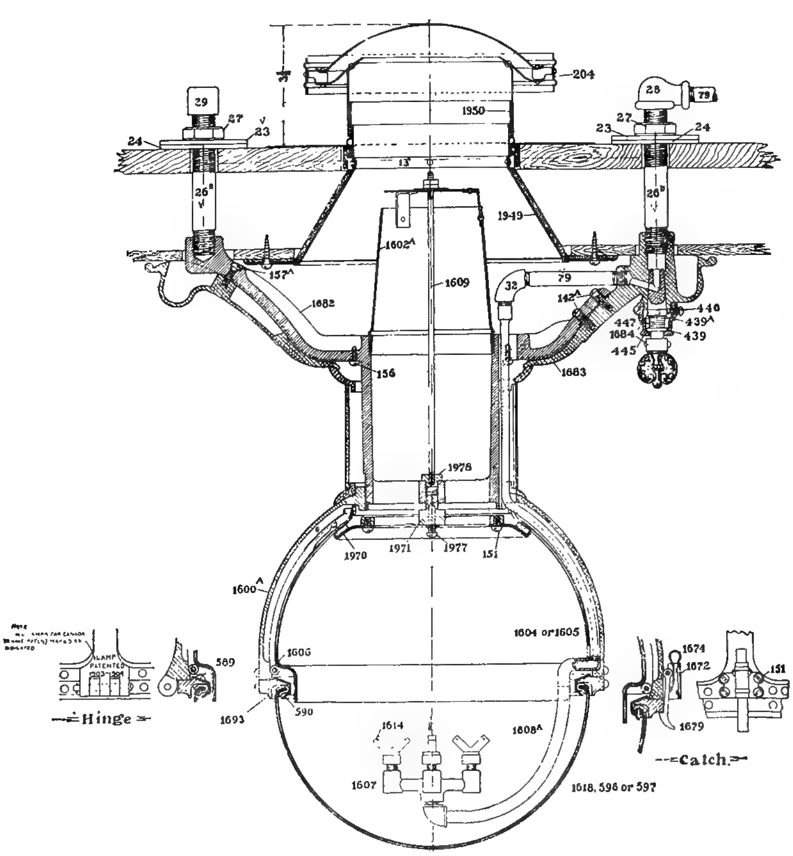


Fig. 2375—Section Through Acetylene Lamp No. 1681.

Fig. 2376—Acetylene Lamp No. 2012.

Safety Car Heating & Lighting Company.

Parts of Acetylene Lamps, Figs. 2372-2382.

17a	*Angle Flange*	154	*Screw for Flue*
23	*Iron Washer*	155	*Screw for Hinge*
24	*Rubber Washer*	156	*Screw for Ceiling Ring*
26	*3/8 in. Nipple, 6 in. Long*	156a	*Screw for Flange*
26b	*3/8 in. Nipple, 5 in. Long*	157	*Screw for Reflector*
26f	*3/8 in. Nipple, 6½ in. Long*	157a	*Screw for Ceiling Ring*
27	*3/8 in. Locknut*	204	*4⅝ in. Ventilator*
28	*3/8 in. by 1/8 in. Ell*	204a	*Ventilator*
29	*3/8 in. Cap*	307	*Bezel for Bowl, with Hinge*
32	*1/8 in. Ell*	316	*Spring Catch, Complete*
79	*1/8 in. Extra Strong Pipe*	316a	*Spring for Catch*
100	*Glass Bowl*	323a	*Diaphragm*
140	*Screw for Bezel*	324	*Ventilating Chimney*
142a	*Screw for Gas Cock Body*	326	*Cock, Complete*
144	*Screw for Spring Lock*	345	*Spun Globe Holder Ring*
151	*Screw for Catch and Reflector*		

(Continued on next page.)

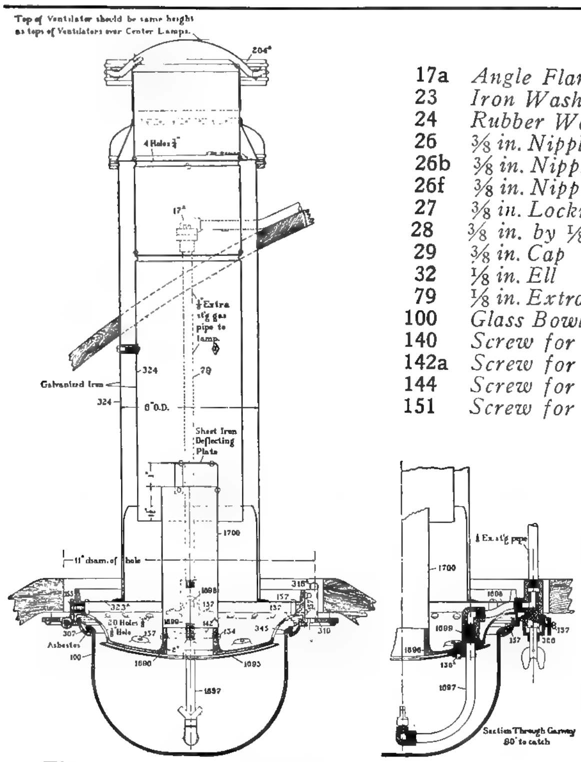


Fig. 2377—Section Through Acetylene Vestibule Lamp No. 1694.

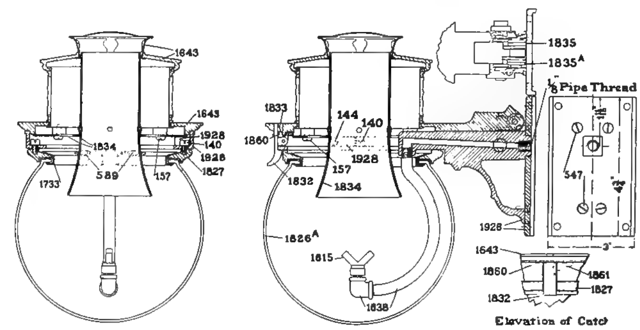


Fig. 2378—Sections Through Acetylene Wall Lamp No. 1641.

Fig. 2379—Wall Lamp No. 1641.

Fig. 2380—Lamp No. 1627.

Fig. 2381—Deck Lamp No. 1681.

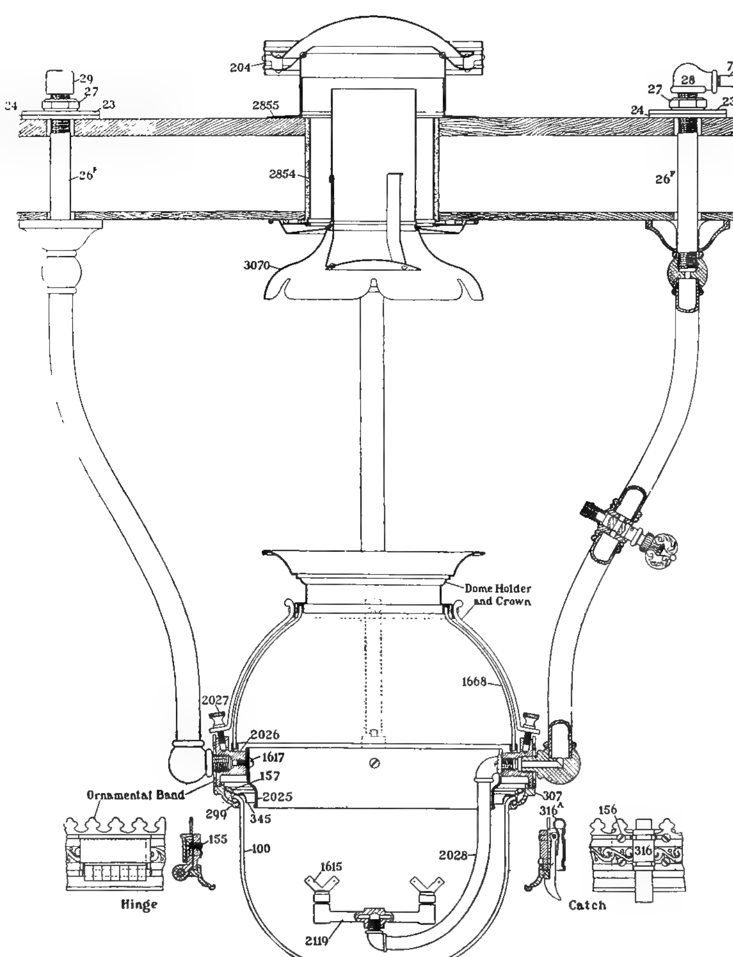


Fig. 2382—Section Through Acetylene Lamp No. 2012.

Safety Car Heating & Lighting Company.

Parts of Acetylene Lamps, Figs. 2372-2382. (Continued.)

439 *Thick Washer for Cock*
439a *Thin Washer for Cock*
444 *Plug and Thumb-piece for Cock*
445 *Bonnet for Cock*
446 *Screw for Cock*
447 *Spring for Cock*
547 *Screw for Wall Plate*
586 *Extension Chimney*
589 *Screw for Spun Globe Holder*
590 *Spun Globe Holder*
596 *9 in. Clear Glass Bowl*
597 *9 in. Etched Glass Bowl*
1600a *Frame for Dome*
1602a *Flue*
1604 *9 in. Etched Dome*
1605 *9 in. Opal Dome*
1606 *Dome Ring*
1607 *Four-flame Cluster*
1608a *Gas-way Tub*
1609 *Post for Flues*
1613 *3/8 ft. Von Schwartz Burner*
1614 *1/2 ft. Von Schwartz Burner*
1615 *3/4 ft. Von Schwartz Burner*
1617 *Screw for Gas-way Tube Flange*
1618 *9 in. Opal Bowl*
1635 *Body Casting*
1638 *Gas-way Tube*
1639 *Flanged Ell*
1643 *Crown*
1644a *Gas-way Tube*
1645 *Frame for Dome*
1668 *Opal Dome*
1672 *Cover for Catch*
1674 *Spring for Catch*
1679 *Catch*
1682 *Body Casting*
1683 *Gas Cock Body*
1684 *Thumb-piece and Plug for Cock*
1693 *Bezel*
1695 *Reflector*
1696 *Body Casting*
1697 *Gas-way Tube*
1697a *Two-flame Cluster*
1698 *Brass Nipple*
1699 *Flanged Ell*
1700 *Flue*
1733 *Spun Globe Holder*
1826 *6½ in. Opal Bowl*
1826a *6½ in. Clear Glass Bowl*
1827 *Bezel*
1832 *Catch*
1833 *Spring for Catch*
1834 *Reflector*
1835 *Spring for Hinge, Left*
1835a *Spring for Hinge, Right*
1860 *Flange for Catch*
1861 *Screw for Flange*
1926 *Body with Gas Cock*
1928 *Spring Lock for Bezel*
1949 *Lower Thimble*
1950 *Roof Thimble*
1970 *Reflector*
1971 *Casting for Reflector*
1977 *Set Screw*
1978 *Bushing for Flue Post*
2025 *Reflector*
2026 *Body Ring*
2027 *Thumb Screw*
2028 *Gas-way Tube*
2119 *Two-flame Cluster*
2854 *Ceiling Thimble*
2855 *Roof Thimble*
3070 *Ventilating Bell*

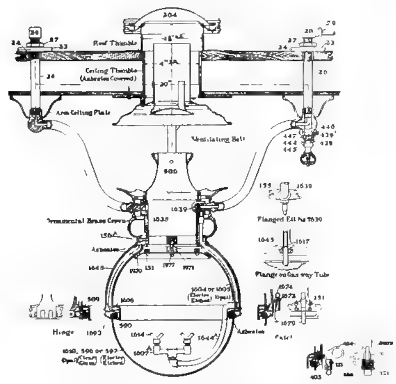


Fig. 2383—Section Through Acetylene Lamp No. 1627.

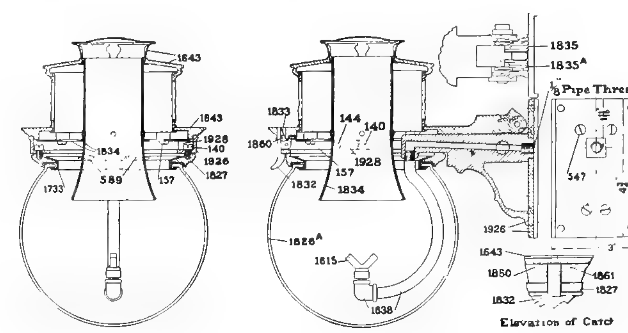


Fig. 2384—Sections Through Acetylene Lamp No. 1641.

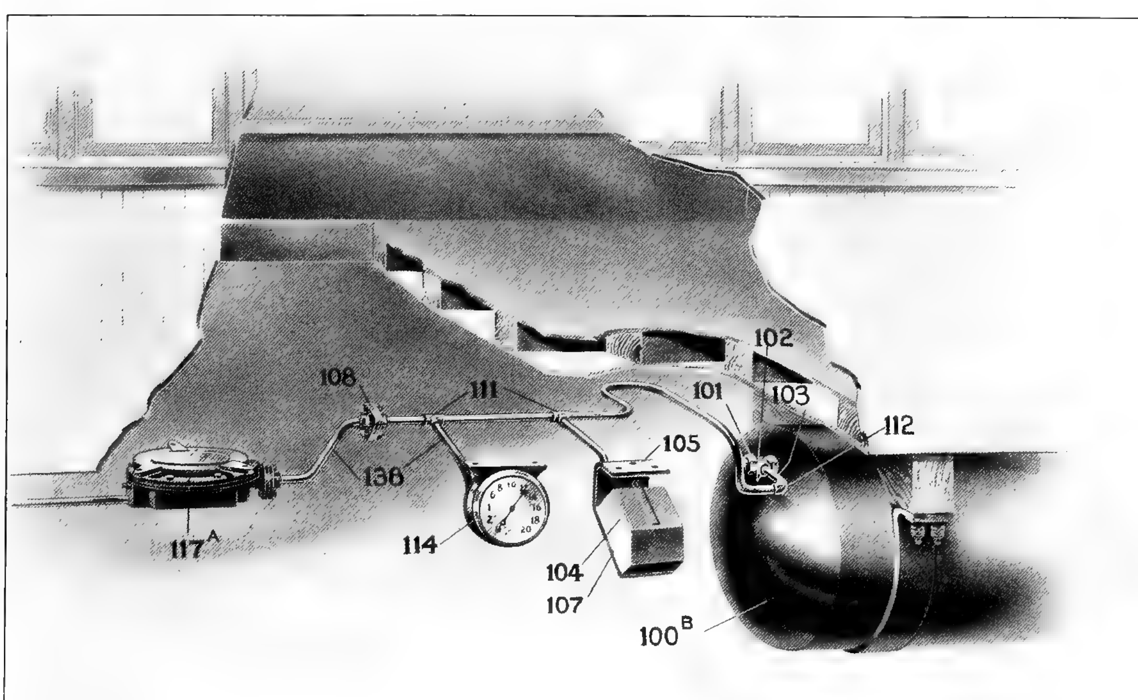


Fig. 2385—Method of Applying Acetylene Flat Flame Lighting System to Passenger Cars.
See Page 829 for List of Parts.
Commercial Acetylene Railway Light & Signal Company.

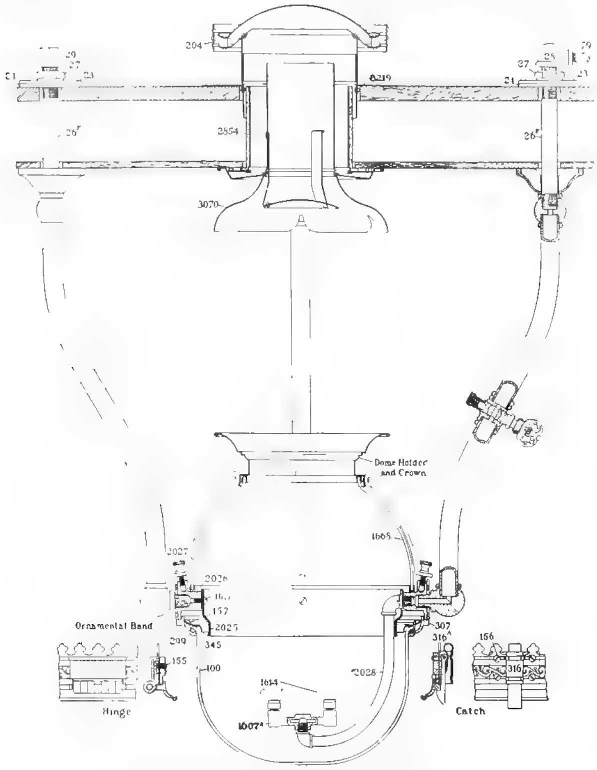


Fig. 2386—Section Through Acetylene Lamp No. 2012.

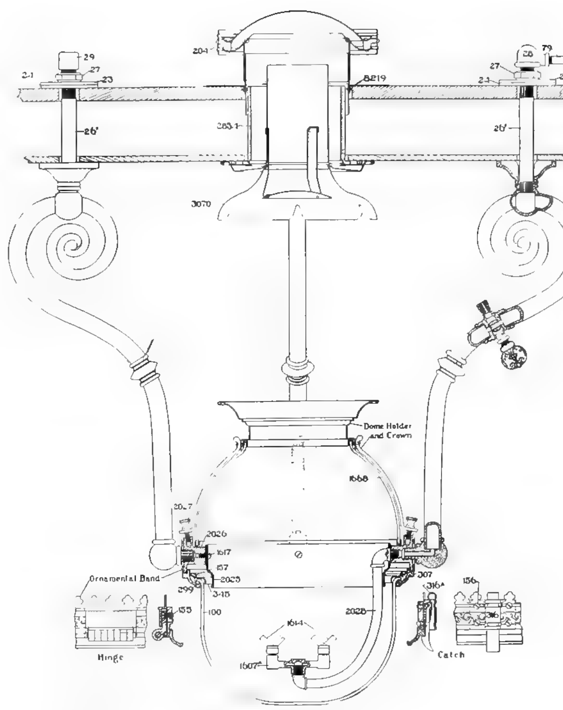


Fig. 2387—Section Through Acetylene Lamp No. 2096.

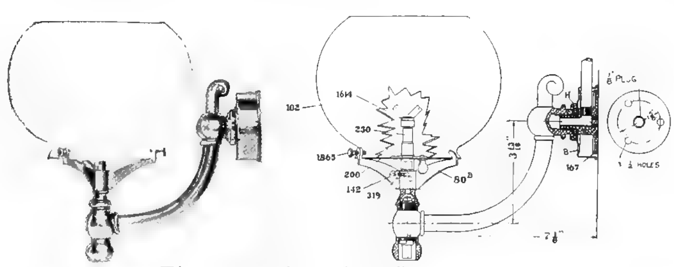


Fig. 2388—Acetylene Lamp No. 86.

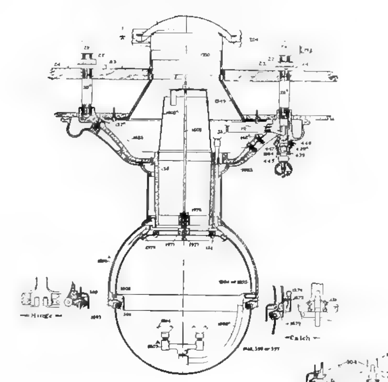


Fig. 2389—Section Through Acetylene Lamp No. 1681.

Fig. 2390—Lamp No. 2012.

Fig. 2391—Lamp No. 2096.

Commercial Acetylene Railway Light & Signal Company.

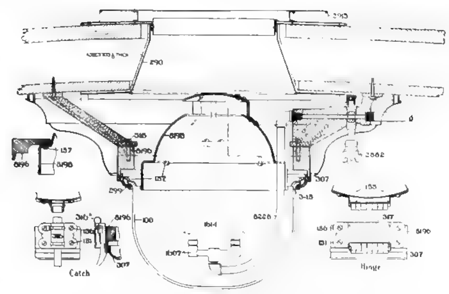


Fig. 2392—Section Through Lamp No. 2054.

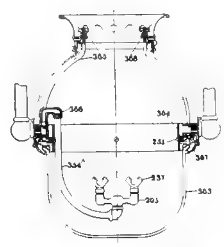


Fig. 2393—Pintsch Gas Lamp Converted for Use with Acetylene.

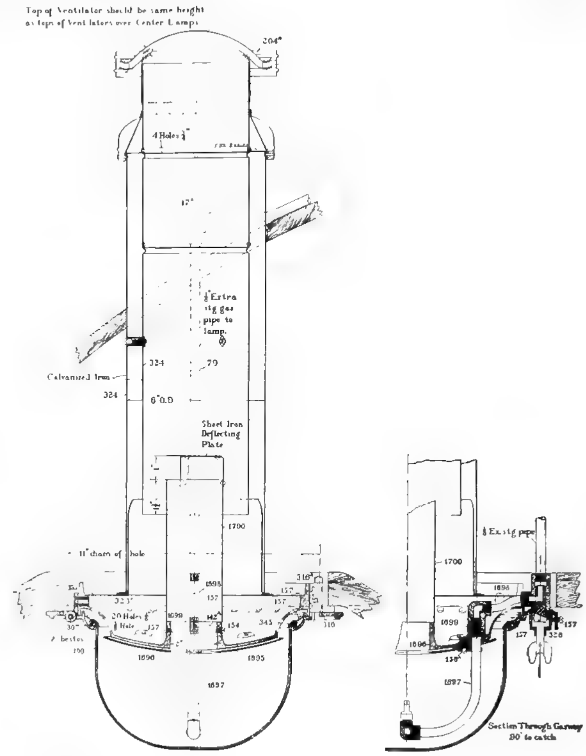


Fig. 2394—Section Through Lamp No. 1694.

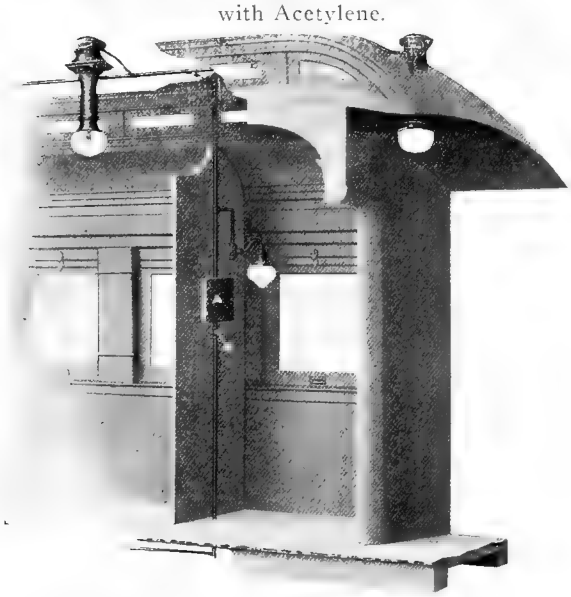


Fig. 2395—End of Car Showing Push Button A and Main Cock B.

Parts of Dalen System, Fig. 2396.

100P	*Cylinder, 500 cu. ft. capacity, 16 in. by 48 in.*
CC202	*Connecting Nut*
CC261	*Connecting Nipple*
D330	*Mixer*
CF920	*¼-in. Extra Heavy Tee*
CG220	*Gage*
CK 10	*Key for Cylinder Valve*
CP230	*5/16-in. Steel Tubing*
CP290	*⅜-in Extra Strong Pipe*
CP310	*¾-in. Standard Pipe*
T150	*Regulator*

Parts of Flat Flame System, Fig. 2385.

100B	*Cylinder, 1,750 cu. ft. Capacity, 20 in. by 114 in.*
101	*Cylinder Valve*
102	*Connecting Nut*
103	*Connecting Nipple*
104	*Filling Valve*
105	*Filling Valve Bracket*
106	*Key for Cylinder Valve*
107	*Cover for Filling Valve*
108	*¼-in. Flange Union*
111	*¼-in. Extra Heavy Tee*
112	*¼-in. Extra Heavy Elbow*
114	*Gage*
117A	*Regulator*

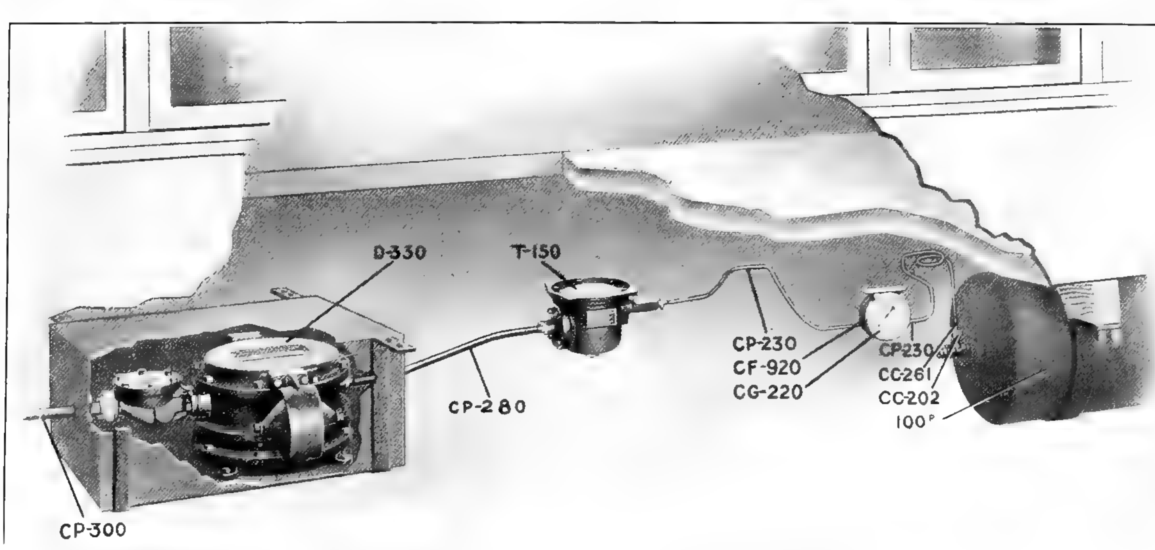


Fig. 2396—Method of Applying the Dalen Acetylene Mantle Lighting System to Passenger Cars. Commercial Acetylene Railway Light & Signal Company.

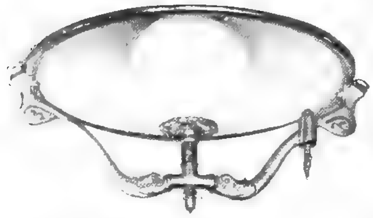


Fig. 2397—Vestibule Lamp No. 709.

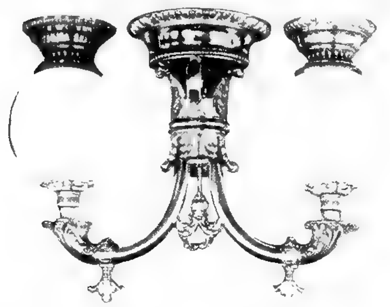
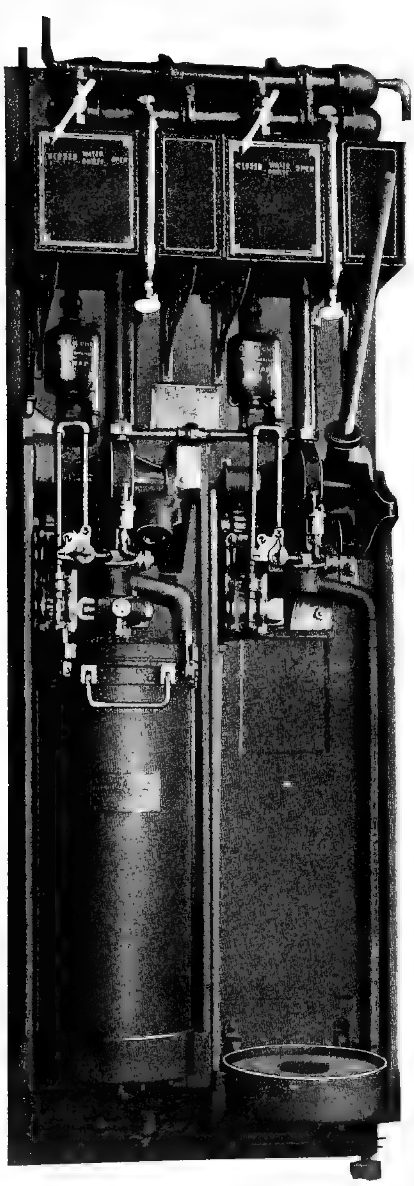


Fig. 2398—Two-Light Chandelier No. 720.

Fig. 2399—One-Light Oval Corridor Lamp.

Fig. 2400—Four-Light Combination Gas and Electric Chandelier No. 747.



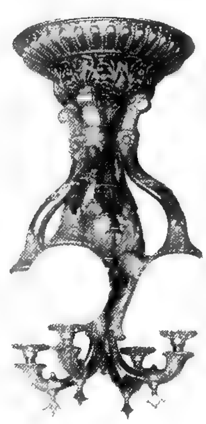


Fig. 2402 — Four-Light Chandelier No. 754.

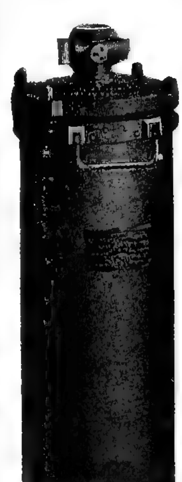


Fig. 2401—Generating Apparatus and Removable Cartridge.

Fig. 2403—View Showing Location of Generator in Closet at End of Car

Adams & Westlake Company.

Fig. 2404 — Combination Gas and Electric Side Bracket Lamp No. 723

Fig. 2405 — Oval Panel Lamp No. 732.

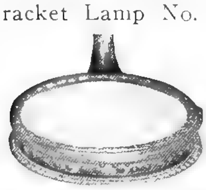


Fig. 2406—Panel Lamp No. 766, for Passage Way.

Fig. 2407—Side Bracket Lamp No. 738.

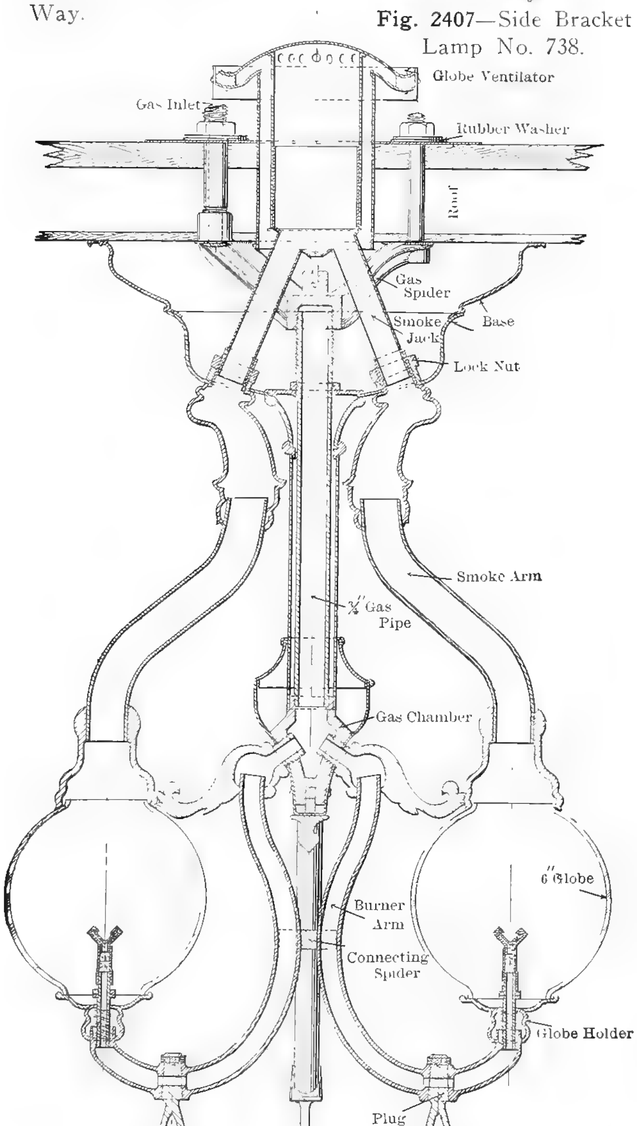


Fig. 2408—Section Through Lamp Body.

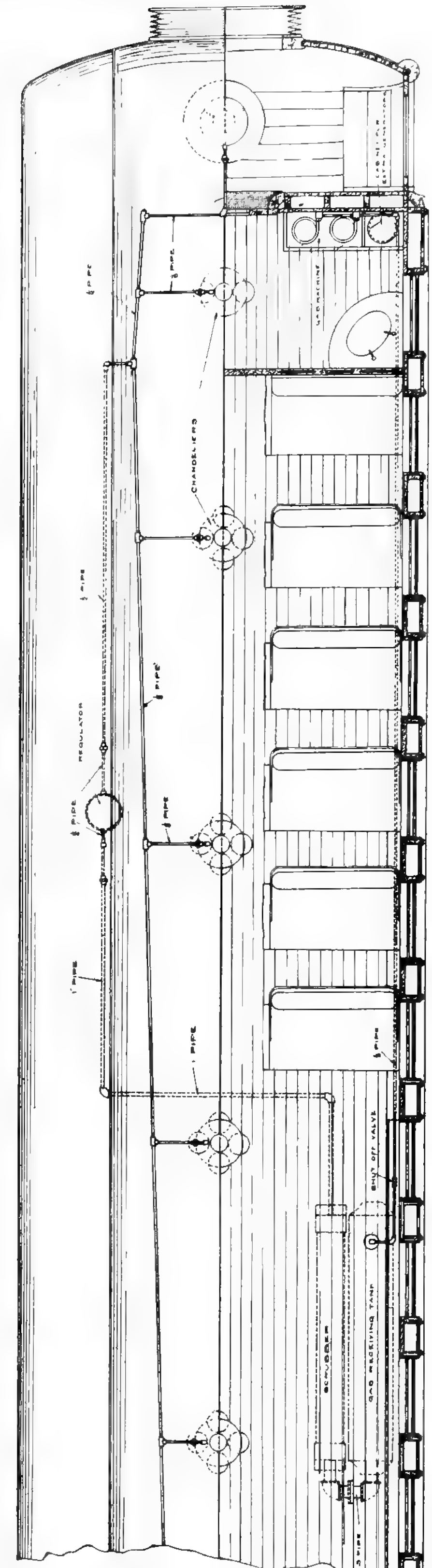


Fig. 2409—Arrangement of Piping on Passenger Car.

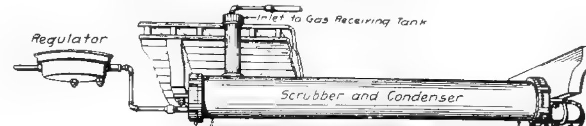


Fig. 2410—Arrangement of Fixtures Under Car.

Adams & Westlake Company.

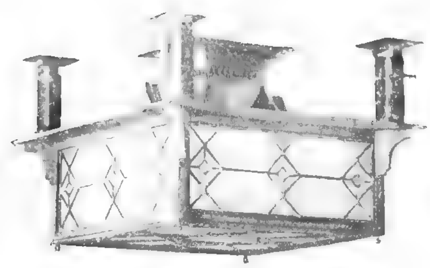


Fig. 2411 -Four-Light Chandelier No. 792.

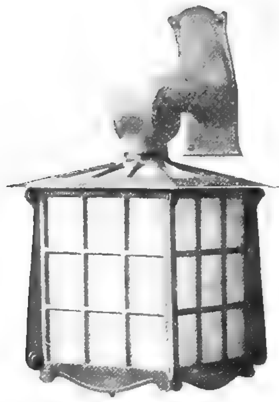


Fig. 2412 — One-Light Side Deck Lamp with Curved Foot for Empire Deck.

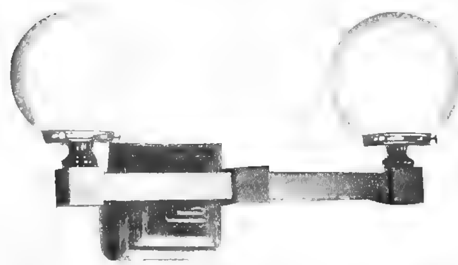


Fig. 2413—Two-Light Electric Bracket No. 7190a.

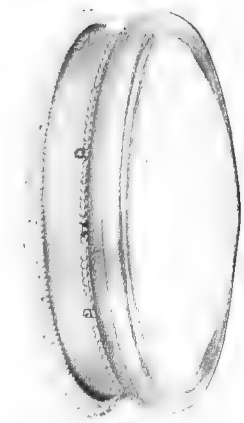


Fig. 2414 — One-Light Oval Panel Lamp.

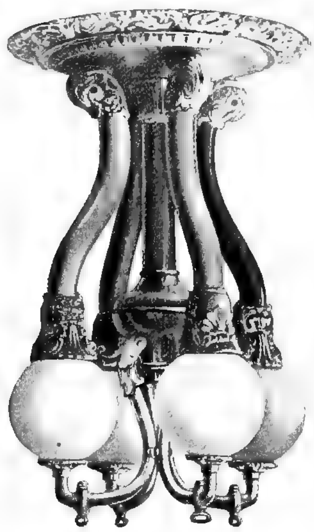


Fig. 2415—Four-Light Chandelier No. 772

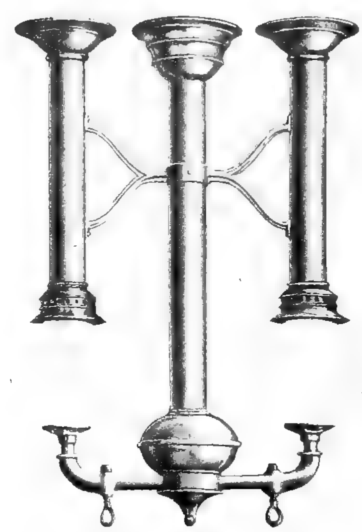


Fig. 2416—Two-Light Chandelier No. 764.

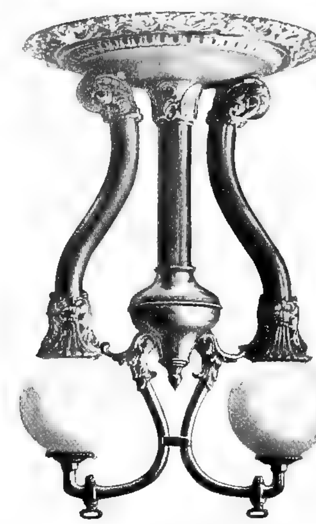


Fig. 2417—Two-Light Chandelier No. 770.

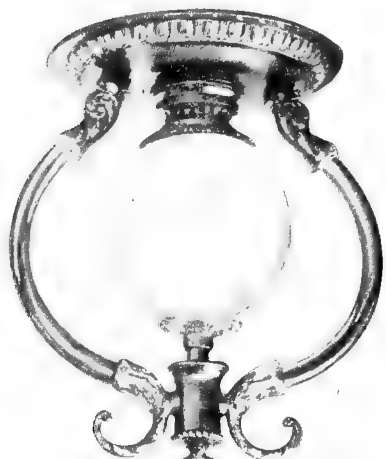


Fig. 2418 — One - Light Vestibule Chandelier No. 798, for Flat Deck.

Fig. 2419—One-Light Chandelier No. 784.

Fig. 2420—Two-Light Electric Bracket No. 7290.

Adams & Westlake Company.

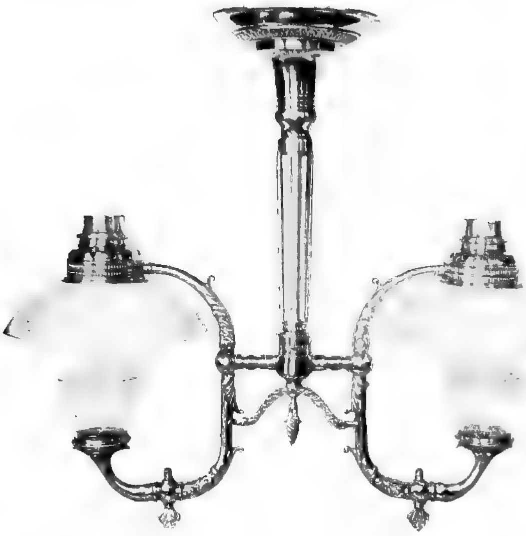


Fig. 2421—Two-Light Chandelier No. 202.

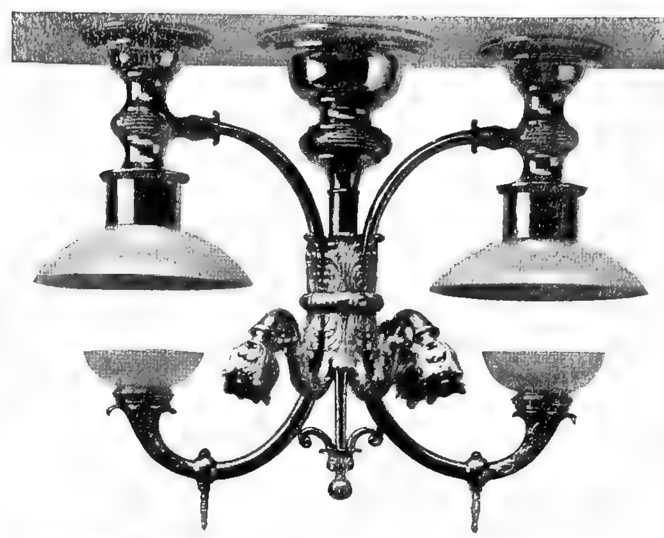


Fig. 2422—Two-Light Chandelier No. 302.

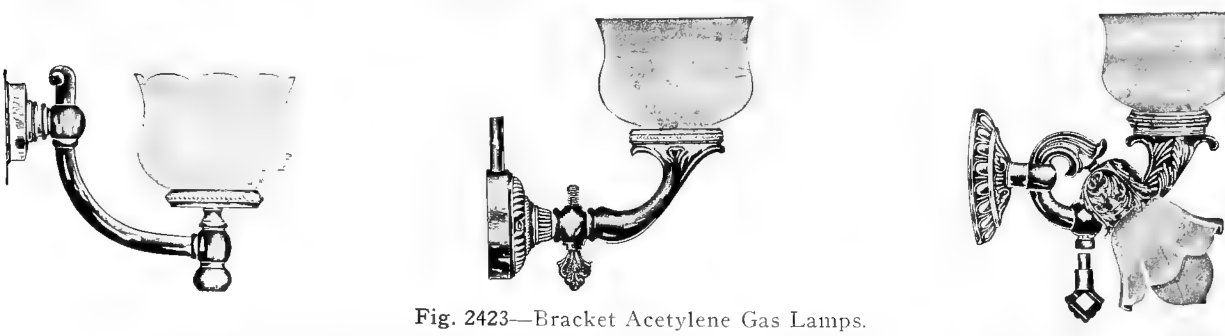


Fig. 2423—Bracket Acetylene Gas Lamps.

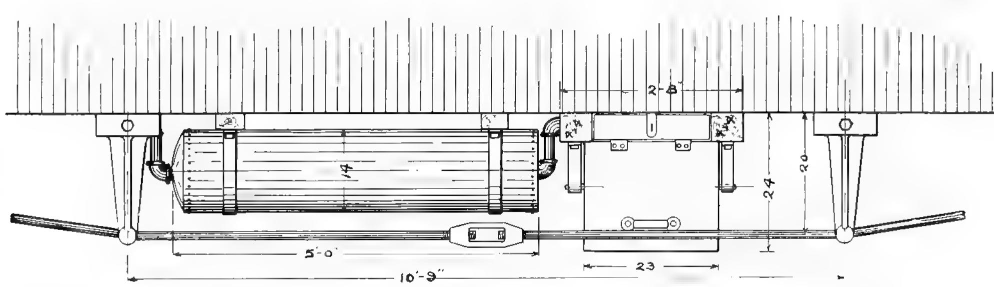


Fig. 2424—Application of Generator and Gas Tank Under Car; Avery System of Acetylene Gas Lighting.

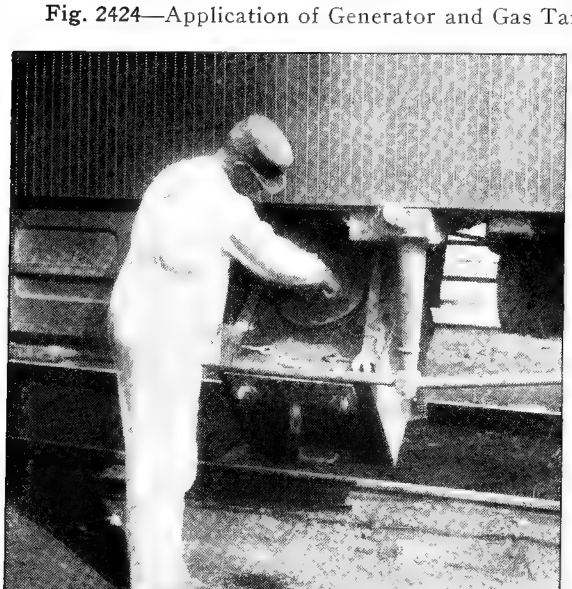


Fig. 2425—Generator Box Lowered for Recharging.

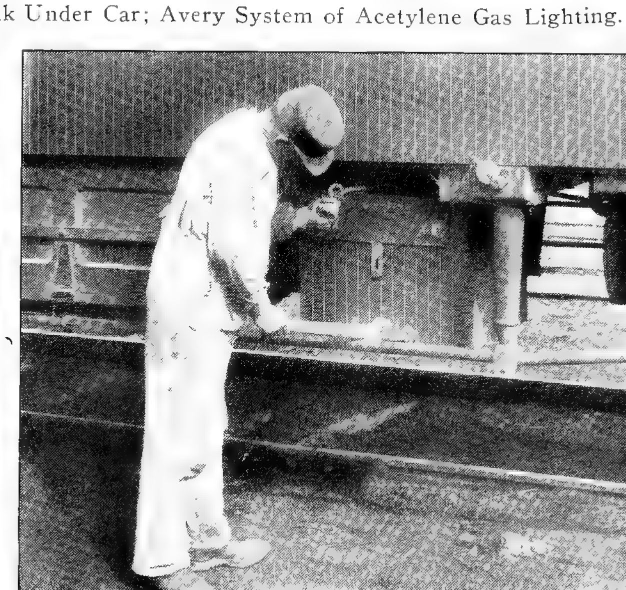


Fig. 2426—Generator Box Closed in Running Position.

Dayton Manufacturing Company.

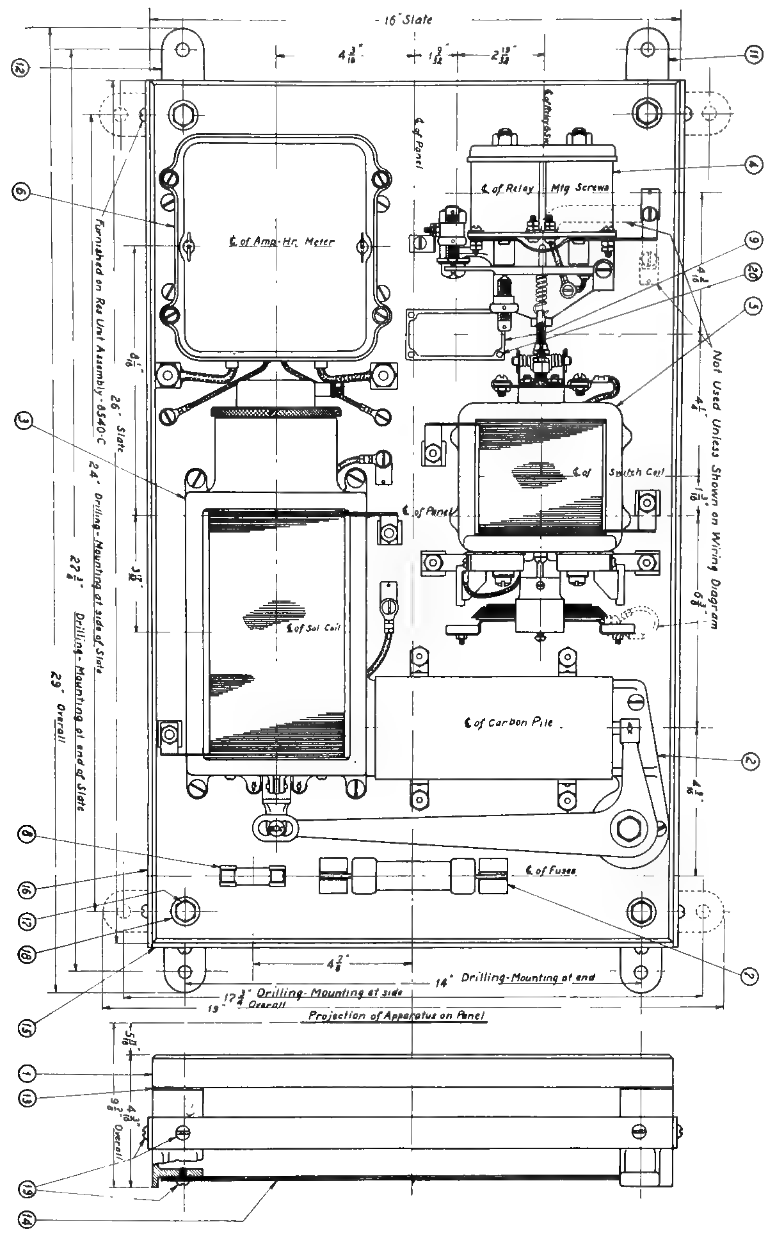


Fig. 2427—U. S. L. Type C Panel, with Ampere Hour Meter.

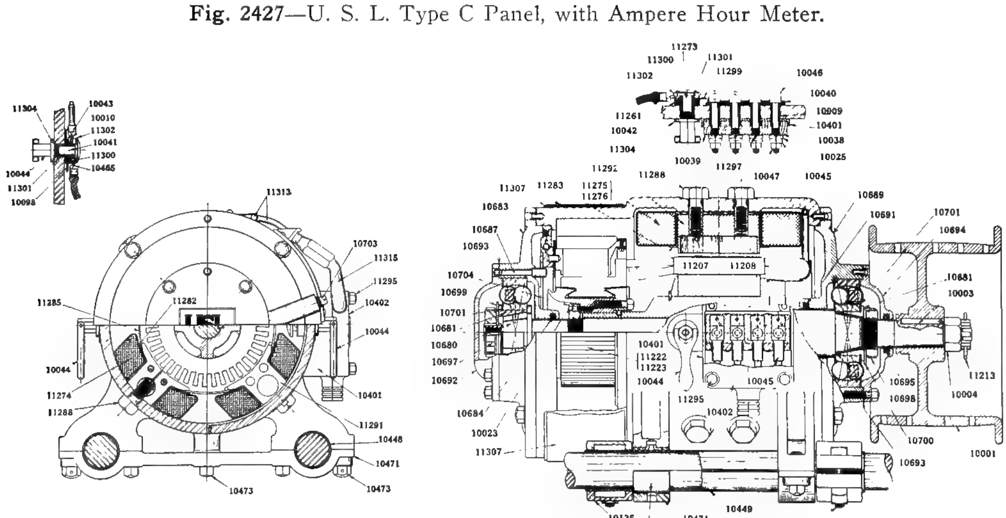


Fig. 2428—U. S. L. Generator, Type B.

United States Light & Heating Company.

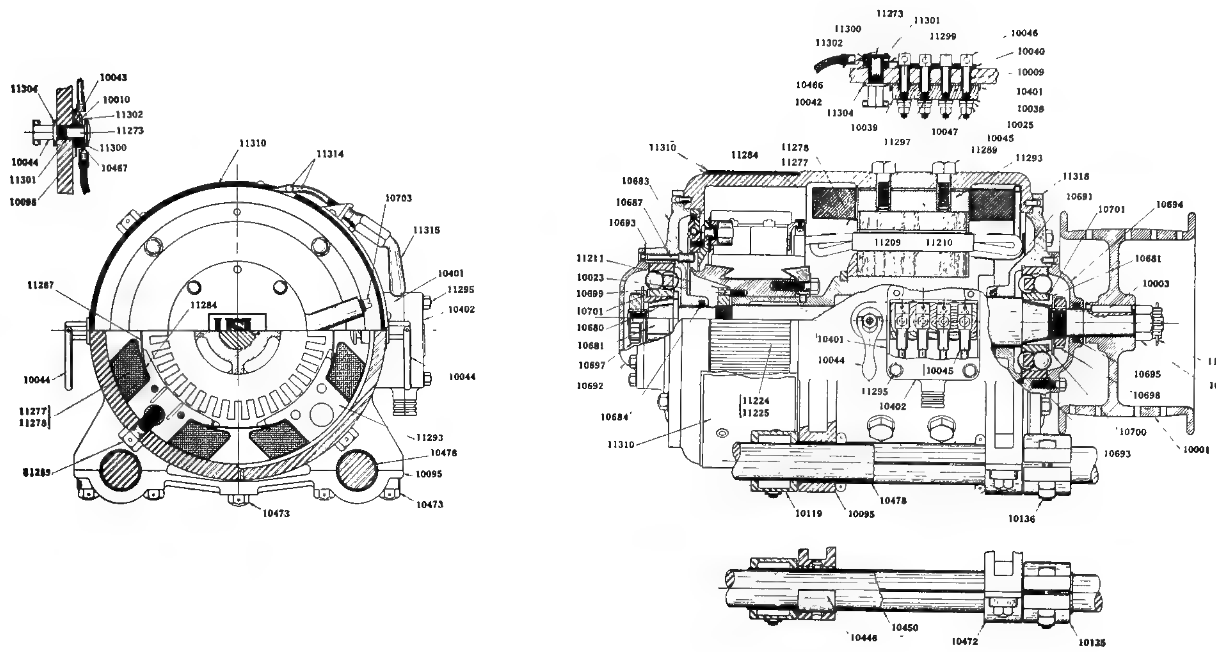


Fig. 2429—U. S. L. Generator, Type C.

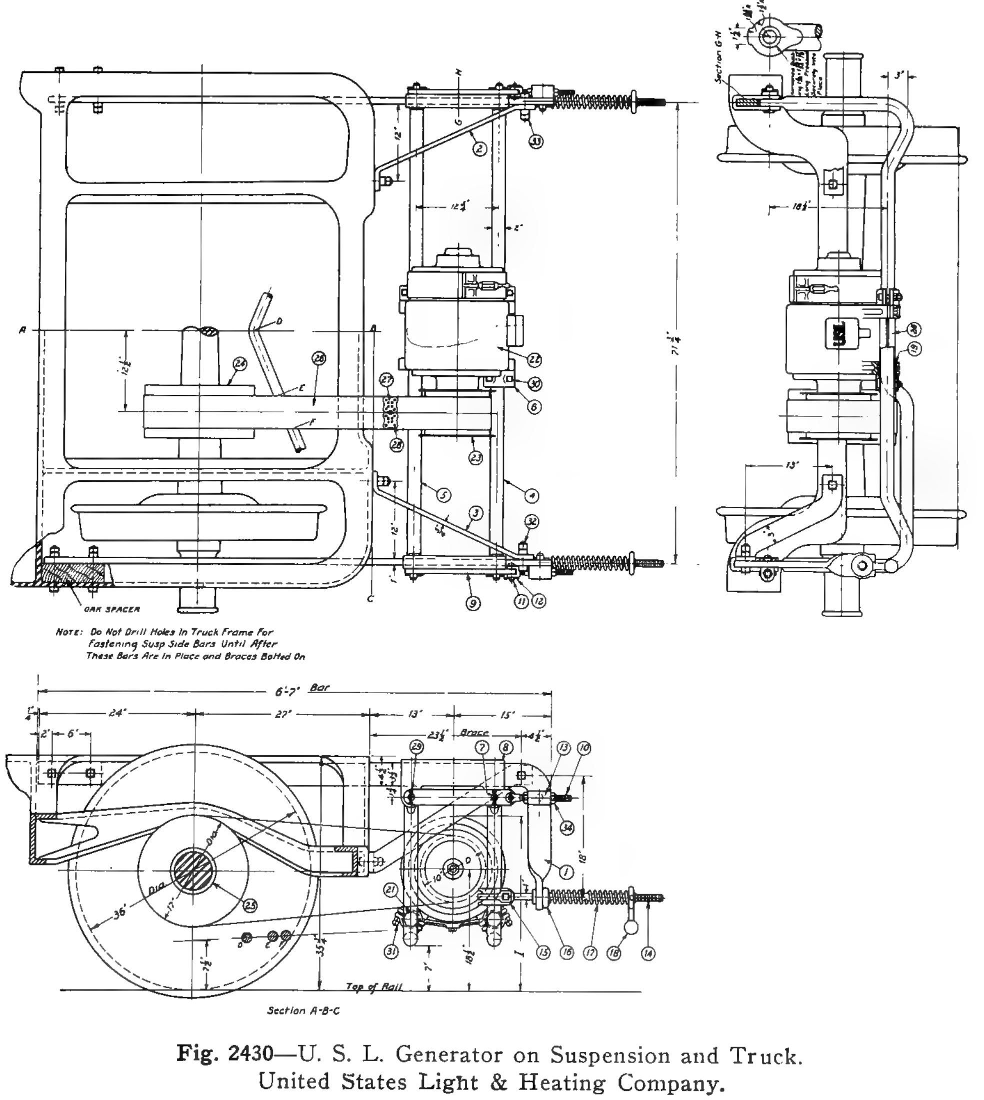


Fig. 2430—U. S. L. Generator on Suspension and Truck.
United States Light & Heating Company.

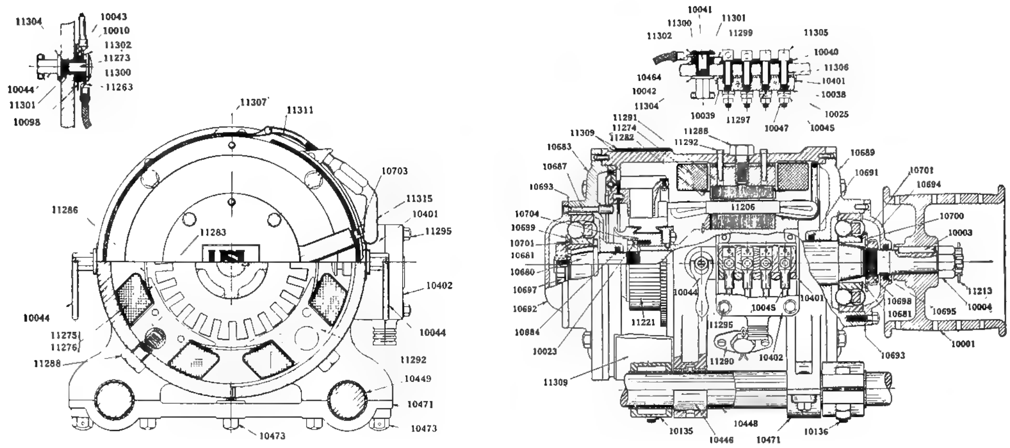
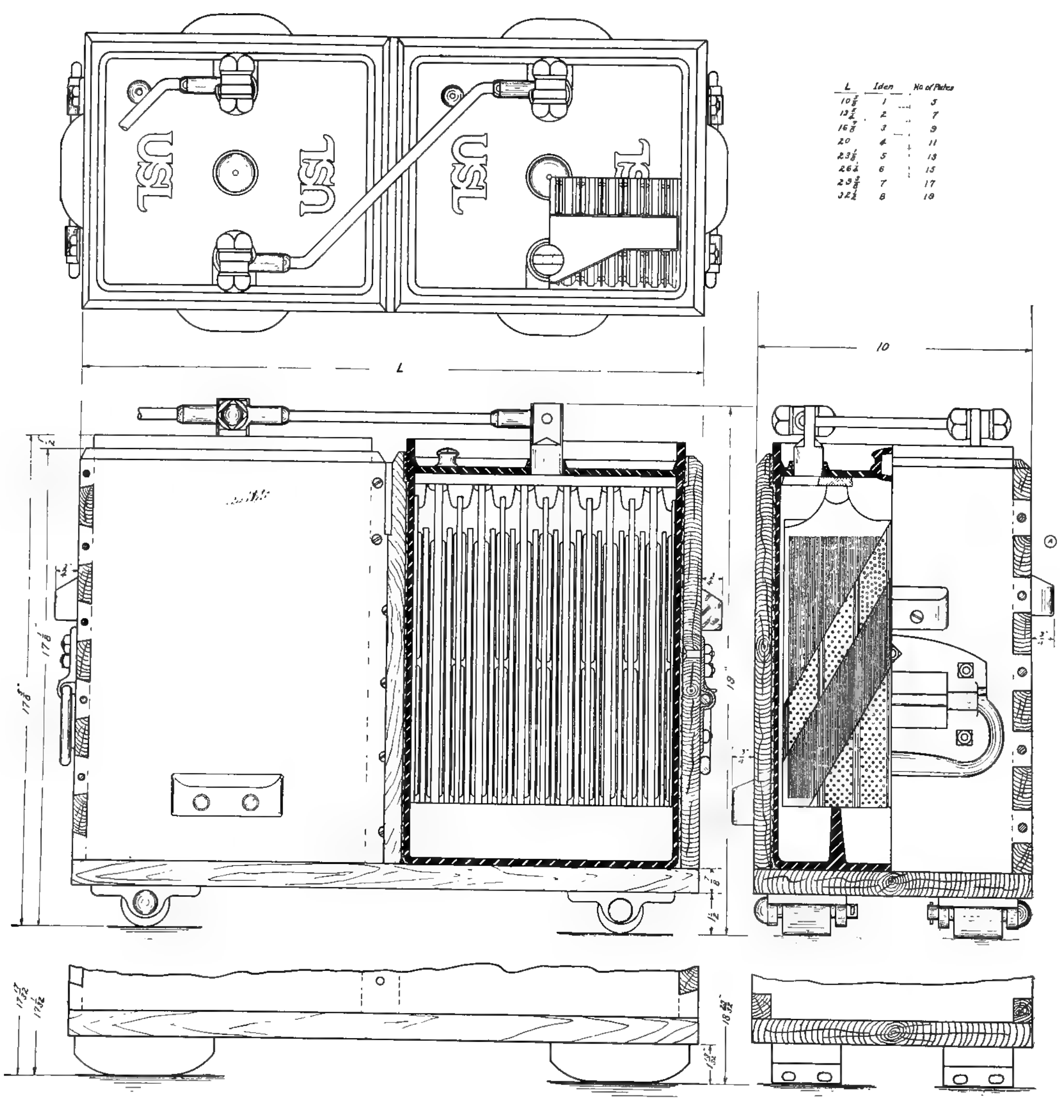


Fig. 2431—U. S. L. Generator, Type A.



L	Iden	No. of Plates
10 5/8	1	5
13 3/4	2	7
16 7/8	3	9
20	4	11
23 1/8	5	13
26 1/4	6	15
29 3/8	7	17
32 1/2	8	19

Fig. 2432—U. S. L., Type CLA, Two-Compartment Car Lighting Battery, in Lead-Lined Tank.

United States Light & Heating Company.

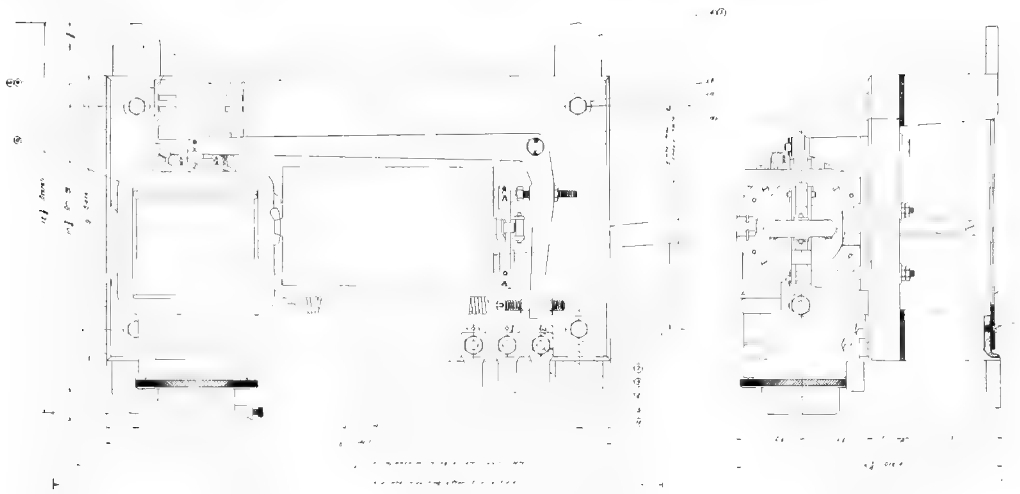


Fig. 2433—U. S. L. Type B Lamp Regulator, for Mounting Inside Locker. United States Light & Heating Company.

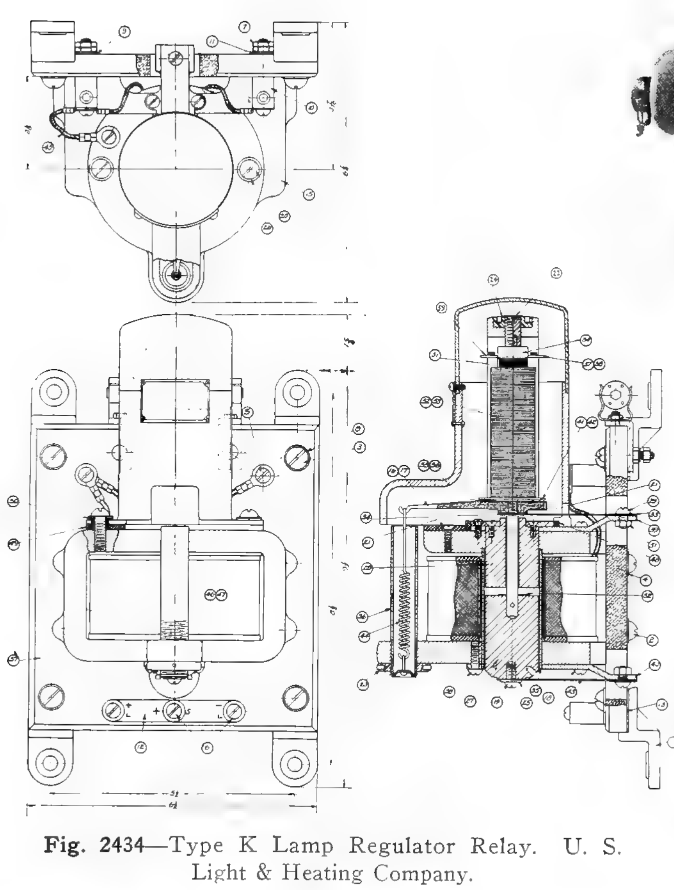


Fig. 2434—Type K Lamp Regulator Relay. U. S. Light & Heating Company.

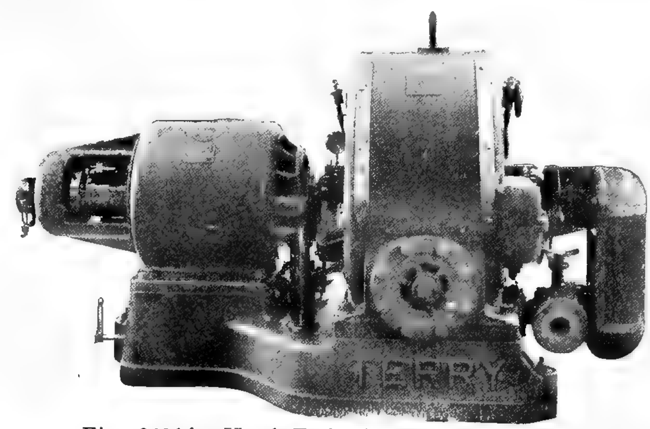


Fig. 2434A—Head End Lighting Set, 15-20 Kw., for Installation in Baggage Cars. Terry Steam Turbine Company.

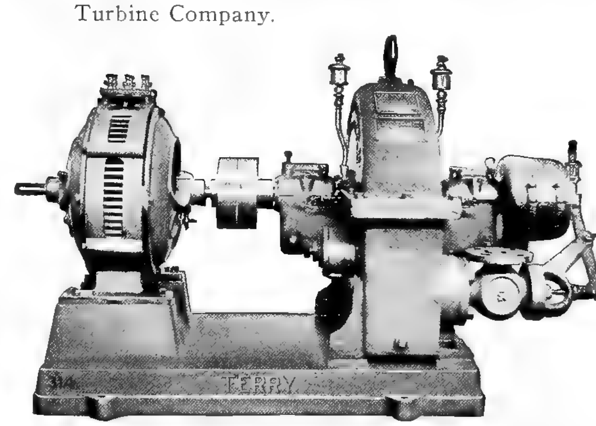


Fig. 2435—Head End Turbo-Generator Set for Wireless Telegraph Operation on Trains. Terry Steam Turbine Company.

Fig. 2436—Ball Bearing for Generator Brush Rocker

Fig. 2437—Ball Bearing for Generator Armature.

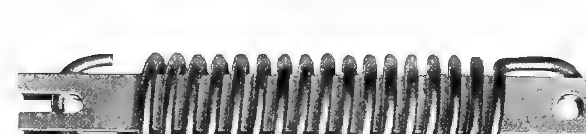


Fig. 2438—Tension Spring for Underframe Suspension.

Safety Car Heating & Lighting Company.

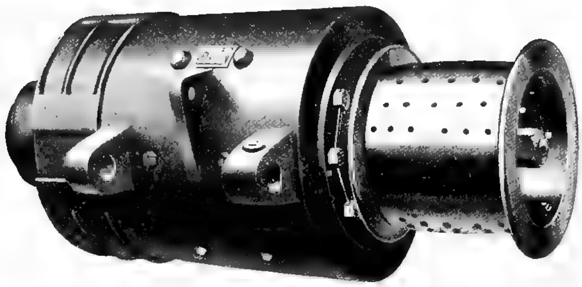


Fig. 2439—Generator with Ball Bearings.

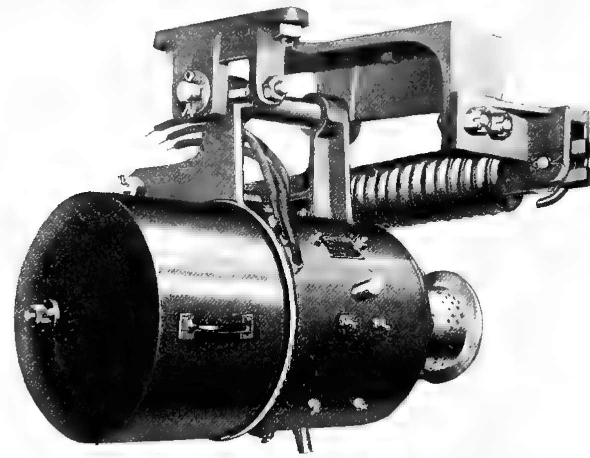


Fig. 2440—"Underframe" Generator.

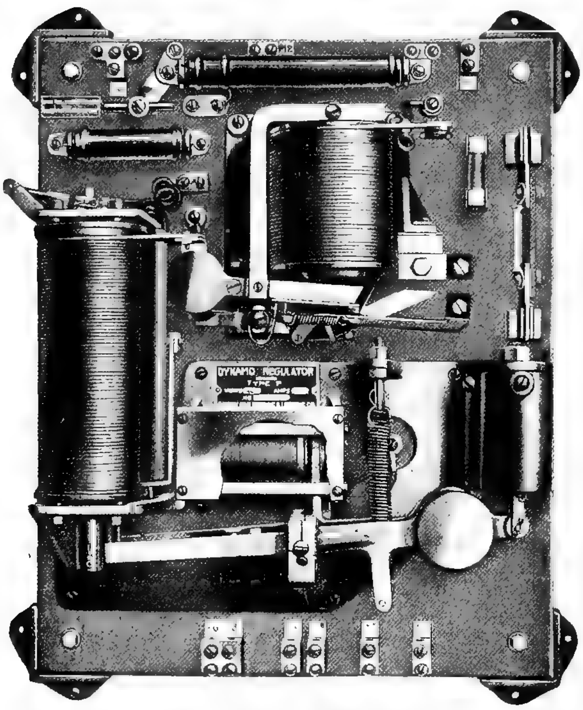


Fig. 2441—Type F Dynamo Regulator.

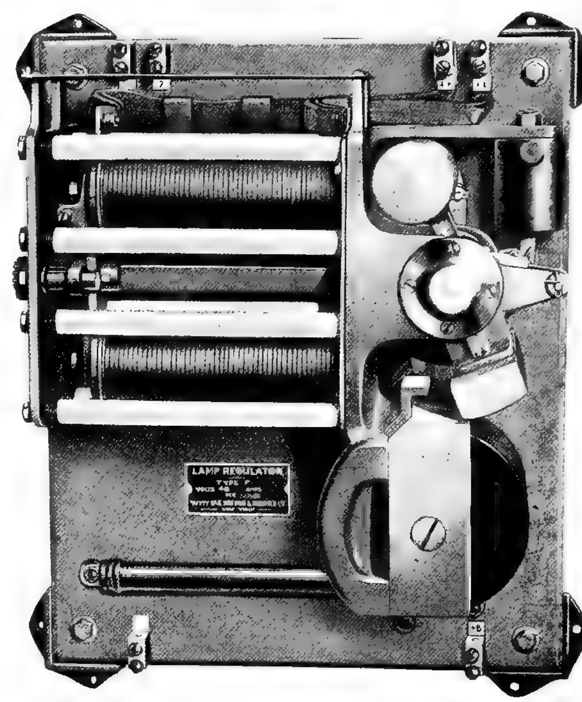


Fig. 2442—Type F Lamp Regulator.

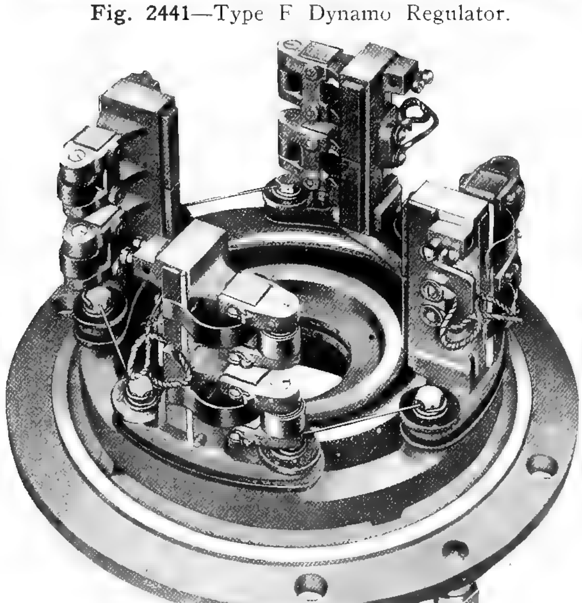


Fig. 2443—Pole Changer Brush Rigging.

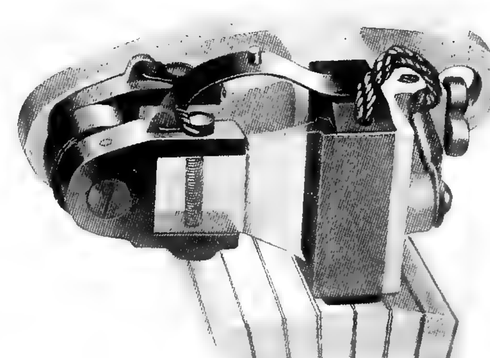


Fig. 2444—Brush Box and Brush Pressure Spring.

Safety Car Heating & Lighting Company.

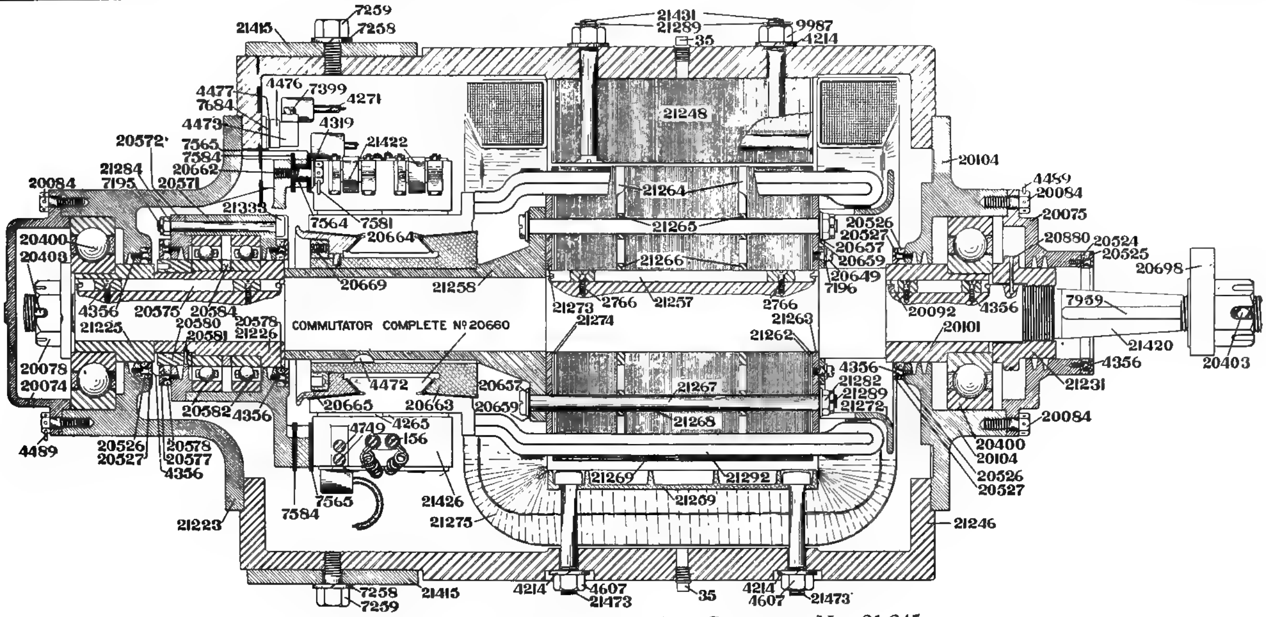


Fig. 2445—Section Through 4 kw. Generator No. 21,245.

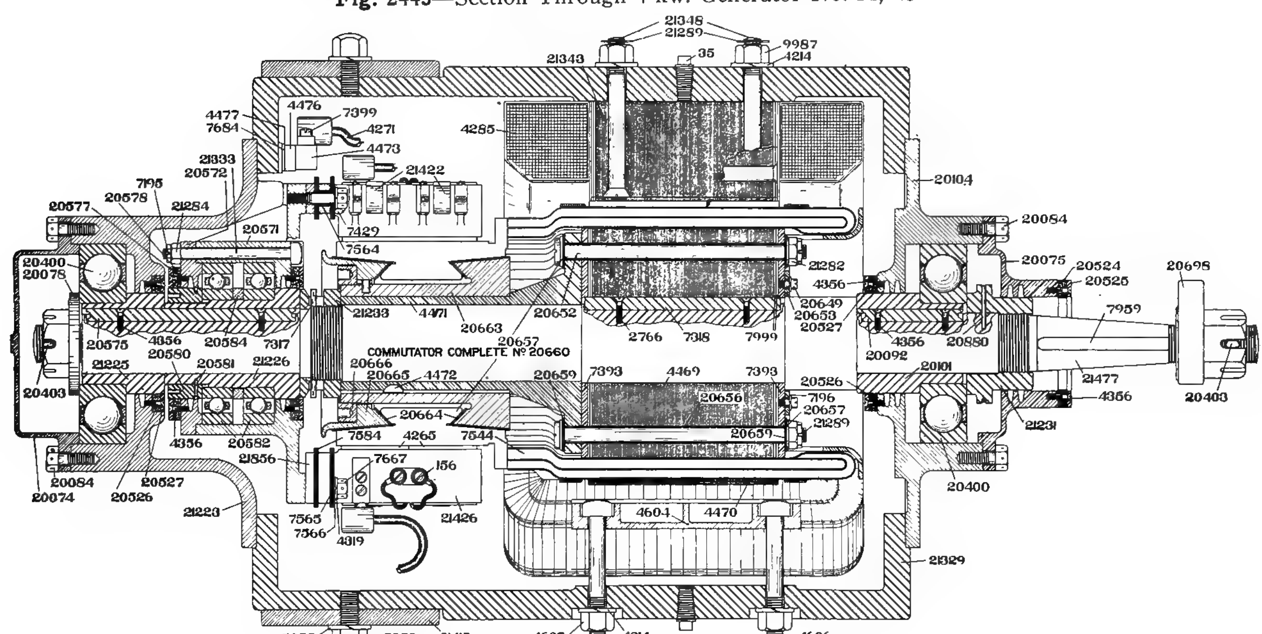


Fig. 2446—Section Through 2.6 kw. Generator No. 21,250.

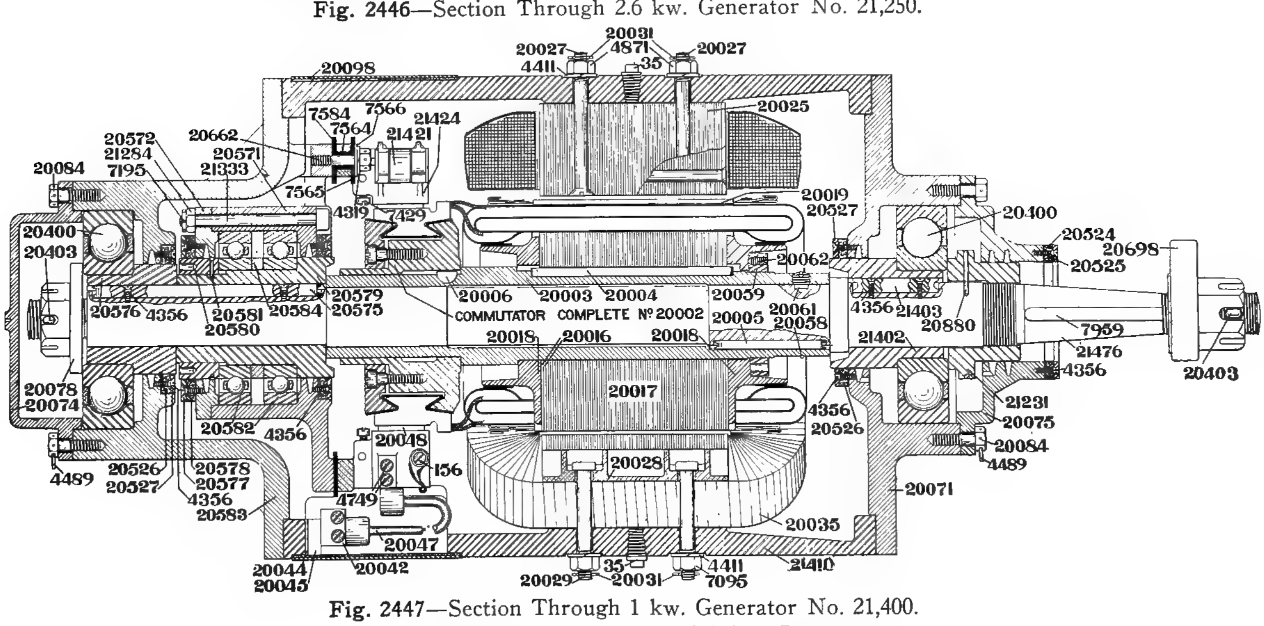
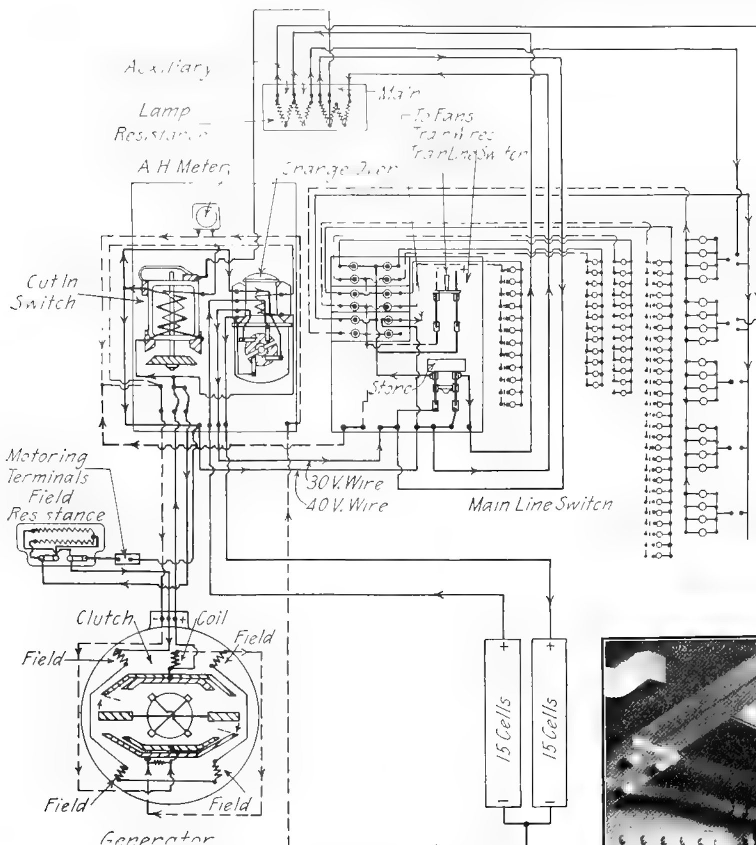


Fig. 2447—Section Through 1 kw. Generator No. 21,400.
Safety Car Heating & Lighting Company.



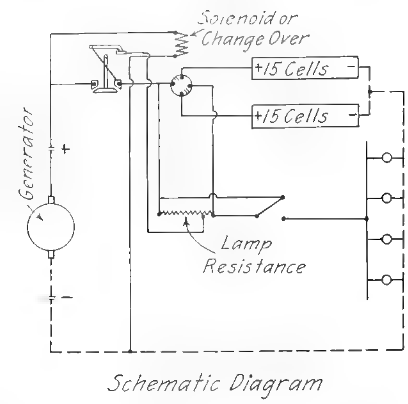


Fig. 2448 — Wiring Diagram for Stone Improved Lighting System. Franklin Railway Supply Company.

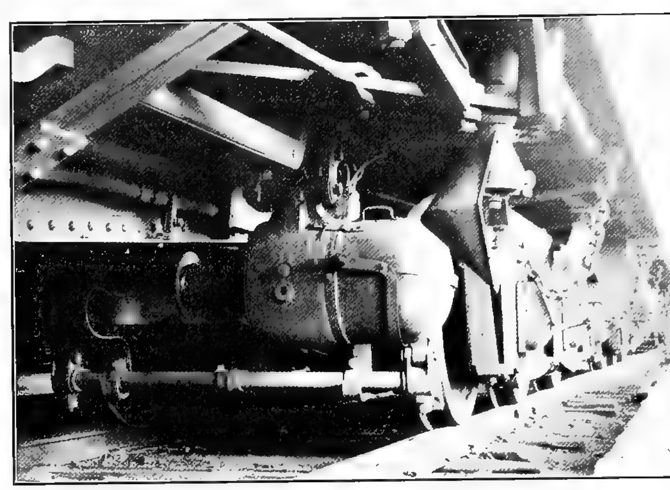


Fig. 2449—Application of Stone Improved Lighting System to Pullman Car. Franklin Railway Supply Company.

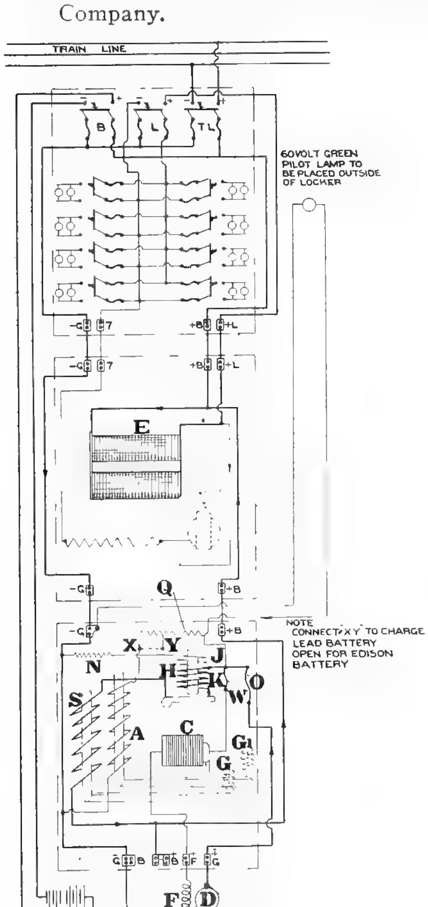


Fig. 2450 — Type F Wiring Diagram. Safety Car Heating & Lighting Company.

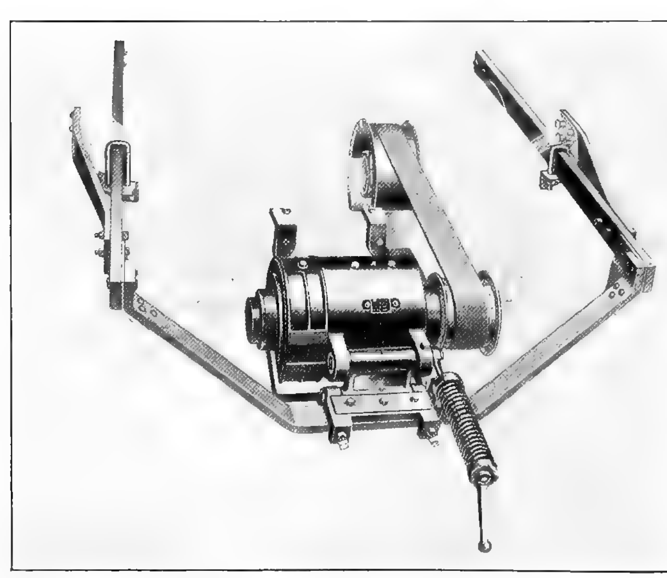


Fig. 2451—Generator Suspension on Truck. Safety Car Heating & Lighting Company.

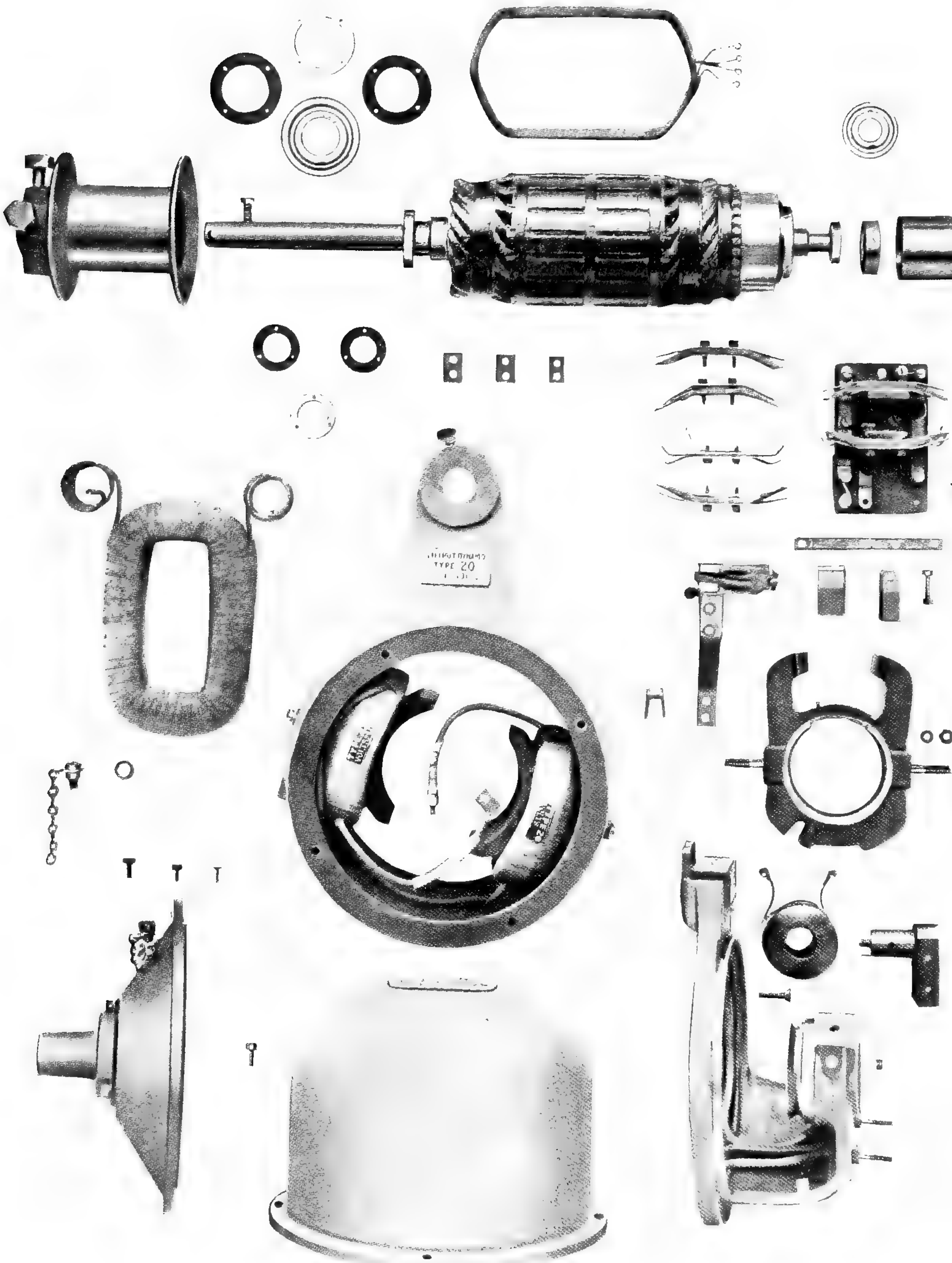


Fig. 2452—Details of Liliput Dynamo, Stone Improved Train Lighting System.

Franklin Railway Supply Company.

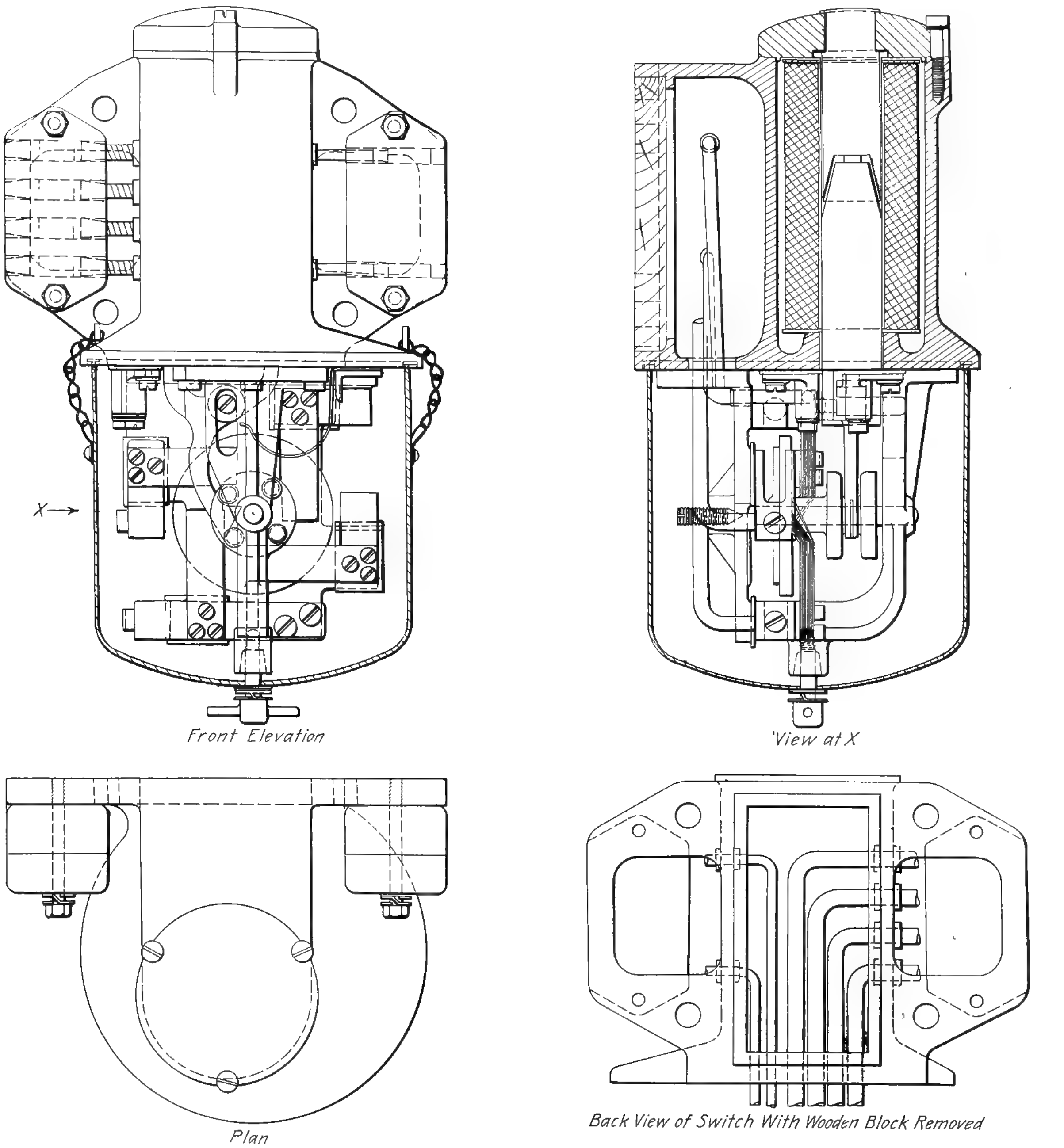


Fig. 2453—Magnetic Changeover Switch, Stone Improved Lighting System.

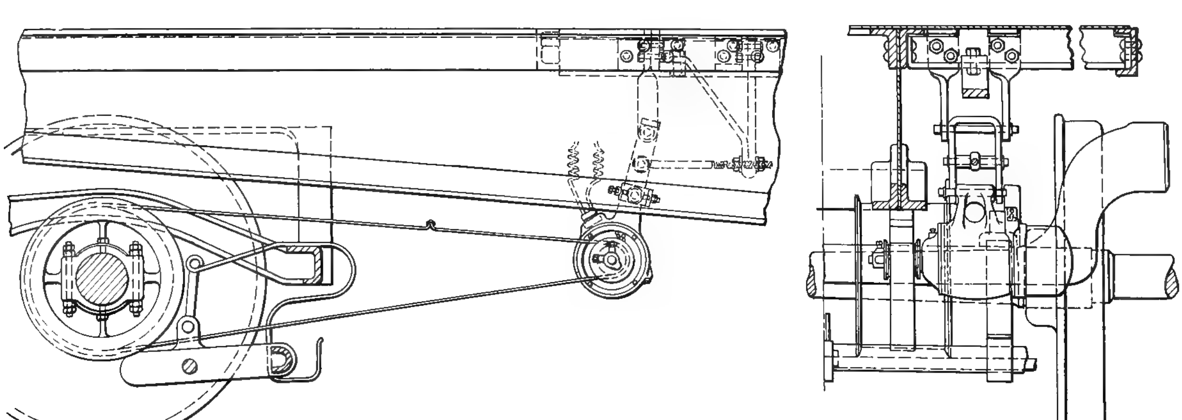


Fig. 2454—General Application, Stone Improved Lighting System.
Franklin Railway Supply Company.

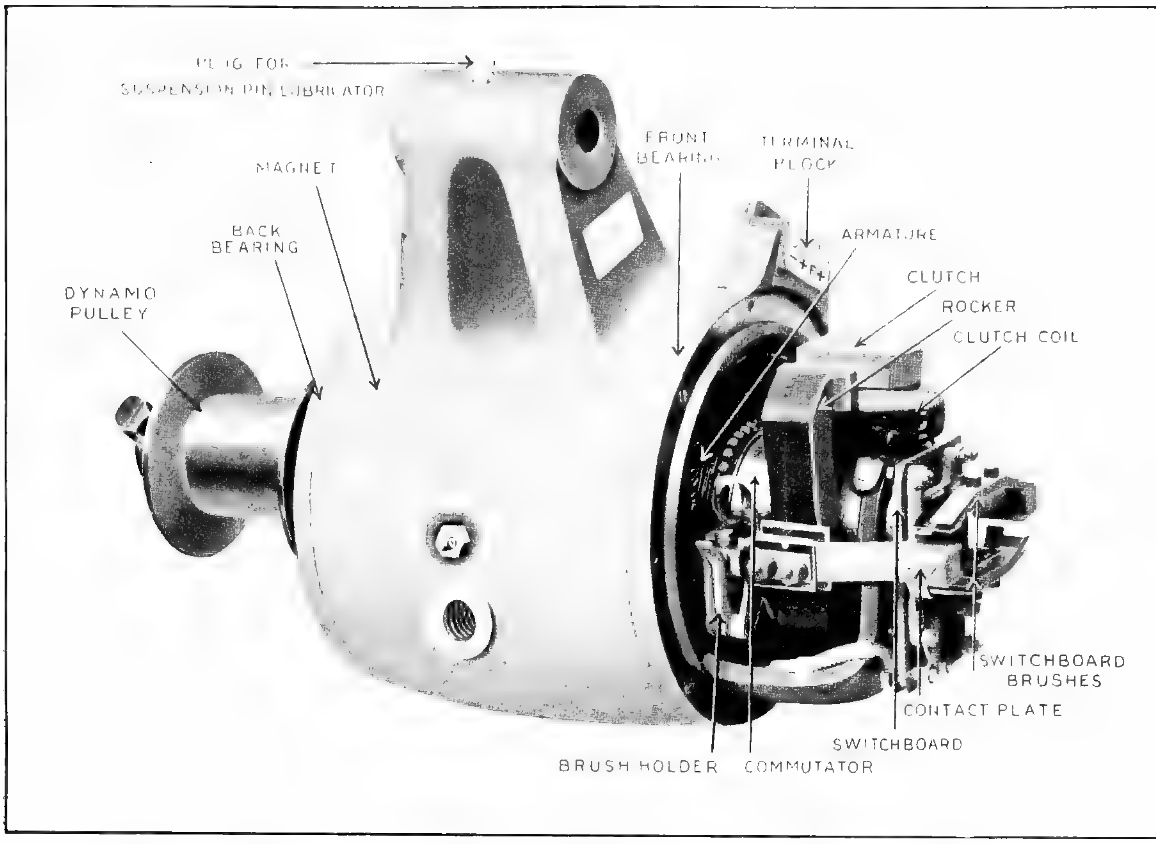


Fig. 2455—Liliput Dynamo with Cover Removed. Franklin Railway Supply Company.

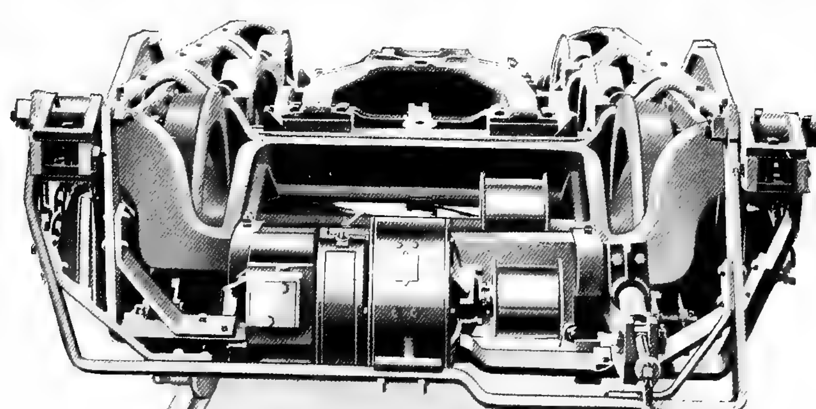


Fig. 2456—Two-Point Swinging Suspension on Commonwealth Truck. Consolidated Railway Electric Lighting & Equipment Company.

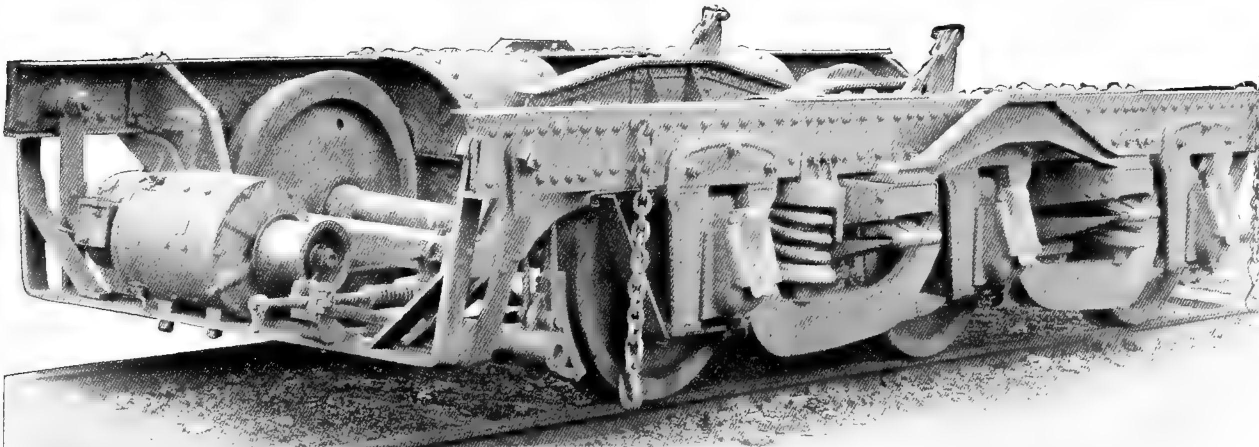


Fig. 2457—Two-Point Swinging Suspension on Built-Up Truck with Side Sills Extended. Consolidated Railway Electric Lighting & Equipment Company.

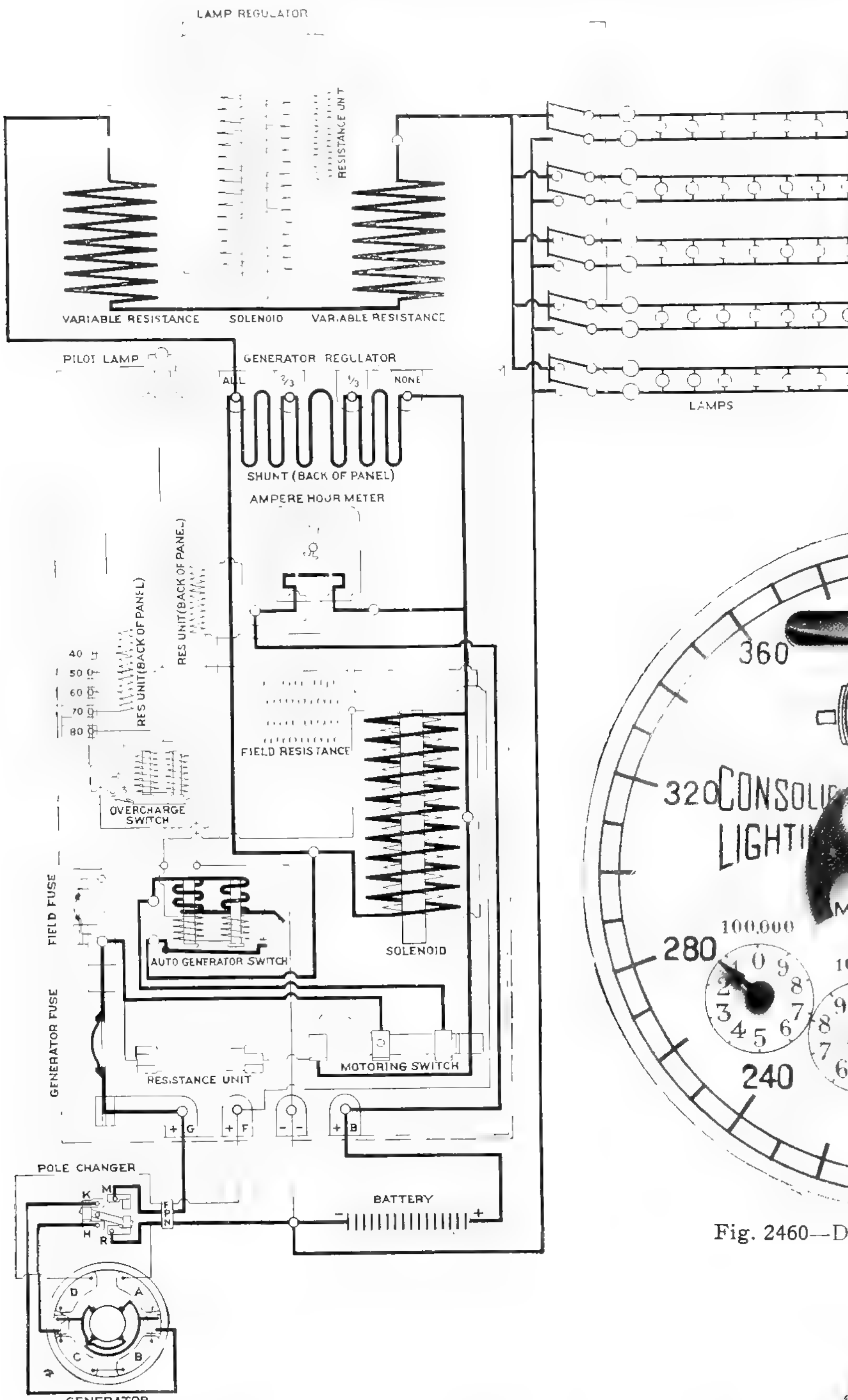


Fig. 2458—Wiring Diagram of Consolidated Axle Light System.

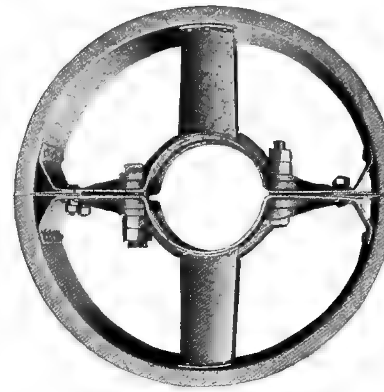


Fig. 2459 Axle Pulley.

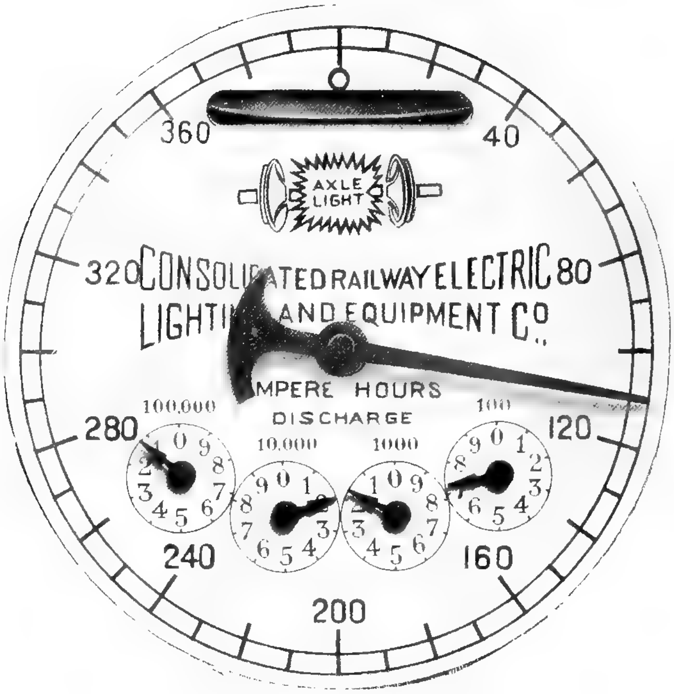


Fig. 2460—Dial of Ampere-Hour Meter.

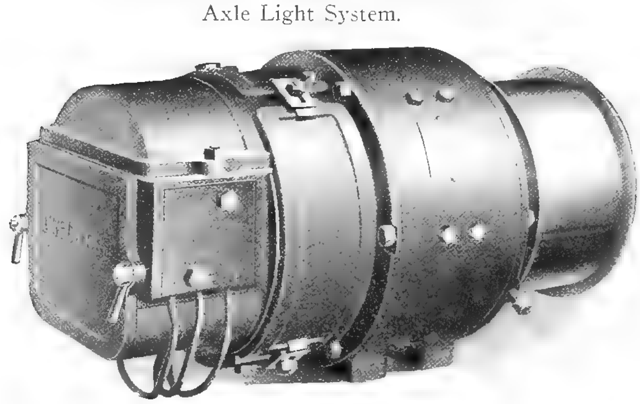


Fig. 2461—Type D-5 Generator.

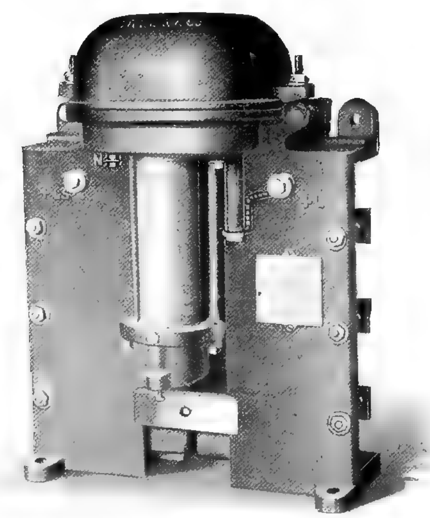


Fig. 2462—Type L Lamp Regulator.

Consolidated Railway Electric Lighting & Equipment Company.

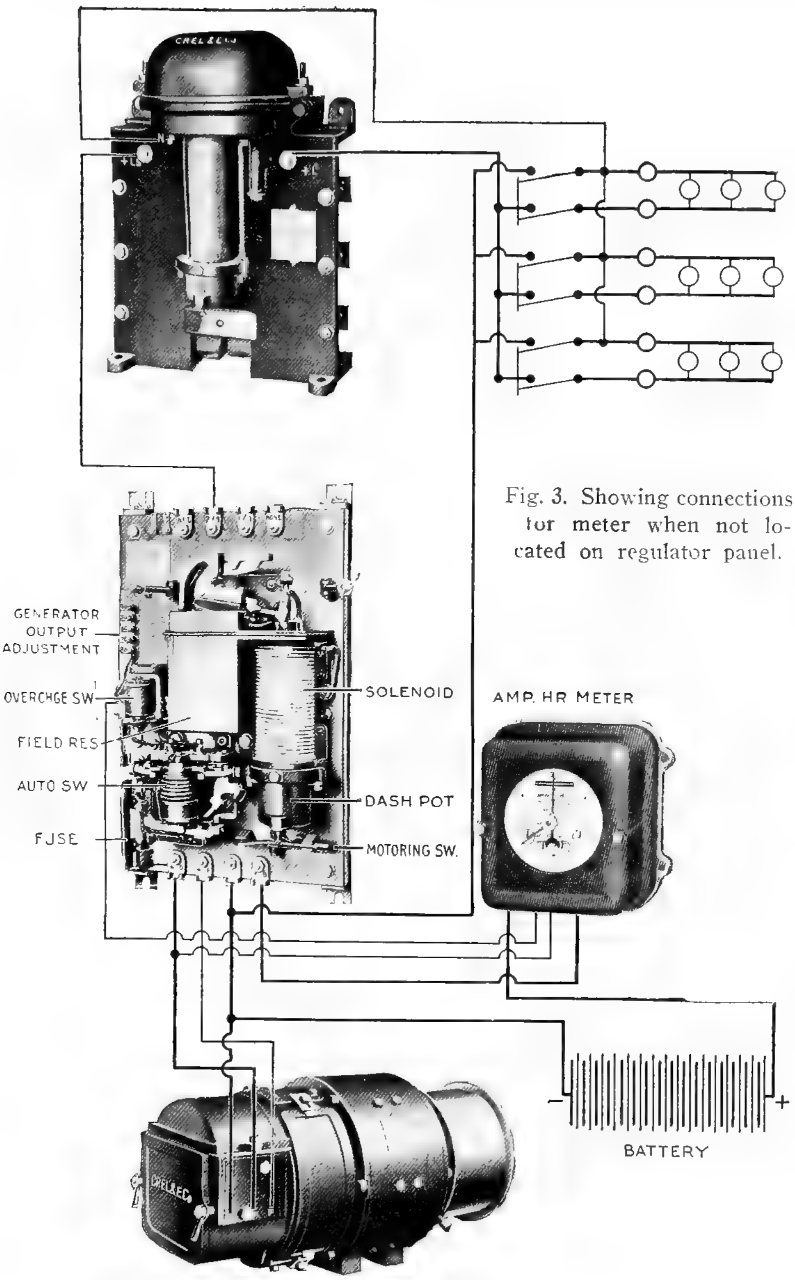


Fig. 2463—Diagram of Connections on a Car Between Dynamo, Batteries and Regulators.

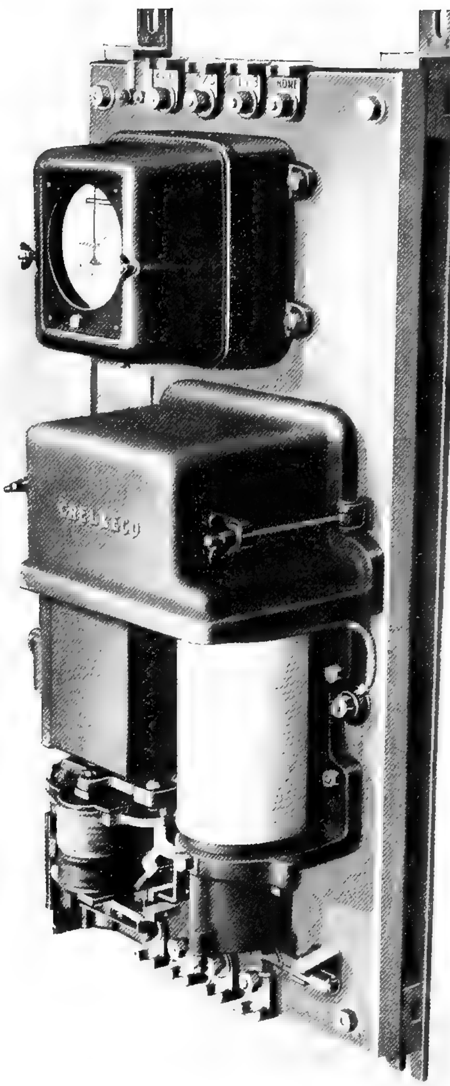


Fig. 2464—Type L-3 Regulator Ampere-Hour Meter Control.

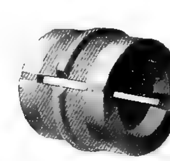


Fig. 2466 -Axle Pulley Bushing.

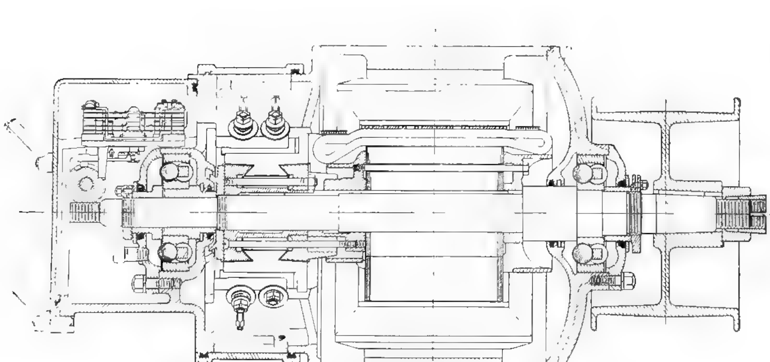


Fig. 2465—Section Through Type D-5 Ball Bearing Dynamo.

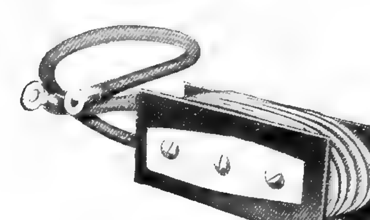


Fig. 2467—Interpole.

Consolidated Railway Electric Lighting & Equipment Company.

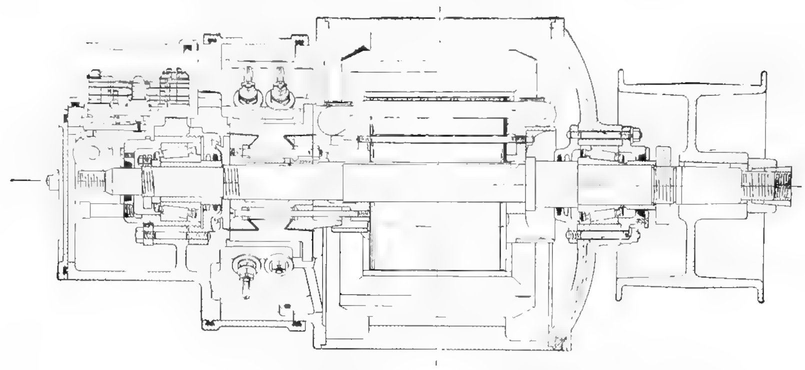


Fig. 2468—Section Through Dynamo with Timken Roller Bearings. Consolidated Railway Electric Lighting and Equipment Company.

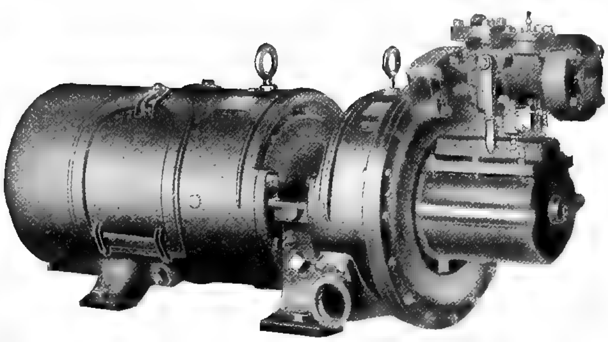


Fig. 2469—Type CC, 2 Pole, 20-25 Kw., Curtis Steam Turbine for Train Lighting; Speed, 4,500 R. P. M. Located on and Takes Steam Supply from Locomotive.

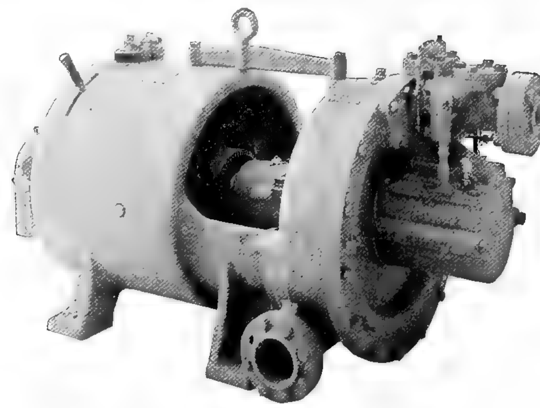


Fig. 2470—Baggage Car Type of Curtis Steam Turbine Generator Set, for Train Lighting.

General Electric Company.

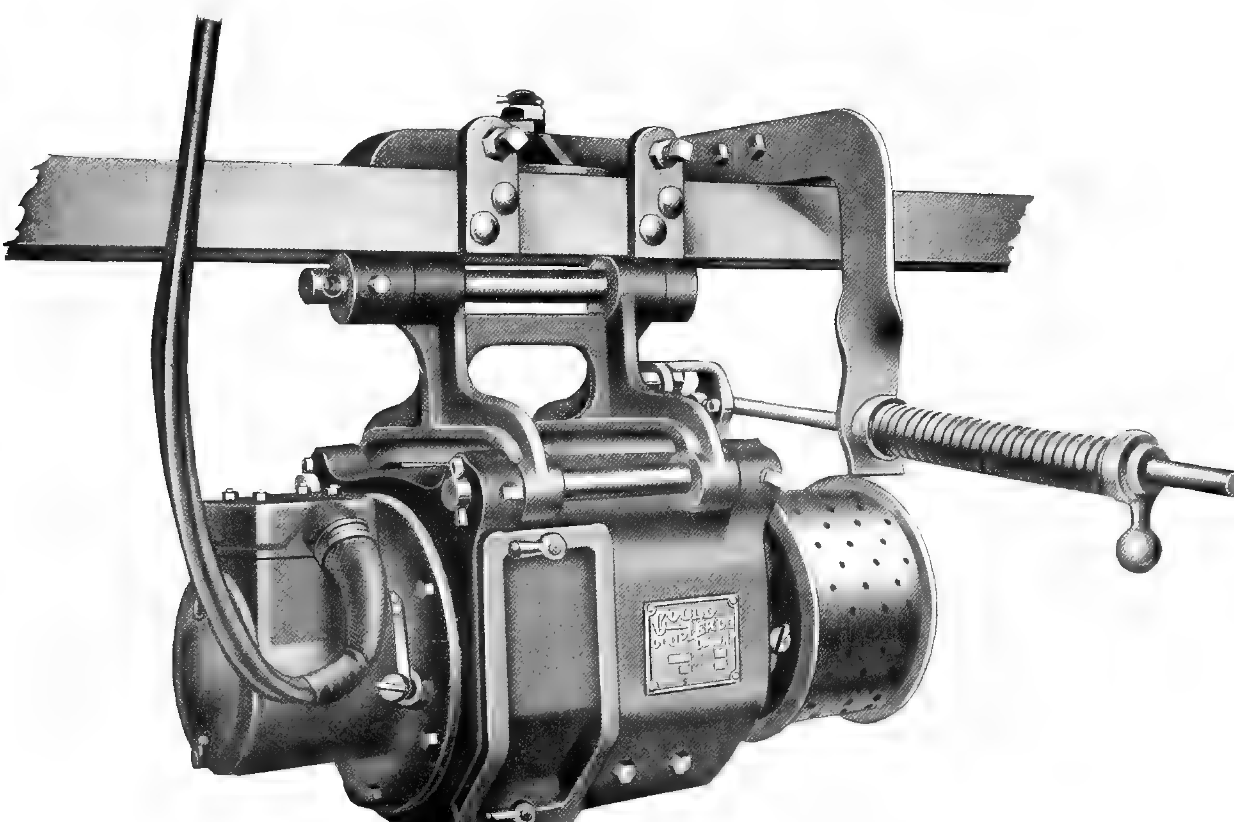


Fig. 2471—Generator Mounting for Car Underframe. Gould Coupler Company.

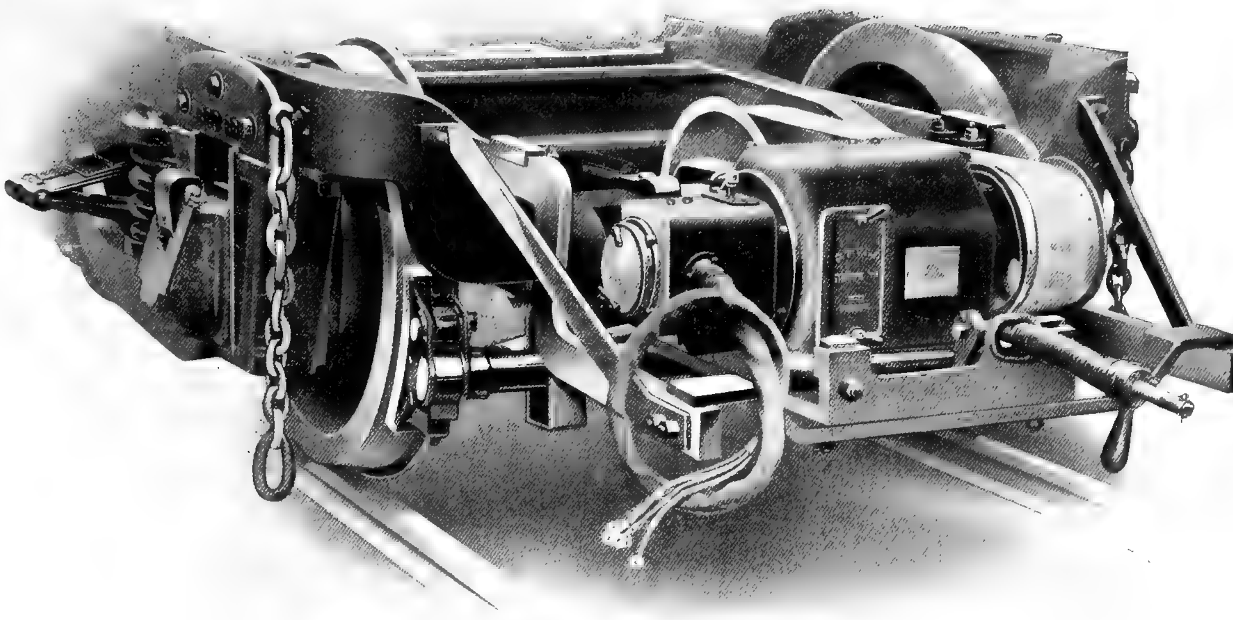


Fig. 2472—Generator Mounted on Drop Type Suspension.

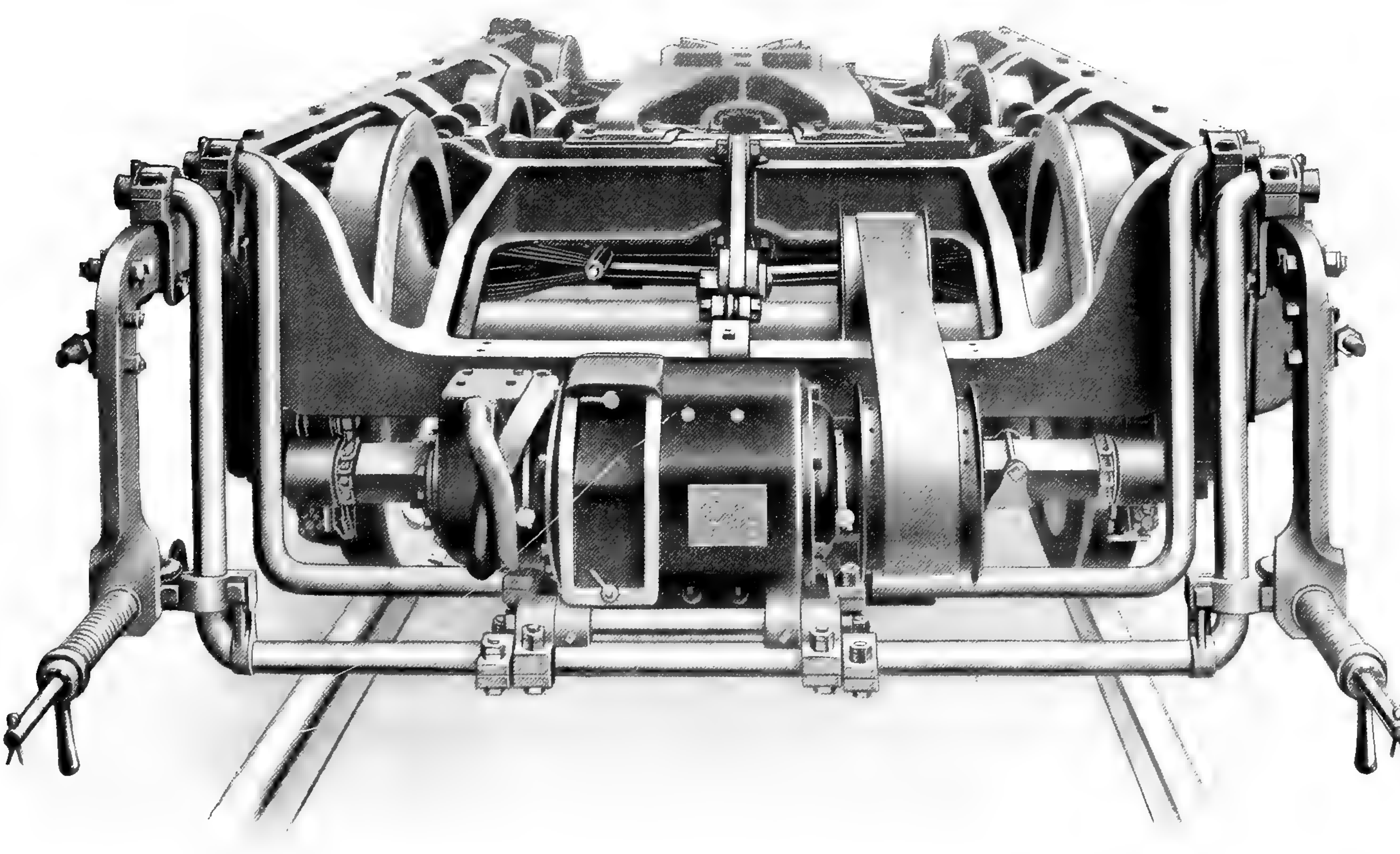


Fig. 2473—Generator Mounted on Link Type Suspension.
Gould Coupler Company.

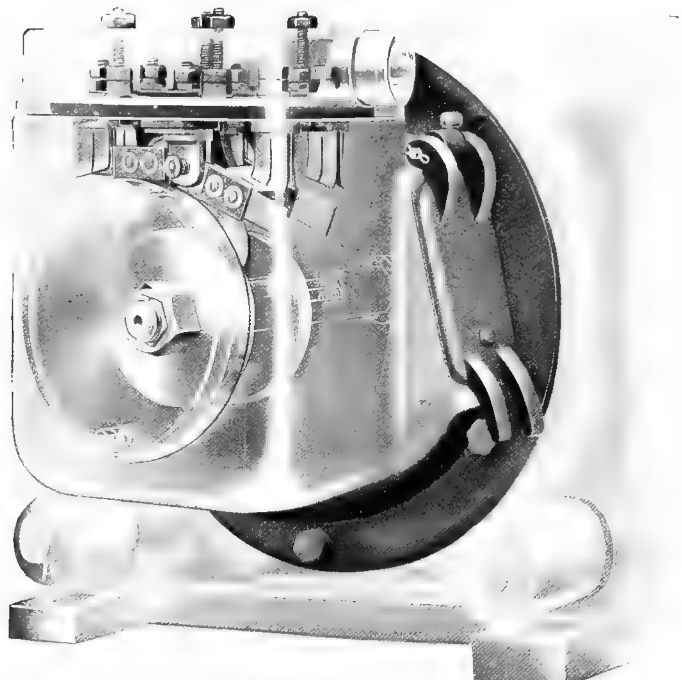


Fig. 2474—Mechanical Pole Changer.

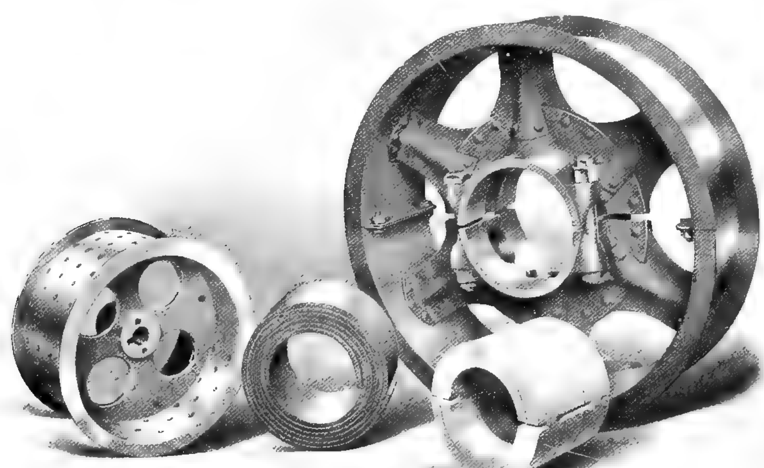


Fig. 2475—Generator Pulley, Belt, Axle Pulley and Bushing.

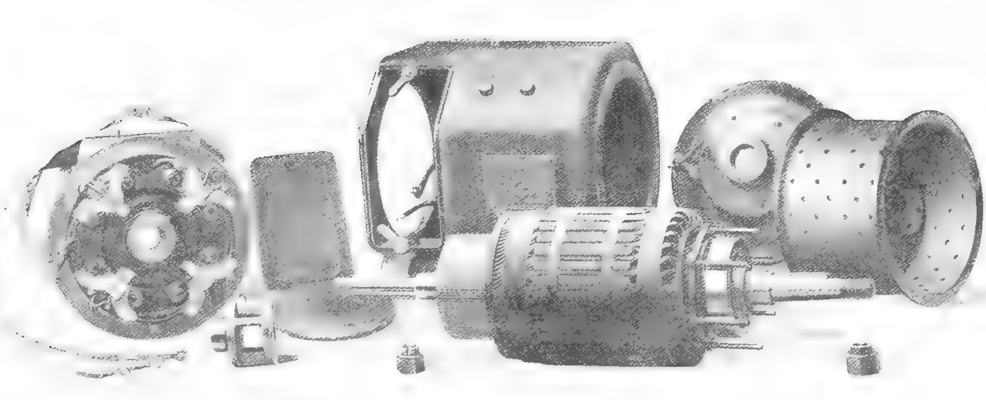


Fig. 2476—Main Parts of Ball Bearing Generator.
Gould Coupler Company.

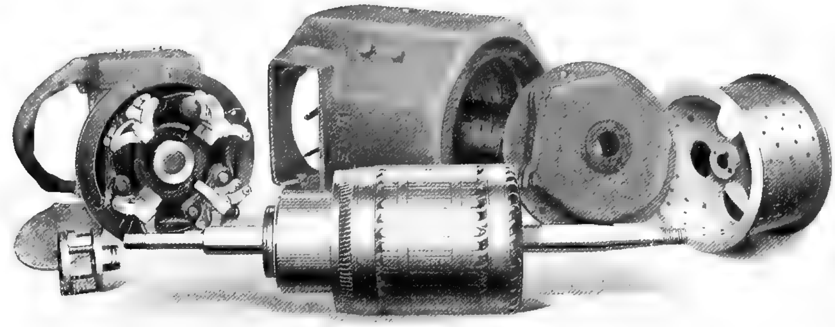


Fig. 2477—Main Parts of Plain Bearing Generator, Gould Simplex System of Car Lighting.

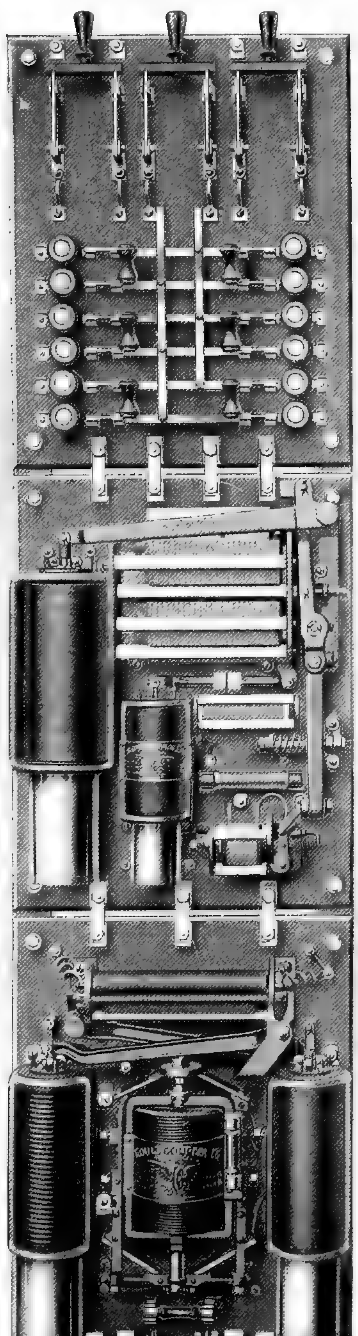


Fig. 2478—Regulator Panels Arranged for Mounting in Locker, Showing Type M Lamp Regulator and Type BB Generator Regulator.

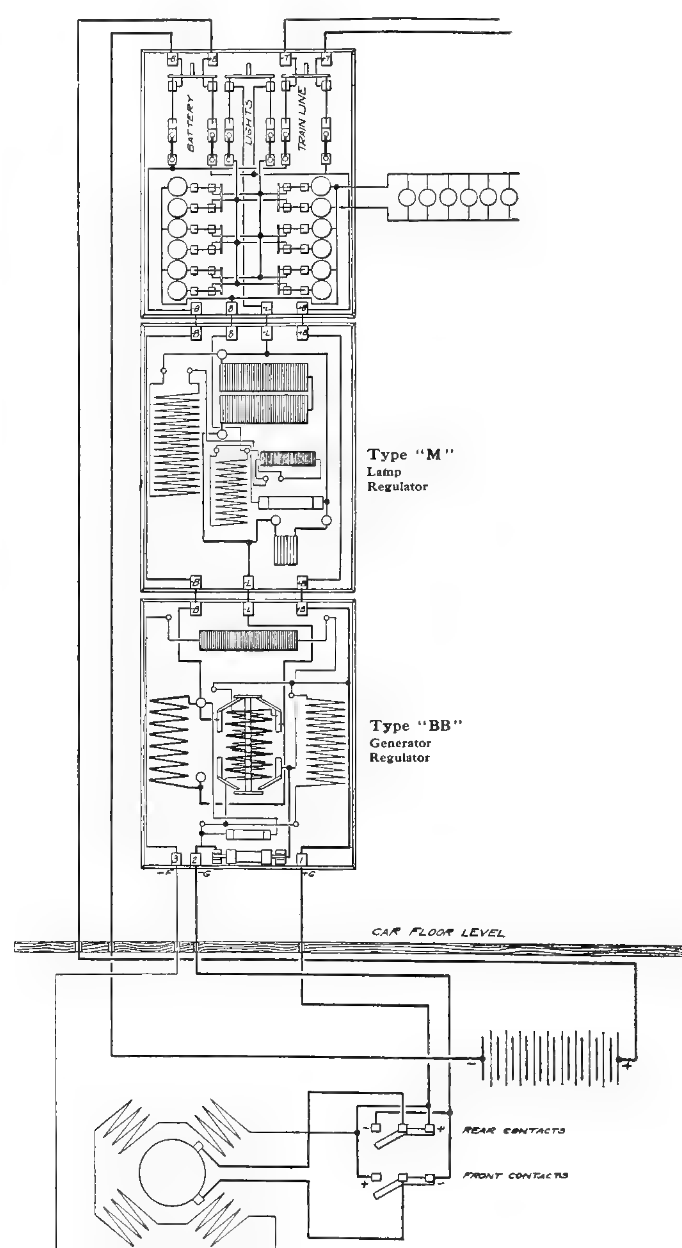


Fig. 2479—Wiring Diagram Showing Regulators.

Gould Coupler Company.

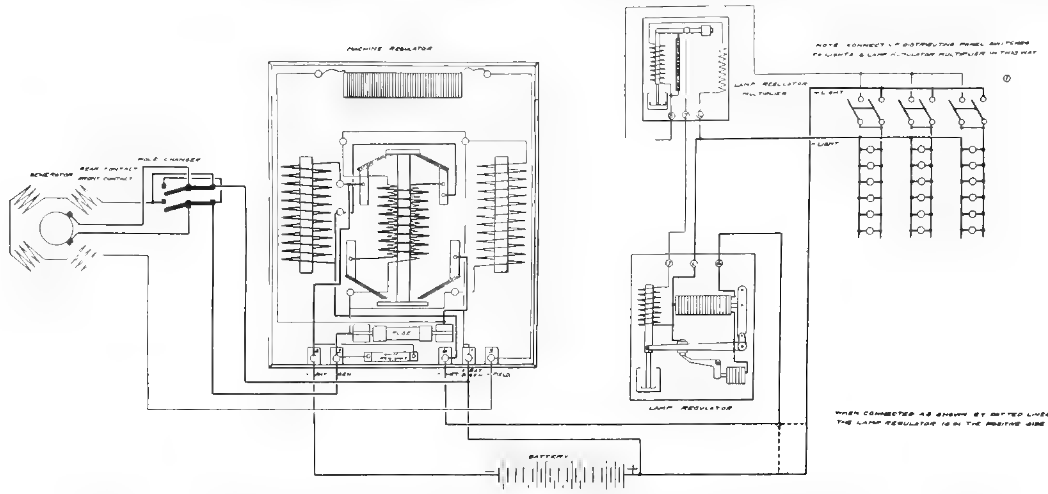


Fig. 2480—Wiring Diagram Showing Type B Generator Regulator, Type B Lamp Regulator and Type A Multiplier.

Fig. 2481—Car Lighting Generator, Plain Bearing Type, 30 and 60 Volt, 1, 2, 3 and 4 Kw. Capacity.

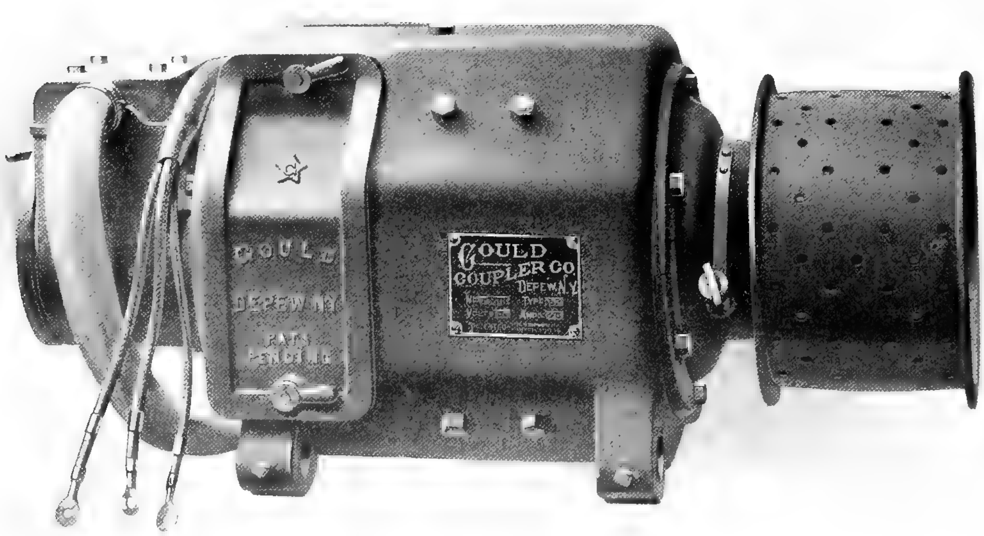


Fig. 2482—Car Lighting Generator, Ball Bearing Type. 30 and 60 Volt, 1, 2, 3 and 4 Kw. Capacity.

Gould Coupler Company.

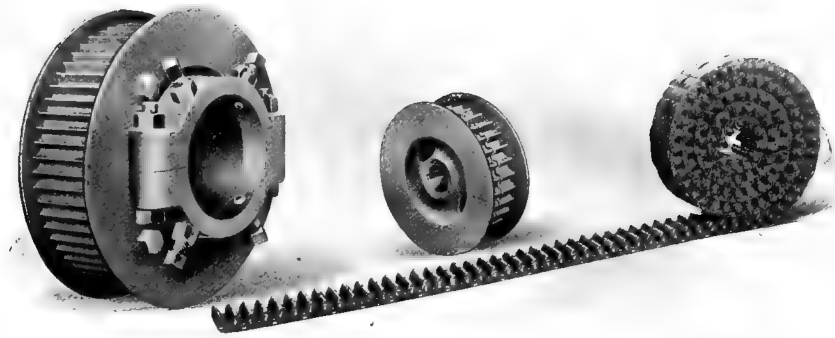


Fig. 2483—Axle and Generator Sprockets; and Chain.

Fig. 2484—Type B Generator Regulator.

Gould Coupler Company.

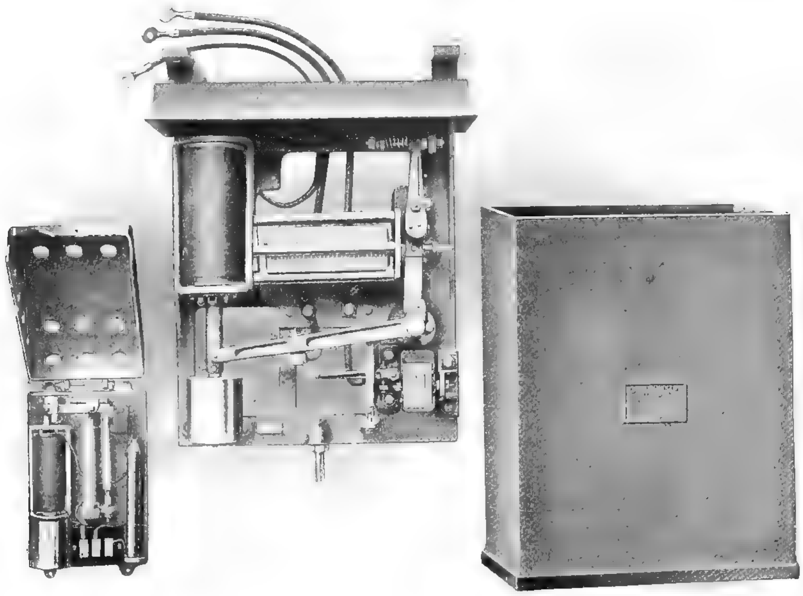


Fig. 2485—Type B Lamp Regulator for Outside Mounting. Gould Coupler Company.

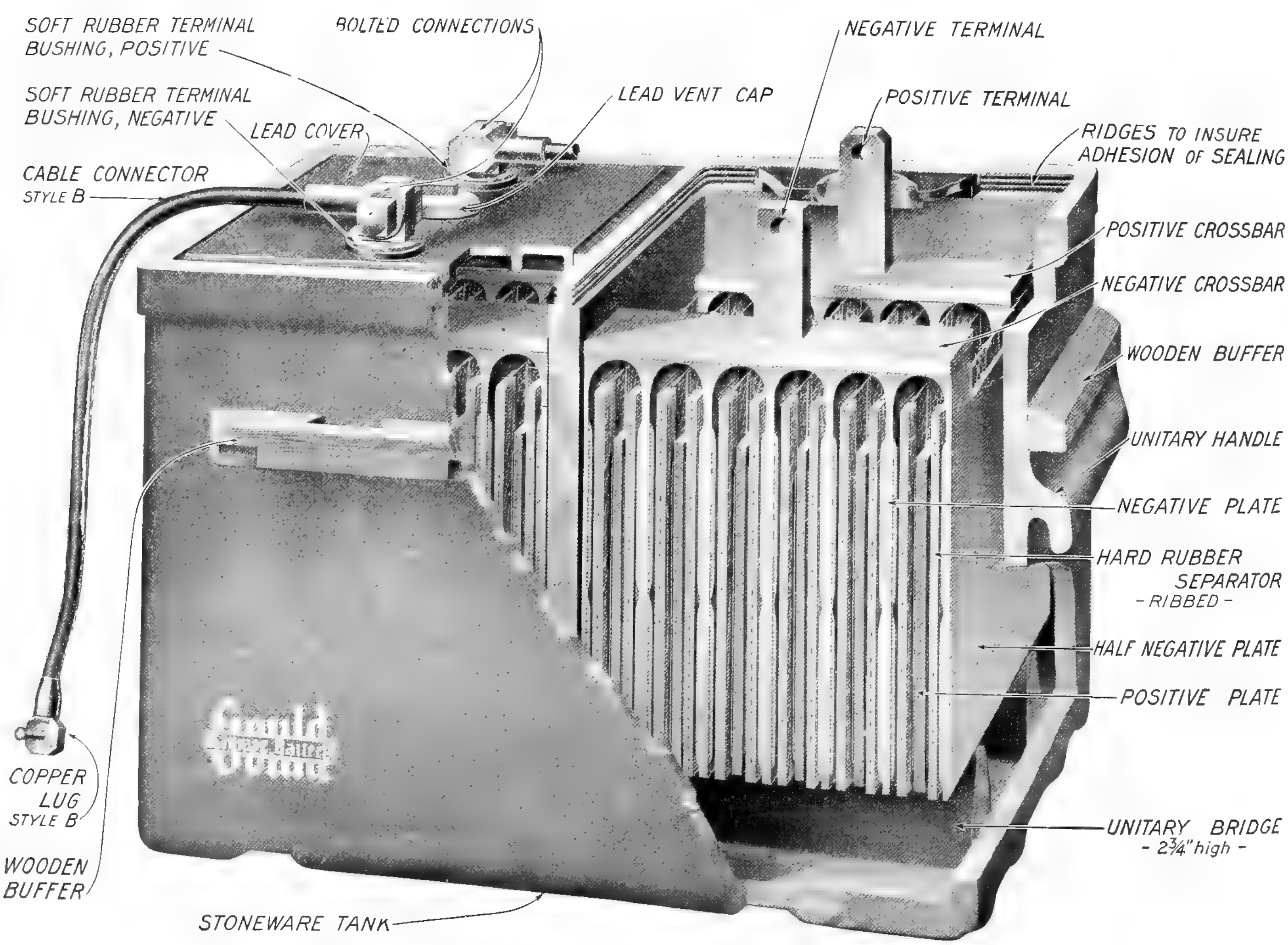


Fig. 2486—Double Compartment Cell in Stoneware Tank.
Gould Storage Battery Company.

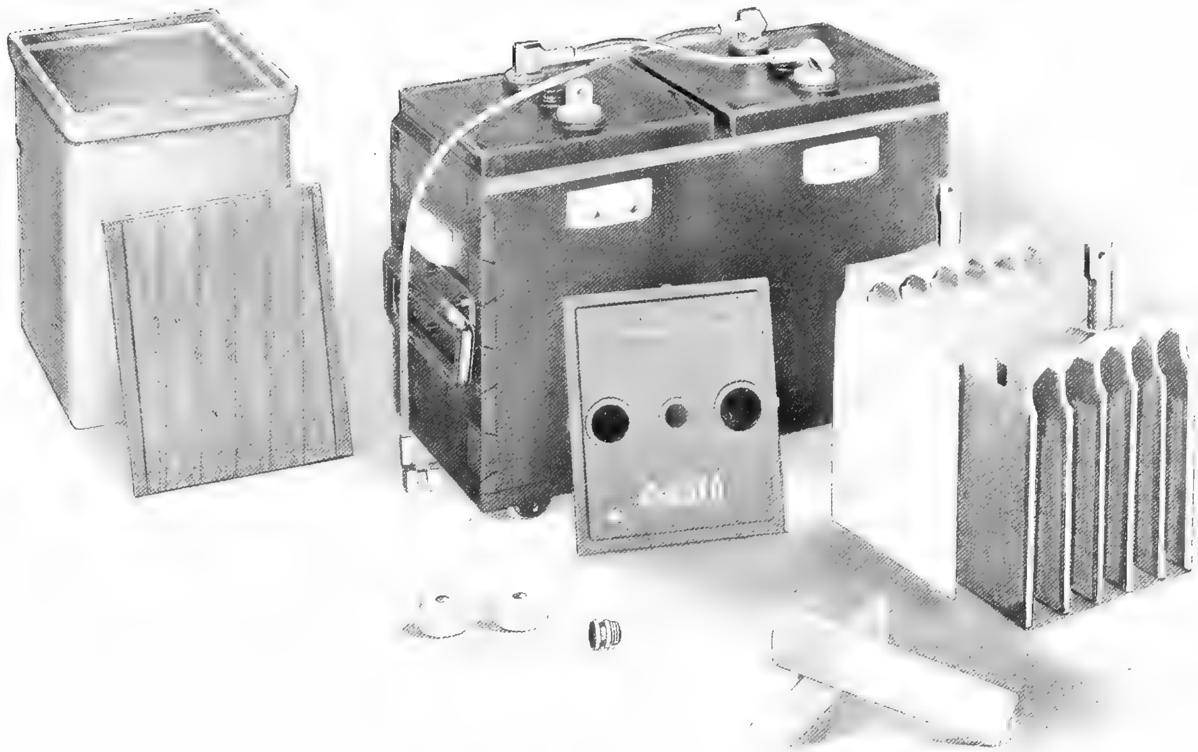


Fig. 2487—Double Compartment Cell and Parts. Gould Storage Battery Company.

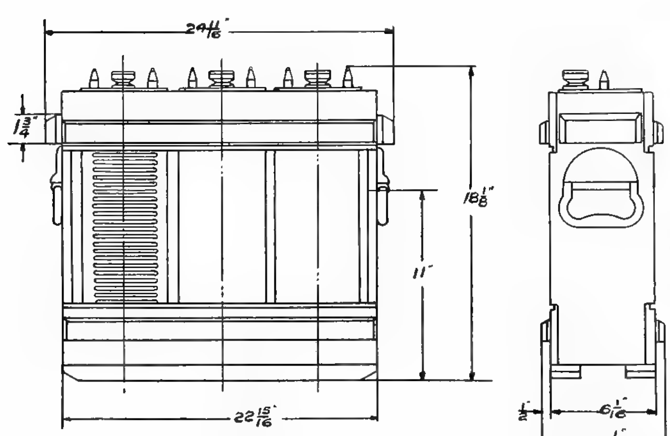


Fig. 2488—Tray Dimensions, Three Cells Type A-8 H.

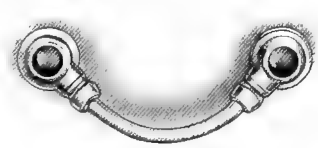


Fig. 2489—Connector.

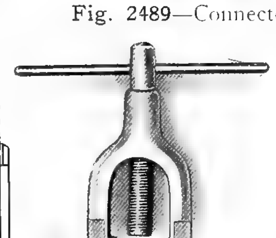


Fig. 2490—Jack.

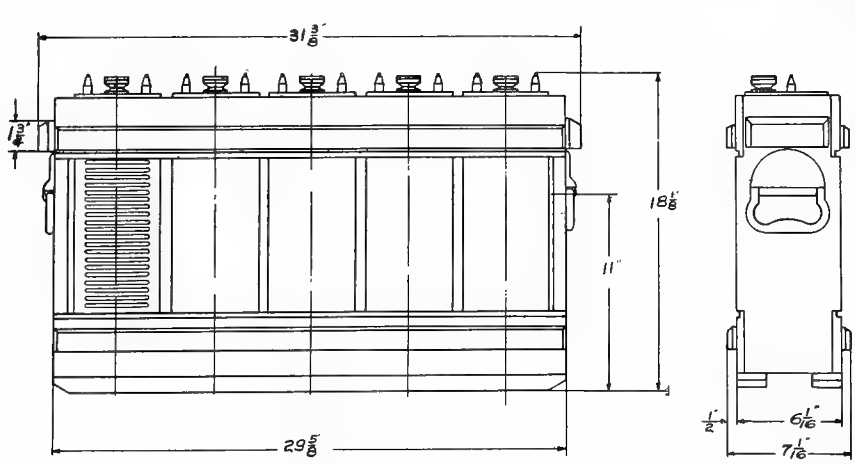


Fig. 2492—Perforated Nickel Plated Steel Positive Tube.

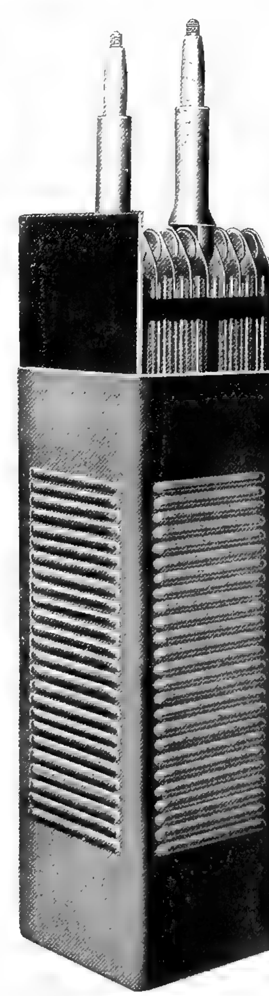


Fig. 2493—Contents of Steel Container Partly Lifted.

Fig. 2491—Tray Dimensions Five Cells Type A-8 H.

Edison Storage Battery Company.

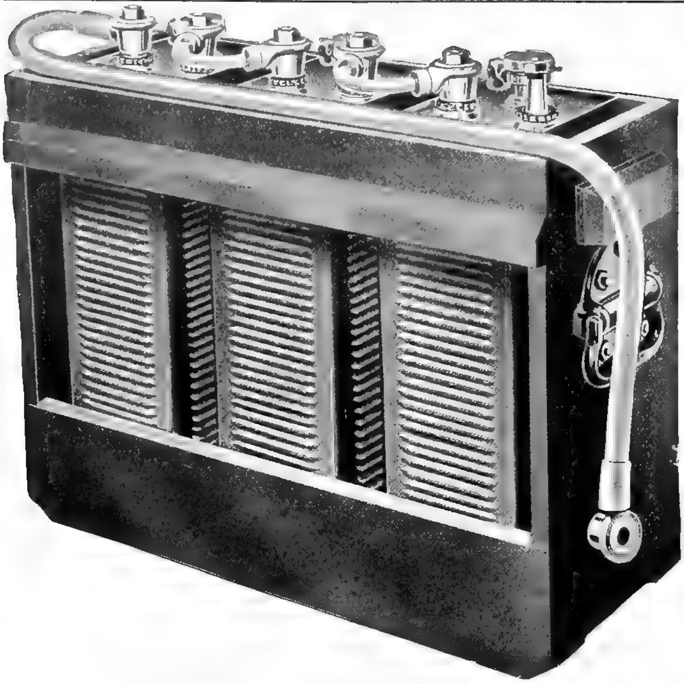


Fig. 2494—Three Type A-8 H Edison Cells in Tray.

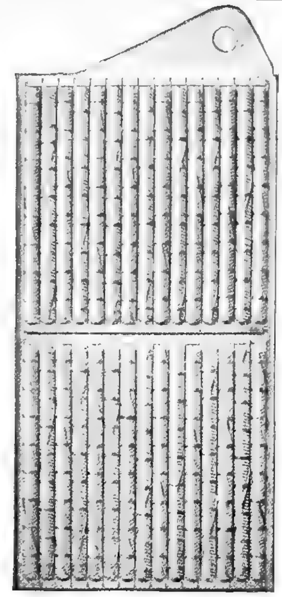


Fig. 2495—Edison Positive Plate; 30 Tubes on Nickel-Plated Steel Grid.

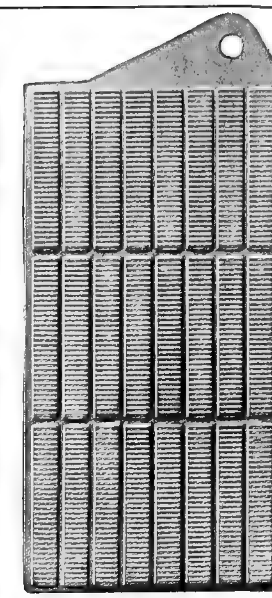


Fig. 2496 — Positive Plate; Pockets Mounted on Nickel-Plated Steel Grid.

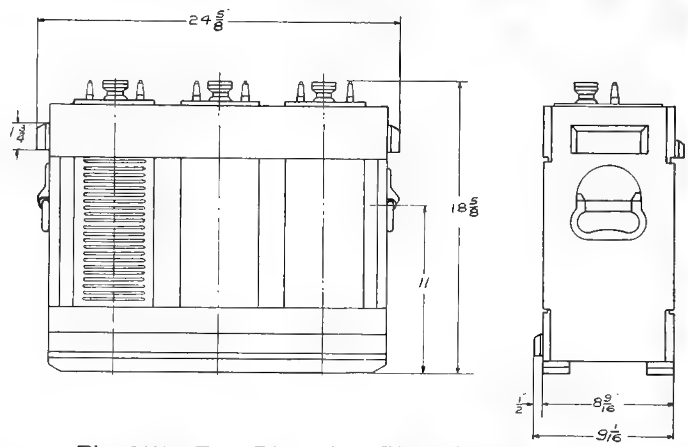


Fig. 2497—Tray Dimensions Three Cells Type A-12 H.

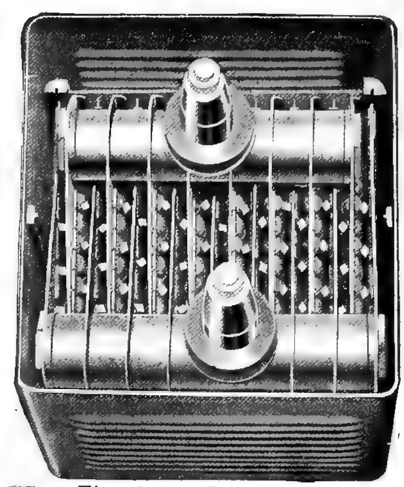


Fig. 2498—Cell with Cover Removed to Show Assembling and Insulating.

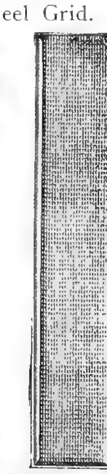


Fig. 2499—Perforated Nickel-Plated Steel Negative Pocket, Loaded with Iron Oxide.

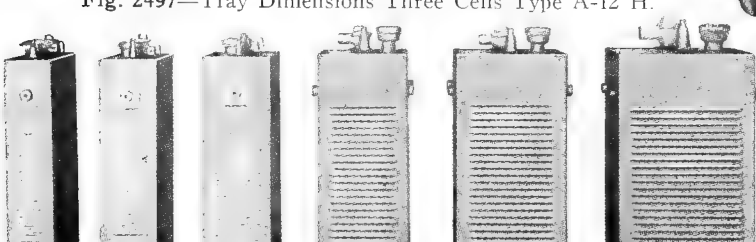


Fig. 2500—A-4 H, A-5 H, A-6 H, A-8 H, A-10 H, A-12 H; Rated Capacity, Ampere-Hours 150, 187.5, 225, 300, 375, 450.

Fig. 2501 –Jumper.

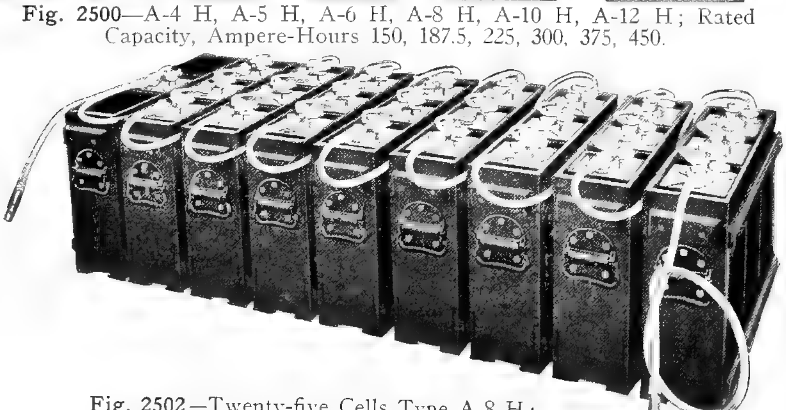


Fig. 2502—Twenty-five Cells Type A-8 H; Weight, 863 lb., Complete.

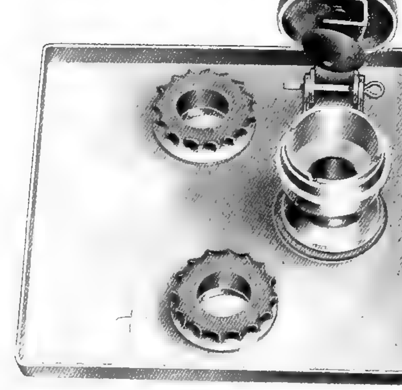


Fig. 2503—Cell Cover, Showing Filling Aperture and Check Valve.

Edison Storage Battery Company.

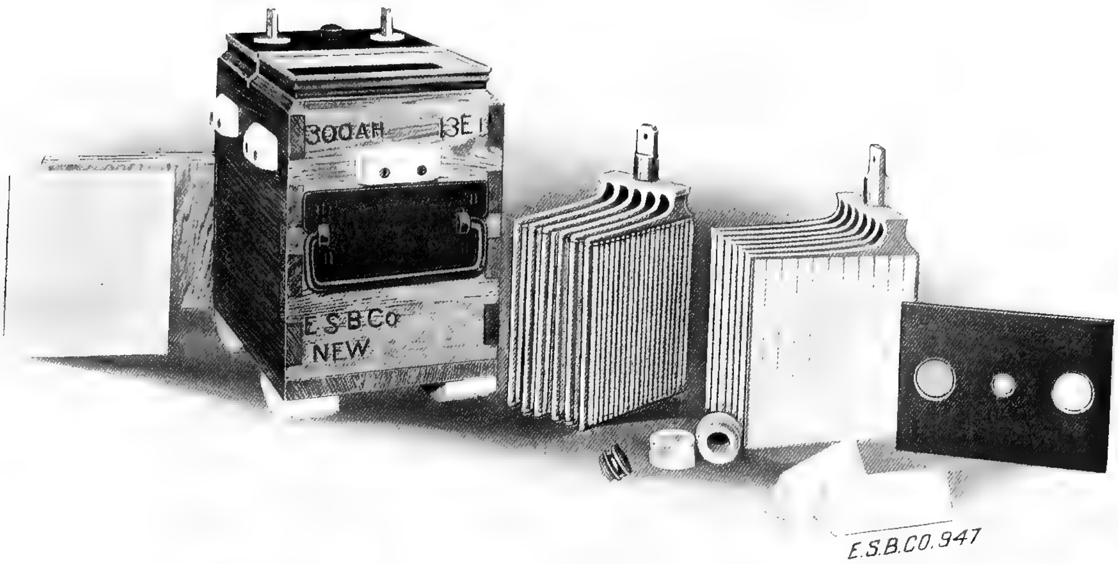


Fig. 2504—EI-13 Two-cell Unit, "Ironclad-Exide" Lead Lined Tank Assembly, 300 Ampere-Hour.

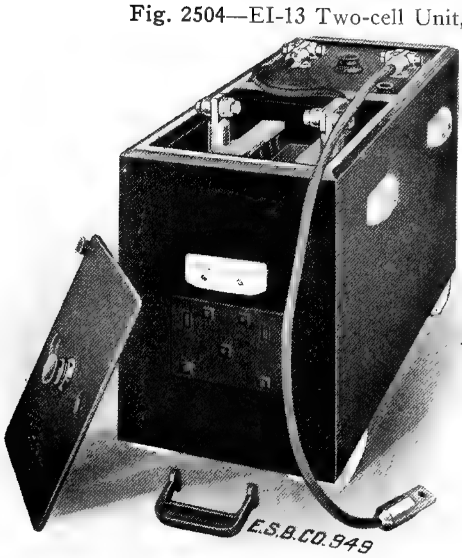


Fig. 2505—ECS-17 Two-cell Unit,, 320 Ampere-Hour.

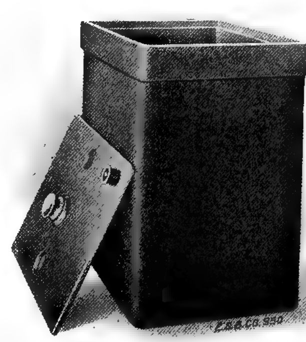


Fig. 2506—ECS-17 Rubber Jar and Cover.

Electric Storage Battery Company.

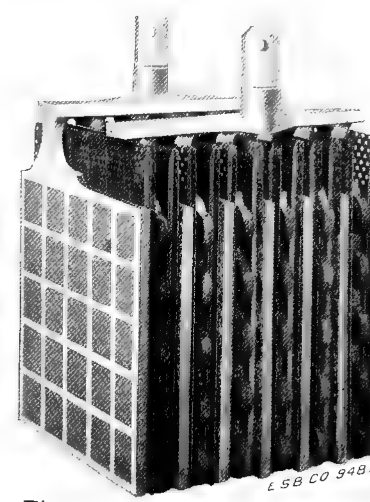


Fig. 2507—ECS-13 Element with Rubber Separators.

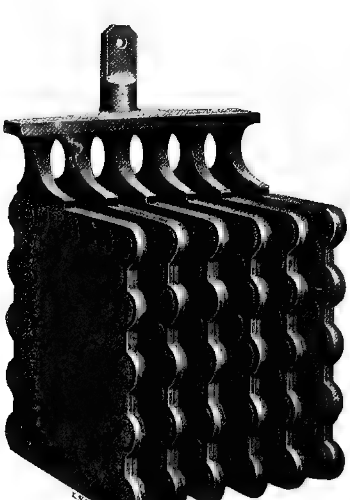


Fig. 2508—ECS-13 Manchester Positive Group.

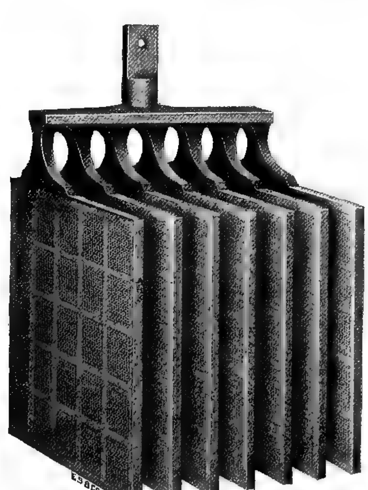


Fig. 2509—ECS-13 Box Negative Group.

Electric Storage Battery Company.

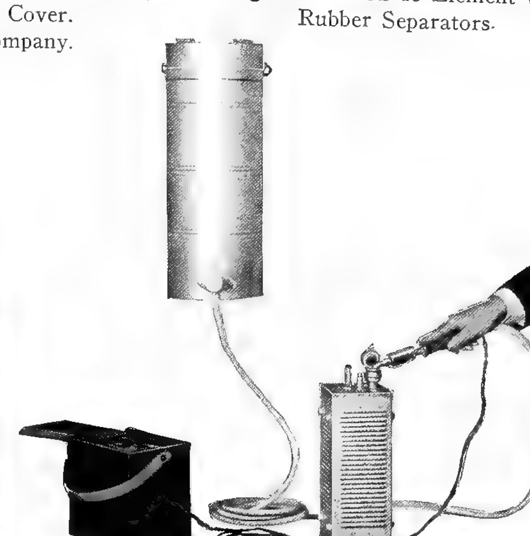


Fig. 2510—Edison Electric Filling Outfit for Adding Distilled Water. Edison Storage Battery Company.

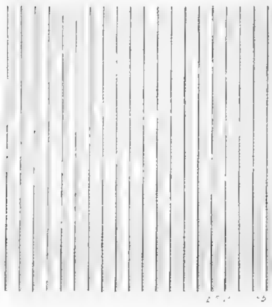


Fig. 2511—ECS Wood Separator.

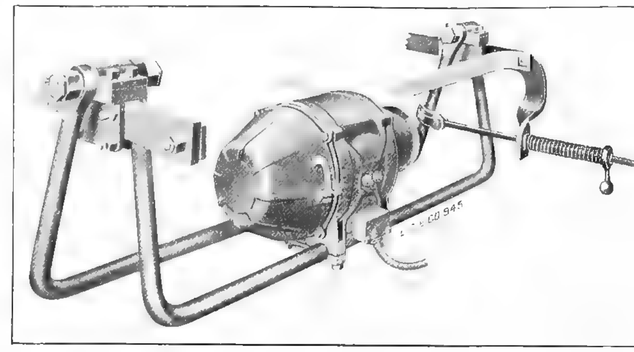


Fig. 2512—ESB Generator Mounted on ESB Suspension.

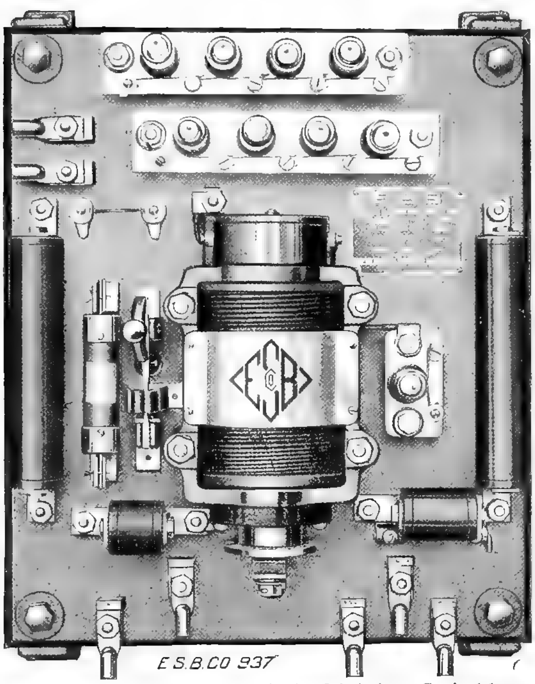


Fig. 2513—ESB Standard Axle Lighting Switchboard

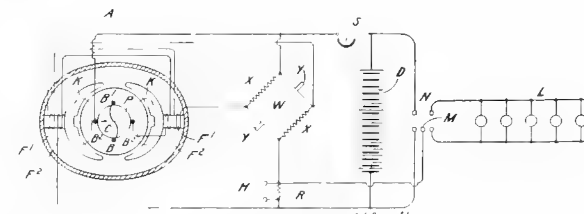


Fig. 2514—Diagram Illustrating Operation of ESB Axle Lighting System.

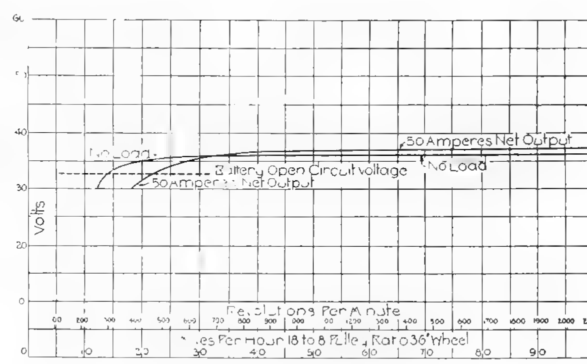


Fig. 2515—Voltage Regulation Curve, ESB Axle Lighting System.

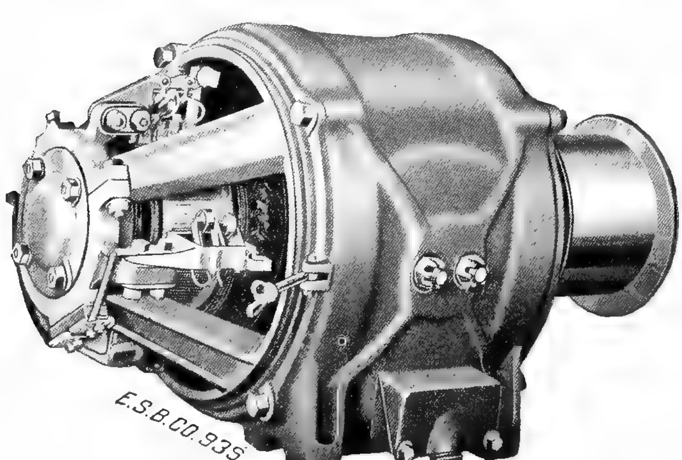


Fig. 2516—ESB Type ER, Form B-2, 2 Kw. Axle Lighting Generator Without Cover Bell.

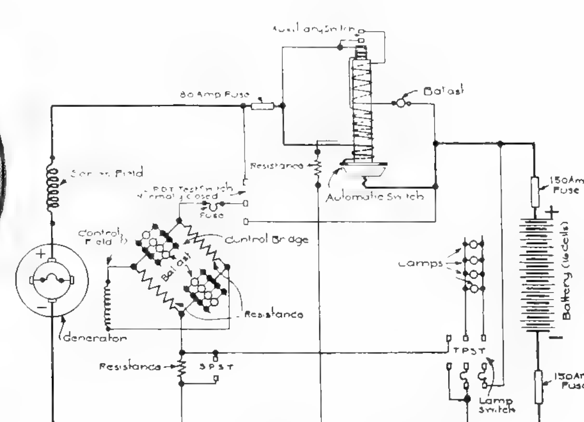


Fig. 2517—Complete Diagram of Connections, ESB Axle Lighting System.

Electric Storage Battery Company.


Fig. 2518—Aluminized Reflector.


Fig. 2519 - Lamp Chimney No. 234.

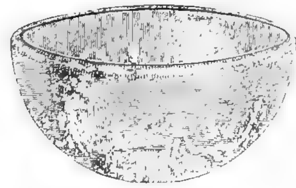


Fig. 2520 — Clear Glass Bowl with Etched Figure.


Fig. 2521 -Gas Lamp Mantle No. 2040 and Protector.


Fig. 2522 -Gas Lamp Mantle No. 3044 and Protector.


Fig. 2523—Opal Bowl.

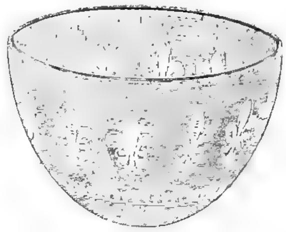


Fig. 2524—Etched Bowl.

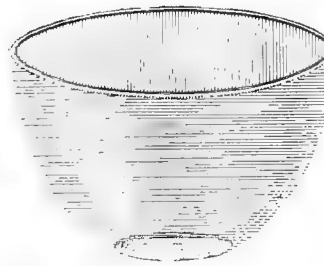


Fig. 2525—Opal Bowl, 6 in.

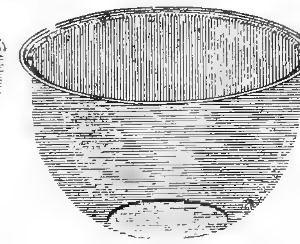


Fig. 2526—Frosted Bowl, 9 in.

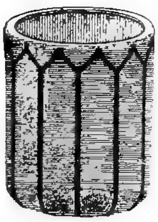


Fig. 2527 Straw Opal Bowl, 4 5/8 in.


Fig. 2528—Etched Glass Bowl, 11 in.

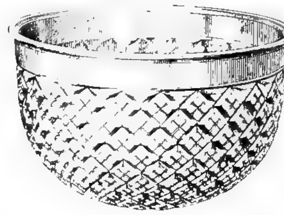


Fig. 2529—Pressed Glass Bowl, 9 in.

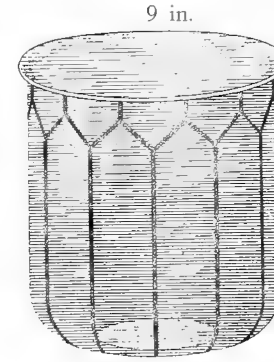


Fig. 2530—Straw Opal Bowl, 8¼ in.

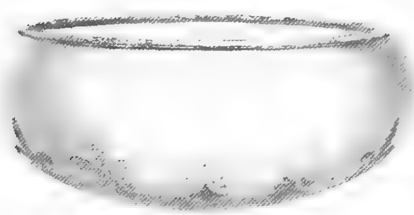


Fig. 2531—Etched Bowl No. 9799

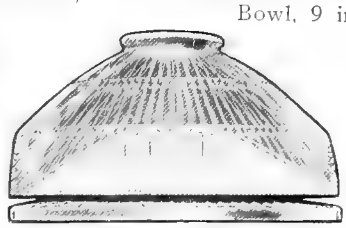


Fig. 2532—Prismatic Reflector Plate Unit No. 18371.


Fig. 2533—Reflector No. 9425.

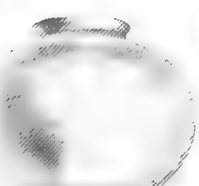


Fig. 2534—Etched Shade No. 9757.


Fig. 2535—Prismatic Bowl No. 18053.

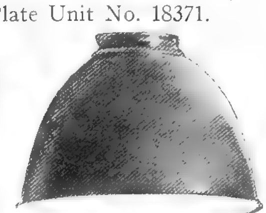


Fig. 2536 — Aluminized Reflectors.

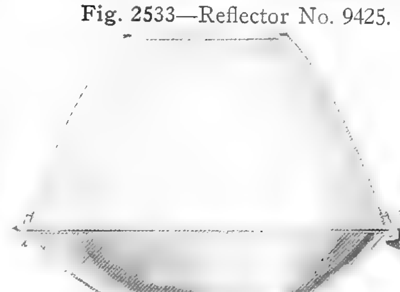


Fig. 2537—Reflector Bowl Unit for Pintsch Mantle Lamps.


Fig. 2538—Shade No. 2346.

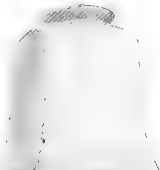


Fig. 2539—Shade No. 8261.

Fig. 2540 — Shade No. 3738.


Fig. 2541—Etched Shade, 3 in.


Fig. 2542—Shade No. 3990.


Fig. 2543—Bowl No. 8017.

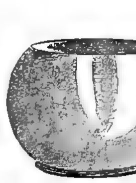


Fig. 2544 — Opal Globe, 4 in.

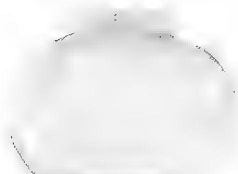


Fig. 2545—Shade No. 3847.

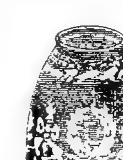


Fig. 2546—Etched Shade, 2¼ in.


Fig. 2547—Etched Shade, 2¼ **in.**

Safety Car Heating & Lighting Company.

Fig. 2548—Corona Bowl No. 3425.

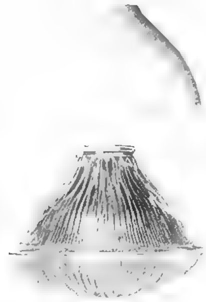


Fig. 2549—Opal Envelope No. 8671 and Prismatic Reflector No. 8672.

Fig. 2550—Bowl No. 8159.

Fig. 2551—Bowl No. 8025.

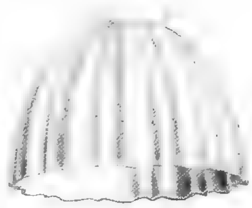


Fig. 2552—Shade No. 9011.

Fig. 2553—Shade.

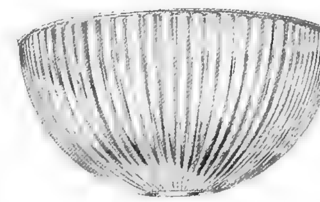


Fig. 2554—Bowl No. 8098.

Fig. 2555—Opal Envelope No. 8687 and Prismatic Reflector No. 8693.

Fig. 2556—Electro-Etched Shade, 4 in.

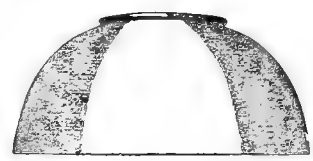


Fig. 2557—Opal Dome, 10 in.

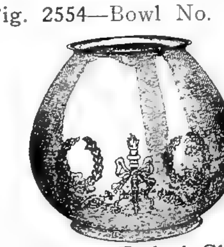


Fig. 2558—Etched Globe, 4 in.

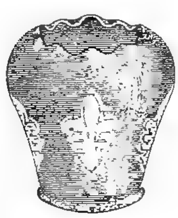


Fig. 2559—Etched Globe, 3¼ in.

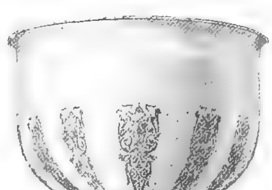


Fig. 2560—Bowl, 11½ in.

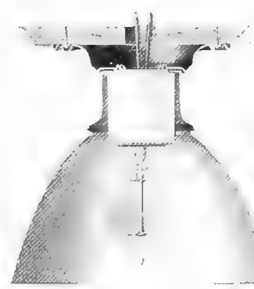


Fig. 2561—Deck Lamp No. 9050.

Fig. 2562—Bracket Lamp No. 8752.

Fig. 2563—Vestibule Lamp No. 9060.

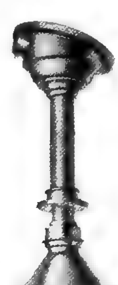


Fig. 2564—Lamp No. 9411 for Letter Case Section of Postal Car.

Fig. 2565 — Bracket Lamp No. 19026.

Fig. 2566 — Semi-Indirect Lighting Fixture No. 9900.

Fig. 2567 — Semi-Indirect Deck Lamp No. 8514.

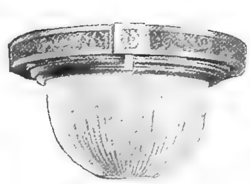


Fig. 2568—Mantle Lamp No. 8503.

Fig. 2569—Electric Pendant.

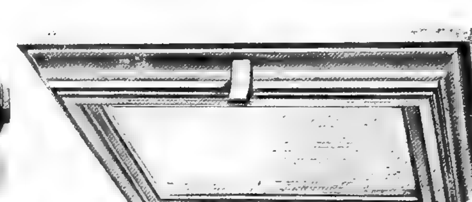


Fig. 2570—Deck Lamp No. 8113.

Safety Car Heating & Lighting Company.

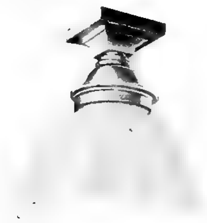


Fig. 2571—Pendant No. 8185.


Fig. 2572 — Vestibule Lamp No. 8406.

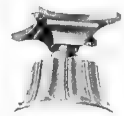


Fig. 2573—Pendant No. 3846.


Fig. 2574 — Bracket Lamp No. 8373.

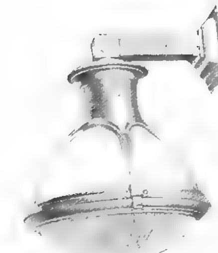


Fig. 2575 — Bracket Lamp No. 8663.

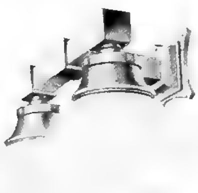


Fig. 2576 — Bracket Lamp No. 8138.


Fig. 2577 — Bracket Lamp No. 8184.


Fig. 2578 — Bracket Lamp No. 3845.


Fig. 2579—Bracket Lamp No. 2386.


Fig. 2580 – Pendant No. 2136.


Fig. 2581—Bracket Lamp No. 8080.

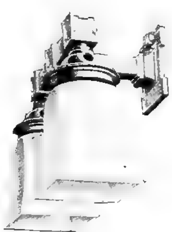


Fig. 2582 — Bracket Lamp.


Fig. 2583 — Bracket Lamp.


Fig. 2584 — Platform Lamp.


Fig. 2585 — Bracket Lamp.


Fig. 2586—Electric Lamp for Conduit.

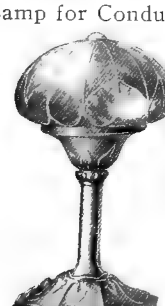


Fig. 2587—Table Lamp No. 9860.


Fig. 2588—Indirect Lighting Fixture No. 9330.

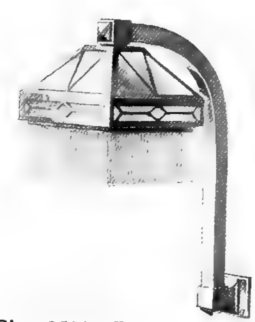


Fig. 2589—Bracket Lamp No. 8960.


Fig. 2590—Five-Light Deck Lamp.

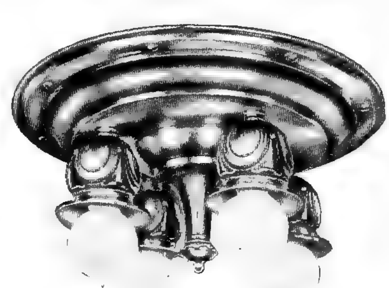


Fig. 2591—Four-Light Deck Lamp.


Fig. 2592—Adjustable Table Lamp.


Fig. 2593—Candelabra No. 2125.

Safety Car Heating & Lighting Company.

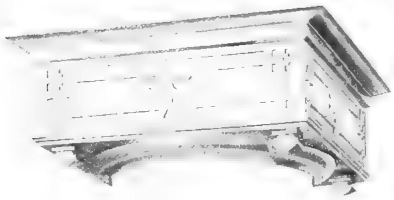


Fig. 2594—Lamp No. 3938.

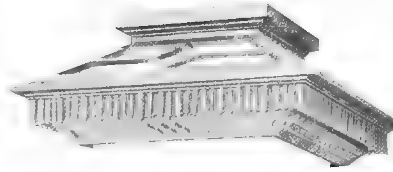


Fig. 2595—Lamp No. 2326.

Fig. 2596—Lamp No. 8662.

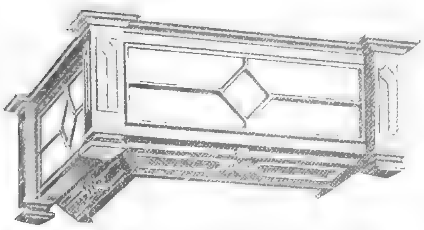


Fig. 2597—Lamp No. 2254.

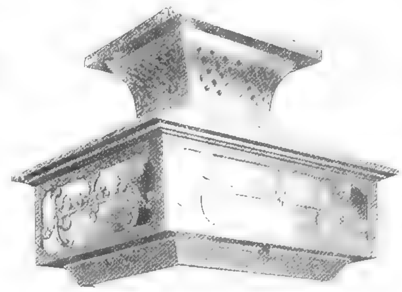


Fig. 2598—Lamp No. 2372.

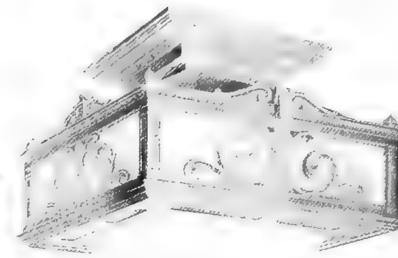


Fig. 2599—Lamp No. 3889.

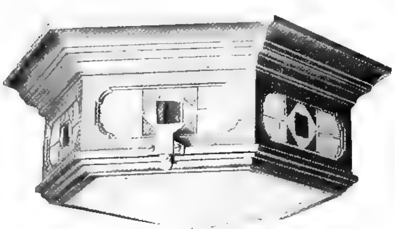


Fig. 2600—Lamp No. 8780.

Fig. 2601—Lamp No. 8350.

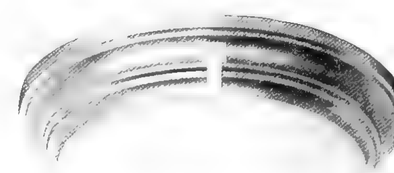


Fig. 2602—Lamp No. 2283.

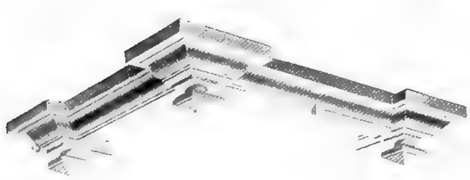


Fig. 2603—Lamp No. 2255.

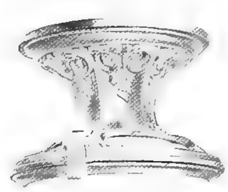


Fig. 2604—Lamp No. 8304.

Fig. 2605—Lamp No. 3880.

Fig. 2606—Lamp No. 8105.

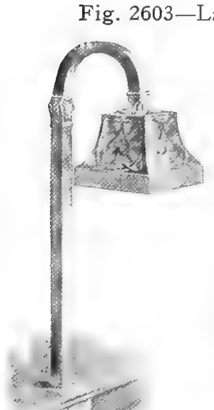


Fig. 2607 — Chandelier No. 3688.

Fig. 2608—Lamp No. 2378.

Fig. 2609—Lamp No. 2160.

Safety Car Heating & Lighting Company.

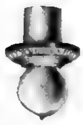


Fig. 2610—Pendant No. 1749.

Fig. 2611—Pendant No. 1921.

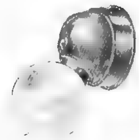


Fig. 2612—Bracket Lamp No. 1785.

Fig. 2613—Corner Berth Lamp

Fig. 2614—Berth Lamp No. 2485.

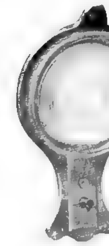


Fig. 2615—Berth Lamp No. 3862.

Fig. 2616—Lamp No. 8661.

Fig. 2617—Lamp No. 8094.

Fig. 2618 — Indirect Lighting Fixture No. 8700.

Fig. 2619—Indirect Lighting Fixture No. 8216.

Fig. 2620—Lamp No. 3875.

Fig. 2621—Lamp No. 3785.

Fig. 2622—Lamp No. 3960.

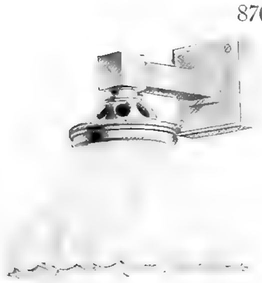


Fig. 2623—Bracket Lamp No. 2305.

Fig. 2624—Bracket Lamp No. 8249.

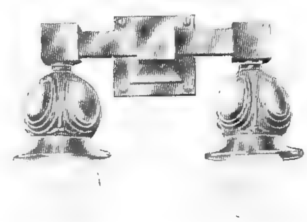


Fig. 2625—Two-Light Bracket.

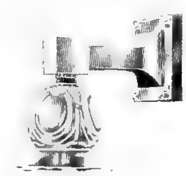


Fig. 2626 — One-Light Bracket.

Fig. 2627 — Pendant.

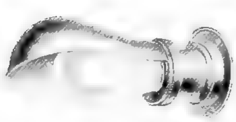


Fig. 2628—Platform Lamp.

Fig. 2629—Electric Lamp.

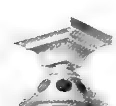


Fig. 2630 — Pendant No. 2482.

Fig. 2631 — Pendant No. 8139.

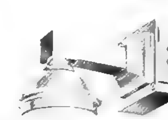


Fig. 2632 — Bracket Lamp No. 8183.

Fig. 2633—Lamp No. 2454.

Fig. 2634—Lamp No. 2310.

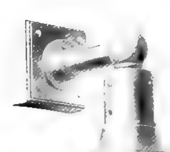


Fig. 2635—Bracket Lamp No. 2318.

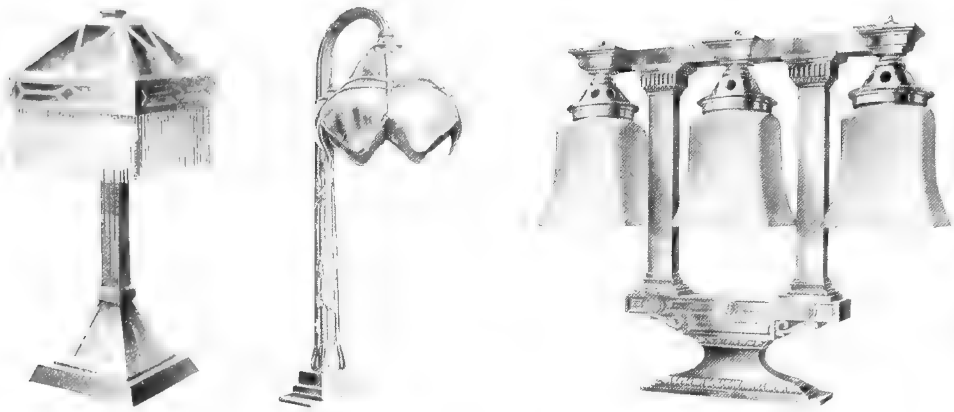
Fig. 2636—Pendant No. 2412.

Fig. 2637—Pendant No. 2145.

Fig. 2638—Swinging Bracket Lamp No. 8181.

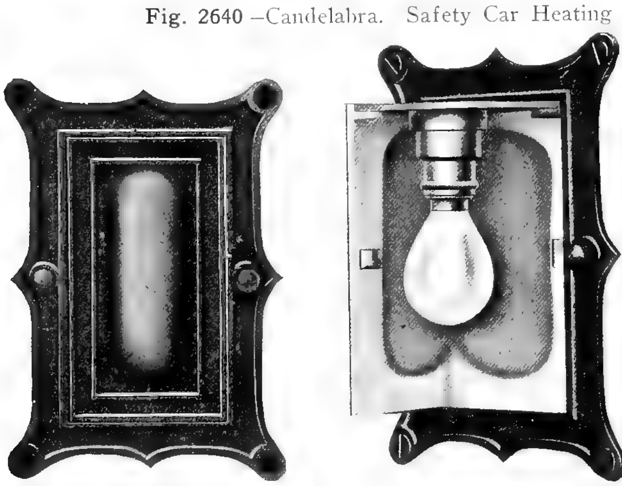
Fig. 2639—Removable Swinging Bracket Lamp No. 8380.

Safety Car Heating & Lighting Company.



No. 2453. No. 2166. No. 3665.

Fig. 2640—Candelabra. Safety Car Heating & Lighting Company.



Closed. Open.

Fig. 2641—Berth Lamp.

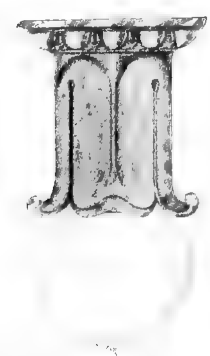
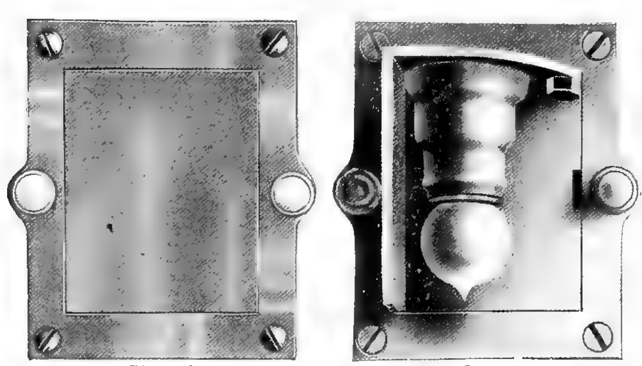


Fig. 2642—Pendant No. 7620.

Fig. 2643—One-Light Chandelier.



Closed. Open.

Fig. 2644—Berth Lamp No. 10540.

Fig. 2645—Bracket Lamp No. 9230.

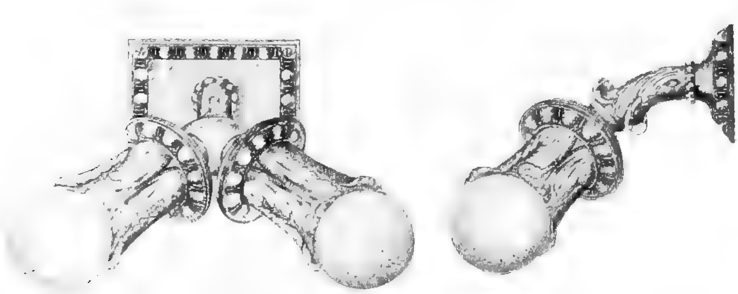


Fig. 2646—Bracket Lamp No. 7260.

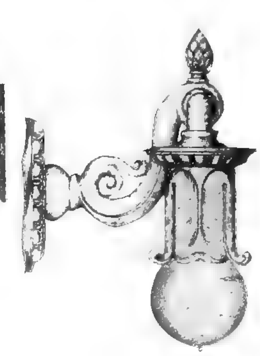


Fig. 2646A—Bracket Lamp.

Fig. 2647—Pendant No. 7760.

Adams & Westlake Company.

Fig. 2648—Four-Light Chandelier.

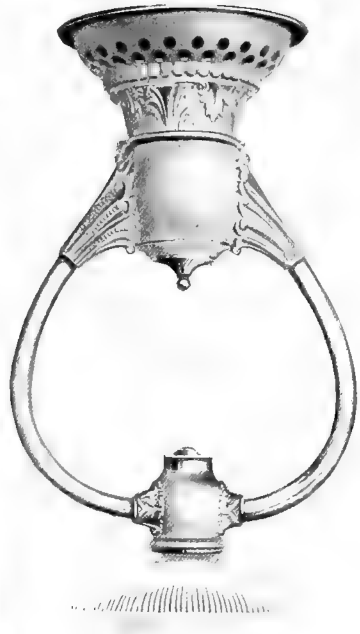


Fig. 2649—One Light Center Fixture.

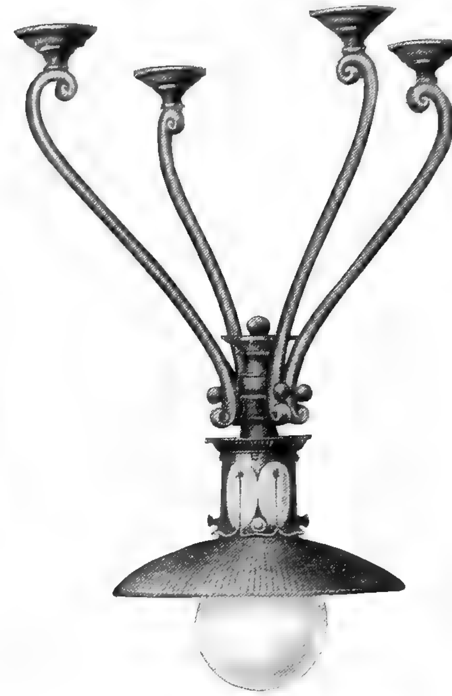


Fig. 2650—One Light Center Fixture.

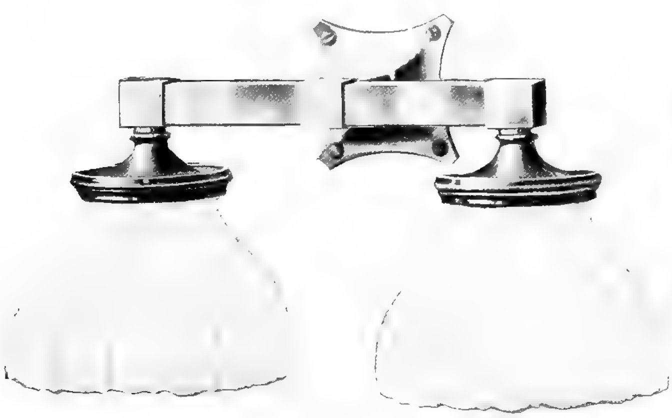
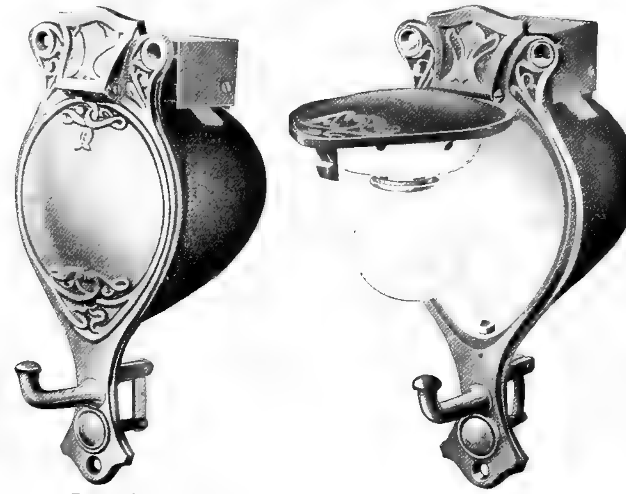


Fig. 2651—Two-Light Bracket Lamp.



Closed. Open.

Fig. 2652—Berth Lamp No. 9600.

Fig. 2653—One-Light Pendant.

Fig. 2654—One-Light Pendant.

Adams & Westlake Company.

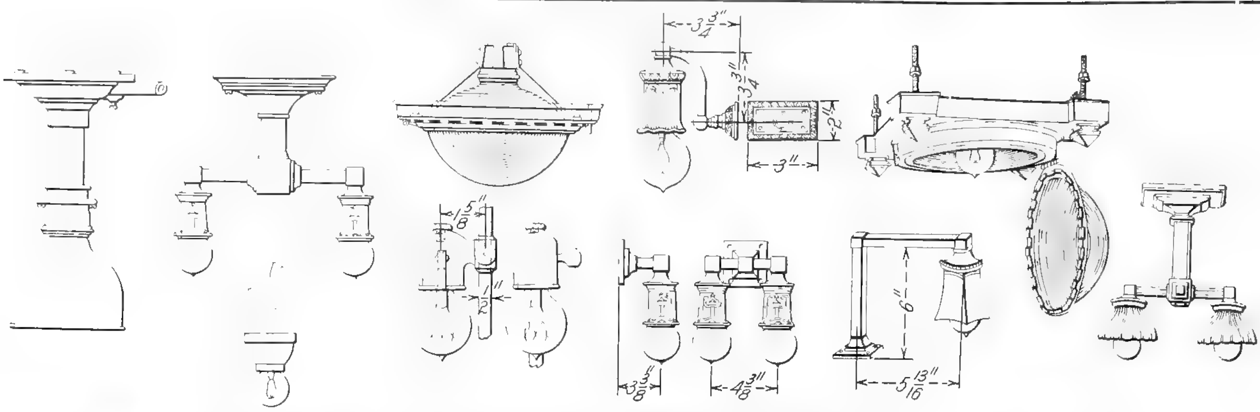


Fig. 2655 Miscellaneous Electric Lamps. Dayton Manufacturing Company.

Fig. 2656—No. 152 Ceiling Fixture. Dayton Mfg. Co.

Fig. 2657—No. 149 Ceiling Fixture. Dayton Mfg. Co.

Fig. 2658—No. 133 Ceiling Fixture. Dayton Mfg. Co.

Fig. 2659—No. 167 Chandelier. Dayton Mfg. Co.

Fig. 2660 Dining Car Table Lamp. Dayton Mfg. Co.

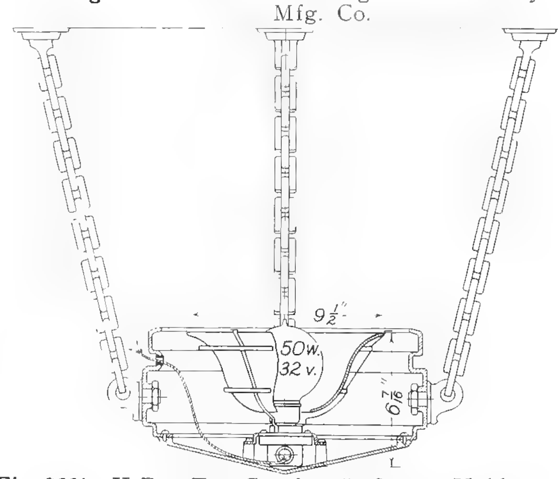


Fig. 2661—X-Ray Eye-Comfort Reflector, Holder and Receptacle. National X-Ray Reflector Company.

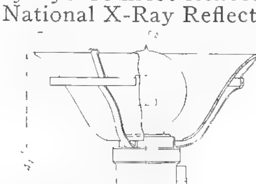


Fig. 2662—X-Ray Eye-Comfort Reflector. National X-Ray Reflector Company.

Fig. 2663—Moonstone Doric Reflectors. Jefferson Glass Company.

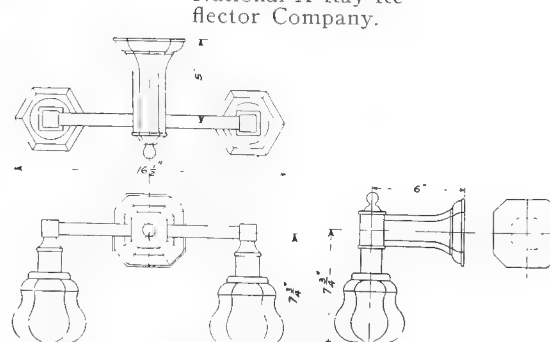


Fig. 2664—Double and Single Bracket Lamps. F. H. Lovell & Company.

Fig. 2665—Side Wall Lamp.

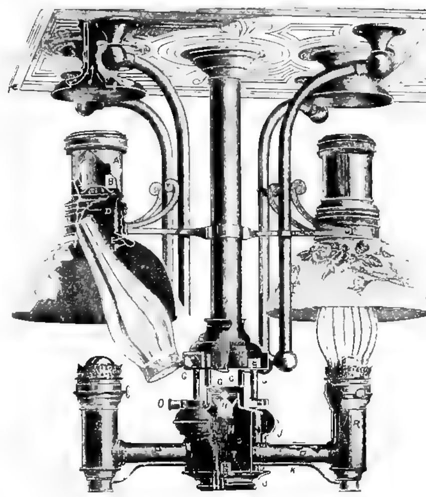


Fig. 2666—Center Lamps.

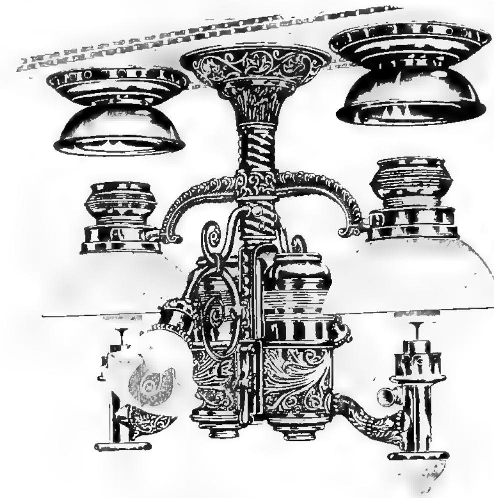


Fig. 2667—Center Lamps.

Dayton Manufacturing Company.

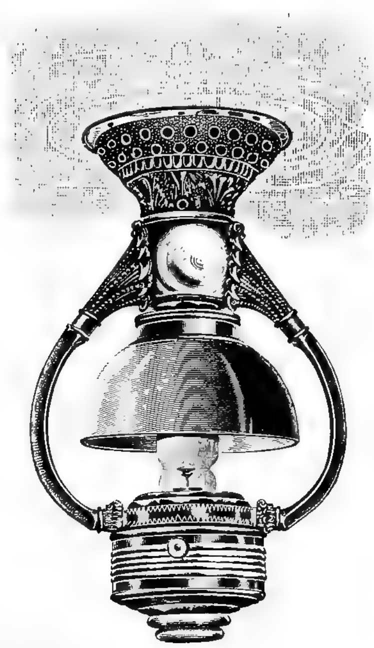


Fig. 2668—Center Lamp. Adams & Westlake Company.

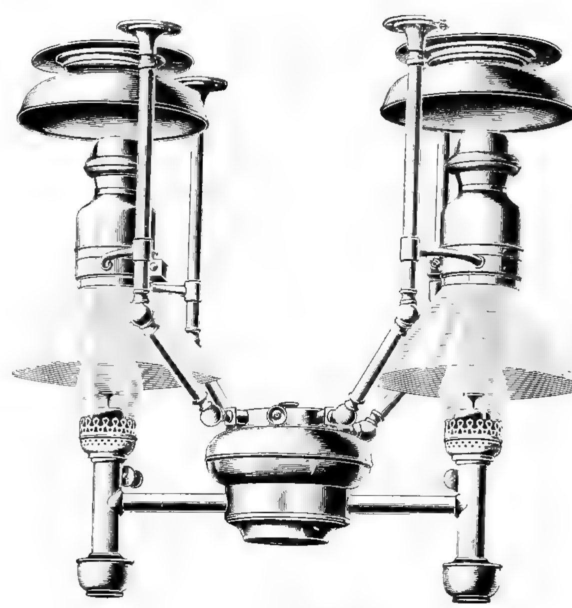


Fig. 2669—Center Lamps with Victoria Burners for Use with Heavy Oil. Sherburne & Company.

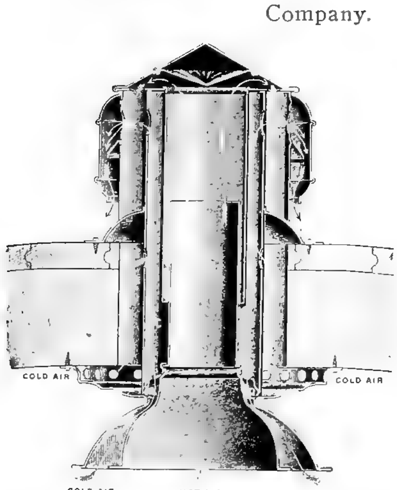


Fig. 2670—Improved Combination Smoke Bell and Ventilator.

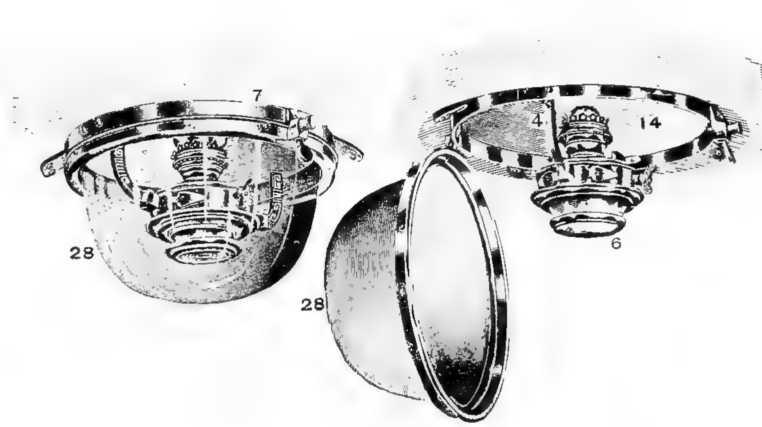


Fig. 2671—Vestibule Dome or Platform Lamp.

Adams & Westlake Company.

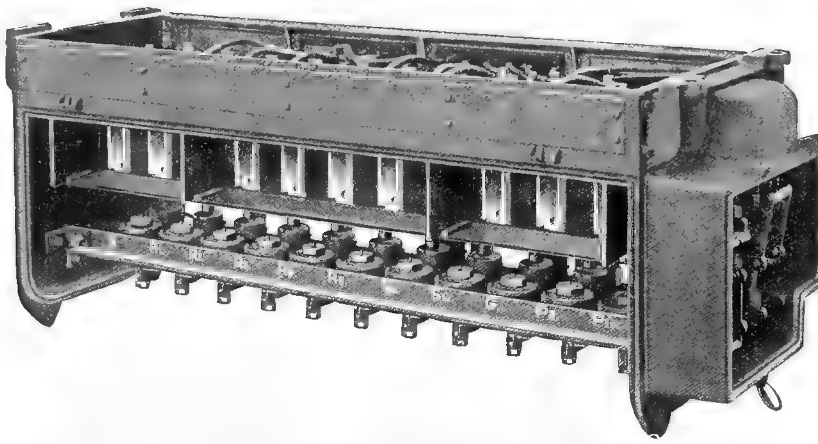


Fig. 2672—Switch Group for 1,500 Volt, Direct Current Control.

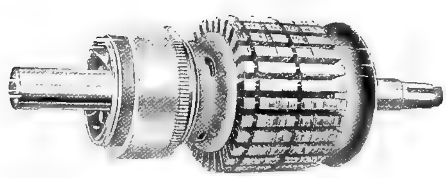


Fig. 2673—Bolted Commutator and Shaft.

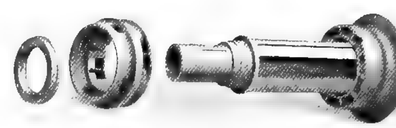


Fig. 2674—Armature Spider.

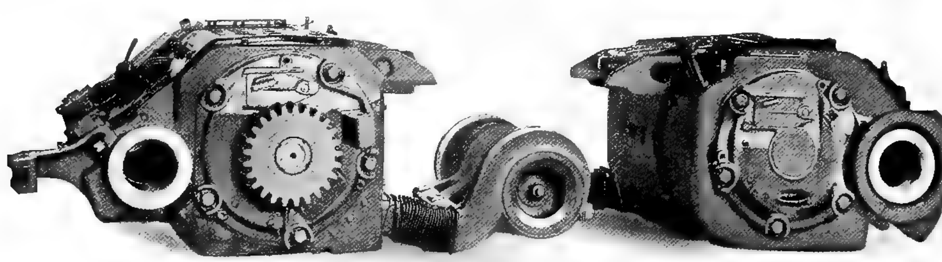


Fig. 2675—Double Equipment of No. 308 Commutating Pole Motors, with Forced Ventilation, and Type Y-E Double Blower Set, for the Long Island Railroad.

Fig. 2676—Motor Car Equipped with 1,500 Volt, Direct Current Apparatus.

Westinghouse Electric & Manufacturing Company.

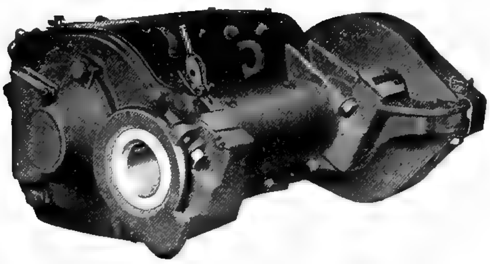


Fig. 2677—Commutating Pole Railway Motor.

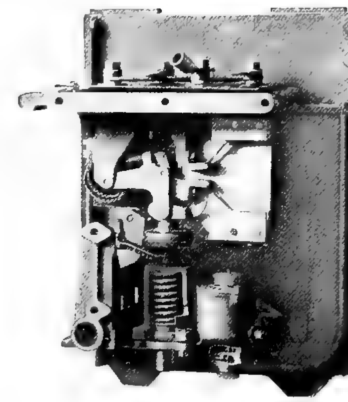


Fig. 2679 -Type 264 Line Switch Without Cover.

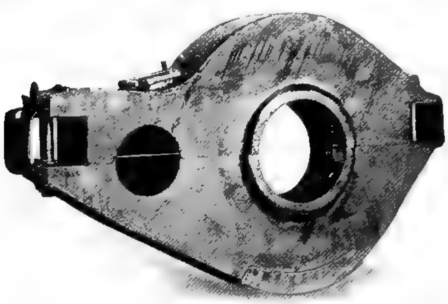


Fig. 2678—Gear Case for Railway Motors.

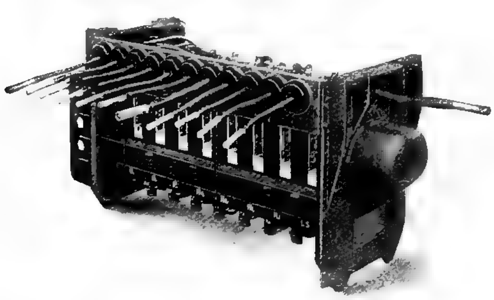


Fig. 2680—HL Control Unit Switch Group Showing Overload Trip and Eight-Unit Switches.

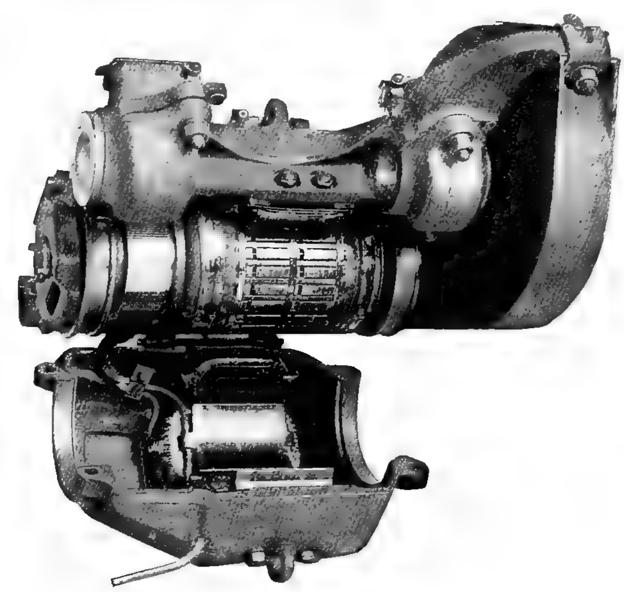


Fig. 2681—No. 323-A, 38 Hp., 600 Volt, Commutating Pole Motor in Open Position, Showing the Armature in the Upper Field Frame.

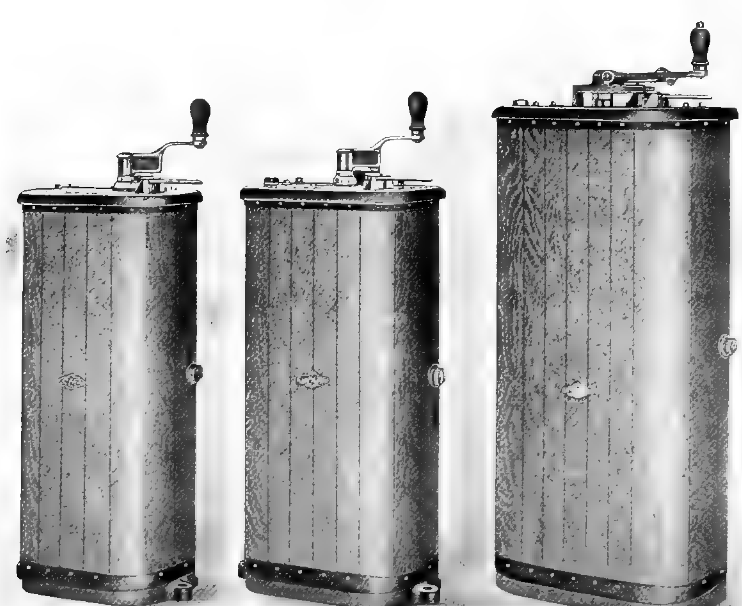


Fig. 2682—Type K Controllers for Railway Service.

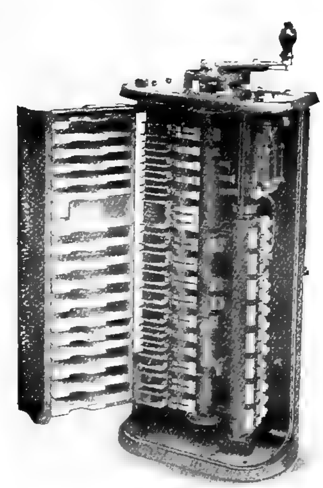


Fig. 2683—Interior of Type K-34-D Railway Controller.

Westinghouse Electric & Manufacturing Company.

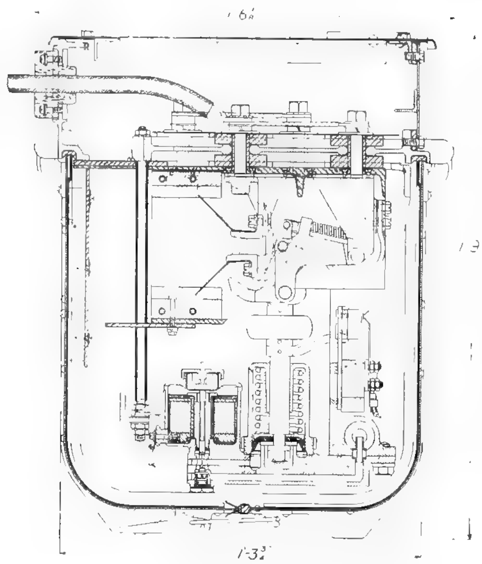


Fig. 2684—Section Through Unit Switch Group.

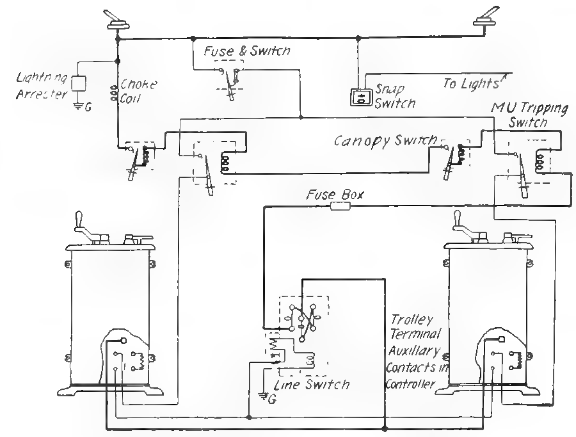


Fig. 2685 —Wiring Diagram for Auxiliary Contactor Equipment.

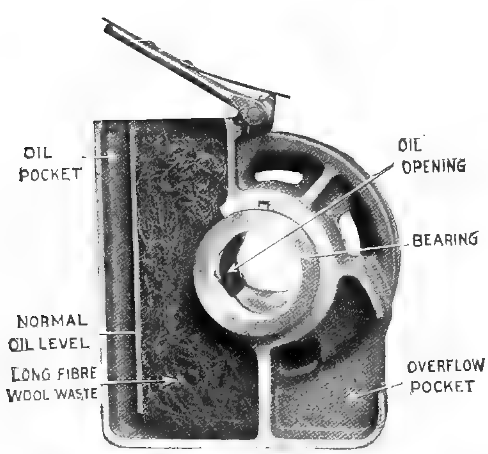


Fig. 2686—Motor Bearing.

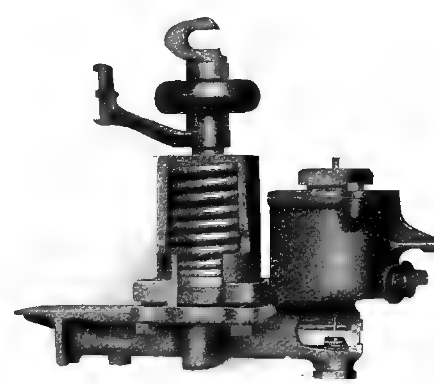


Fig. 2687—Unit Switch Magnet and Cylinders Cut to Show Working Parts of the Air Cylinder of Unit Switches.

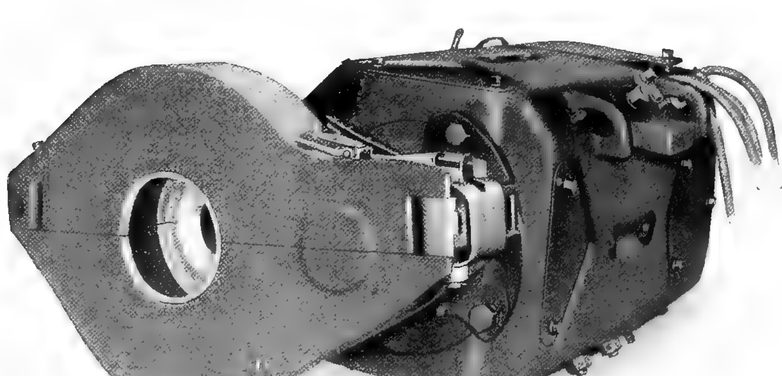


Fig. 2688 —No. 321, 750-1,500 Volt Direct Current Commutating Pole Railway Motor.

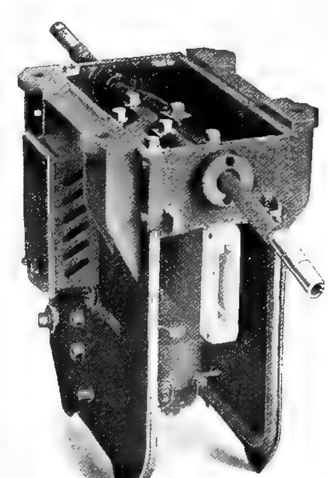


Fig. 2689 — Single Jaw Line Switch of the Unit Switch Type for Use with Auxiliary Contactor Equipments.

Westinghouse Electric & Manufacturing Company.

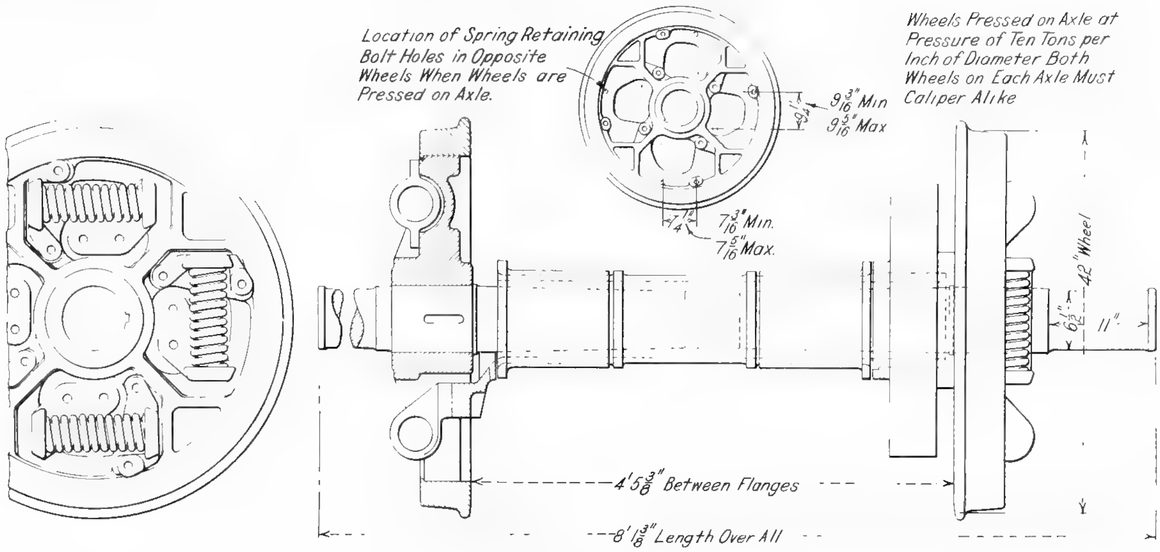
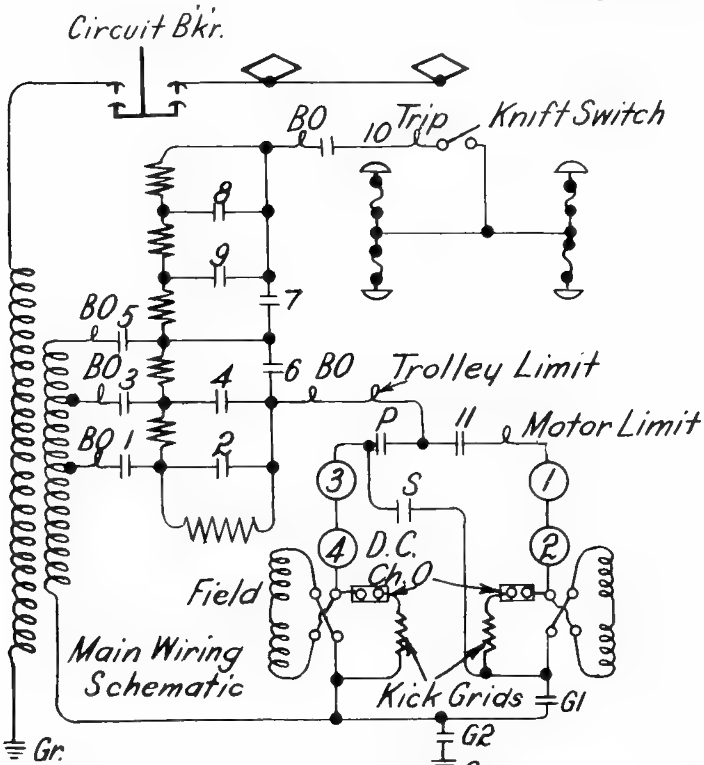


Fig. 2690—Quill and Spring Driving Arrangement for New York, New Haven & Hartford Motor Shown in Fig. 2701.



Sequence of Switches.

A. C. Operation.

Step	1	2	3	4	5	6	7	8	9	10	11	P	S	G1	G2
1	o										o	o		o	
2	o	o									o	o		o	
3		o	o								o	o		o	
4		o	o	o							o	o		o	
5		o		o	o						o	o		o	
6		o		o	o	o					o	o		o	

D. C. Operation

Step	1	2	3	4	5	6	7	8	9	10	11	P	S	G1	G2
1										o	o		o		o
2								o		o	o		o		o
3								o	o	o	o		o		o
4		o						o	o	o	o		o		o
5		o		o				o	o	o	o		o		o
6		o		o		o		o	o	o	o		o		o
7		o		o		o	o	o	o	o	o		o		o
Tran										o	o		o	o	o
8										o	o	o		o	o
9								o		o	o	o		o	o
10								o	o	o	o	o		o	o
11		o						o	o	o	o	o		o	o
12		o		o				o	o	o	o	o		o	o
13		o		o		o		o	o	o	o	o		o	o
14		o		o		o	o	o	o	o	o	o		o	o

Fig. 2691—Wiring Diagram for New York, New Haven & Hartford Alternating Current Motor Cars.

Fig. 2692 — Direct Current Car Circuit Breaker.

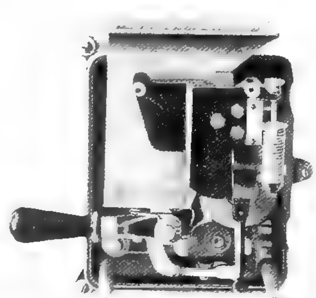


Fig. 2693—Open View of Circuit Breaker for Car Service.

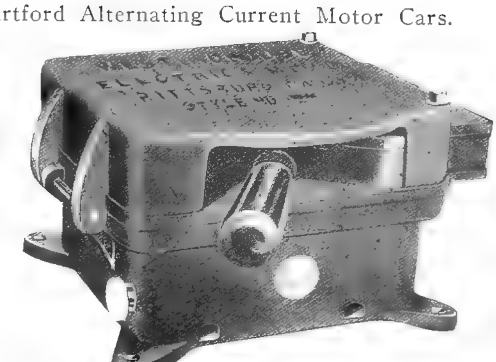
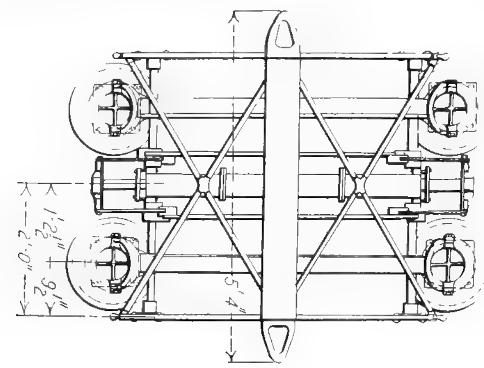


Fig. 2694—Westinghouse Car Type Circuit Breaker.

Westinghouse Electric & Manufacturing Company.

Fig. 2695—Westinghouse M. P. Lightning Arrester for Railway Service.



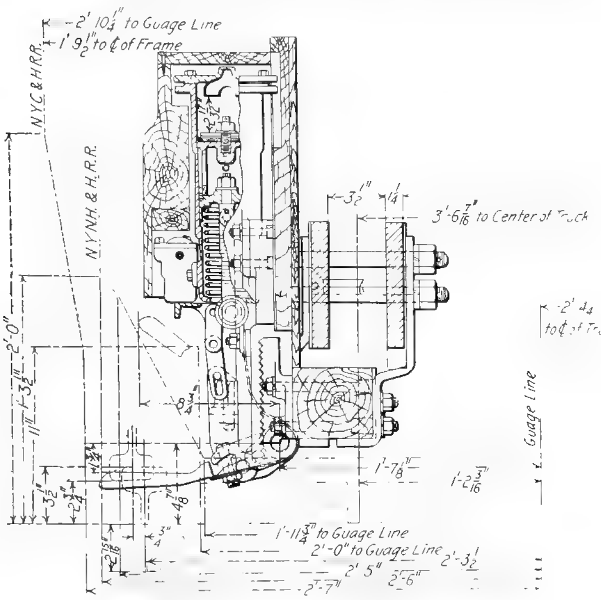


Fig. 2696—New York, New Haven & Hartford Third Rail Current Collecting Shoe.

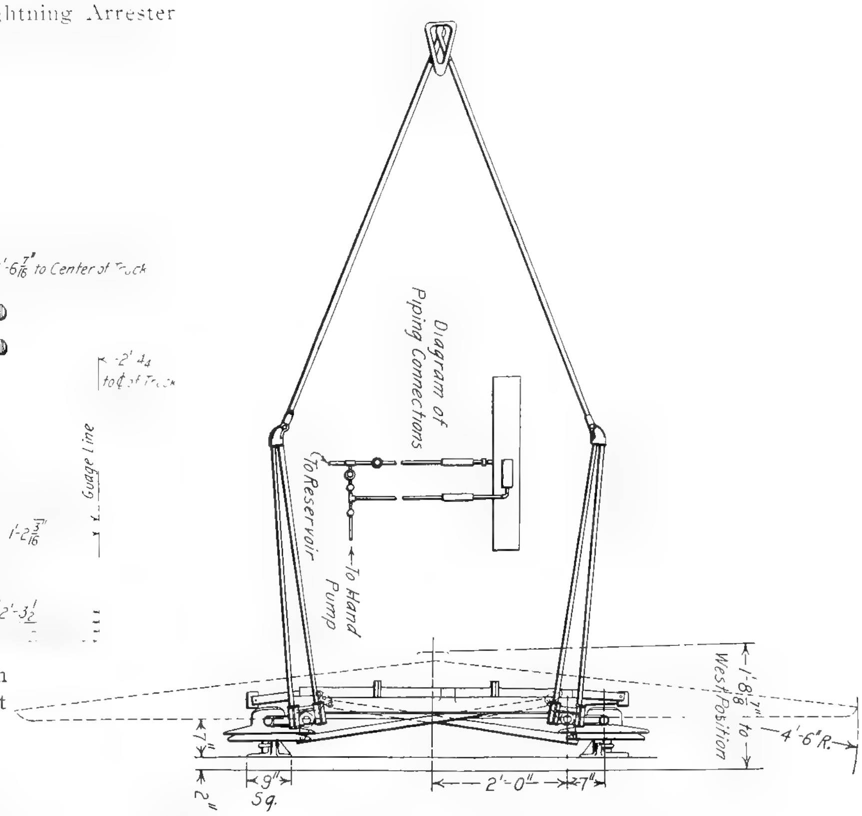


Fig. 2697—New York, New Haven & Hartford Pantagraph Trolley.

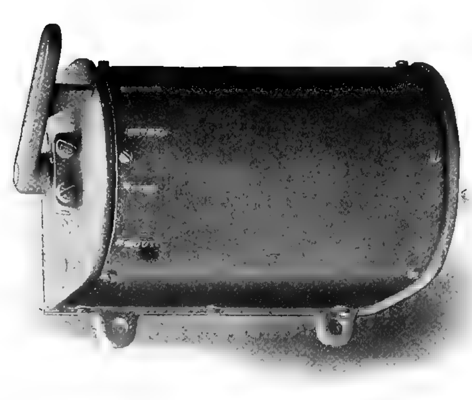


Fig. 2698—Motor Control Cut-Out for Two 200 Hp. Direct Current Motors.

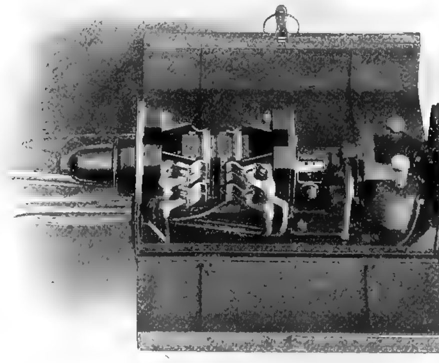
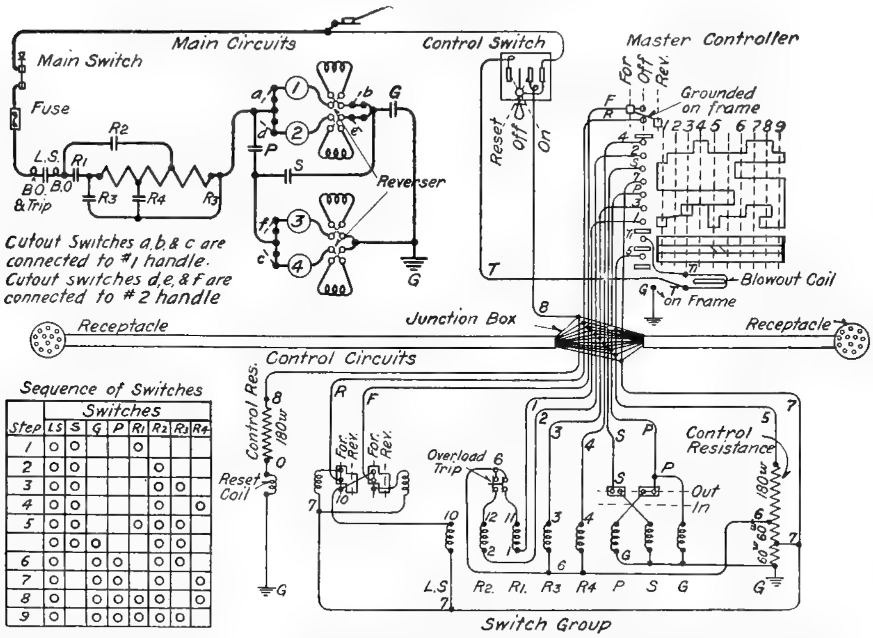


Fig. 2699—Type No. 176-C Reverse Switch for Two 200 Hp. Direct Current Motors.

Westinghouse Unit Switch System of Multiple Control.

Westinghouse Electric & Manufacturing Company.



Step	LS	S	G	P	R1	R2	R3	R4
1	O	O			O			
2	O	O				O		
3	O	O				O	O	
4	O	O				O		O
5	O	O			O	O	O	
	O	O	O			O	O	
6	O		O	O		O	O	
7	O		O	O		O		O
8	O		O	O	O	O		O
9	O		O	O	O	O	O	

Fig. 2700—Wiring Diagram for Type Unit Switch Control for Quadruple Equipment of 75 Hp. Railway Motors. Westinghouse Electric & Manufacturing Company.

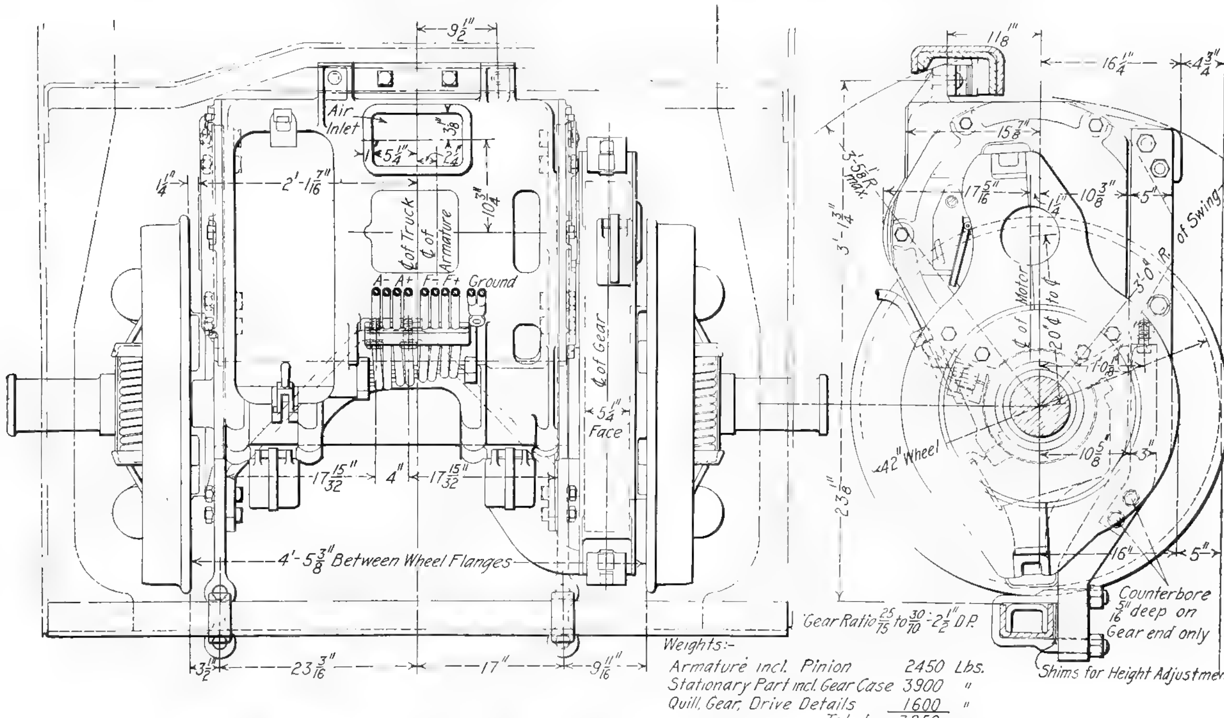


Fig. 2701—Motor Used on the New York, New Haven & Hartford.

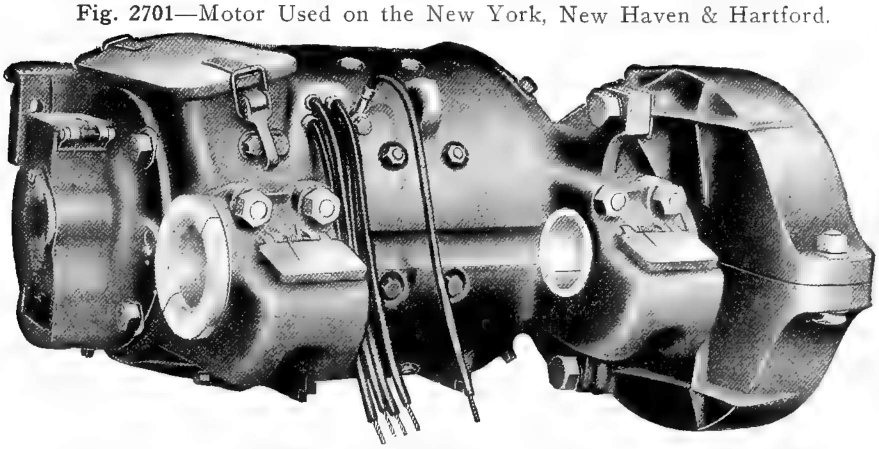


Fig. 2702—G. E.-216A, 50 Hp., 600 Volt Railway Motor. Weight, 2,875 lbs. General Electric Company.

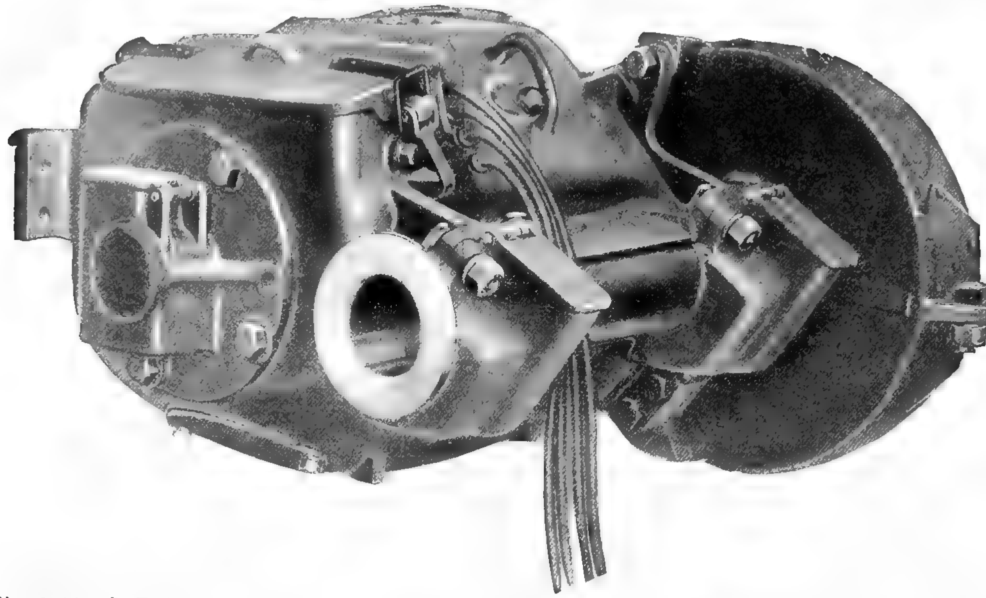


Fig. 2703—G. E. 203A Railway Motor. Capacity, 50 Hp. at 600 Volts. Weight, Including Gear and Case 2,150 lbs.

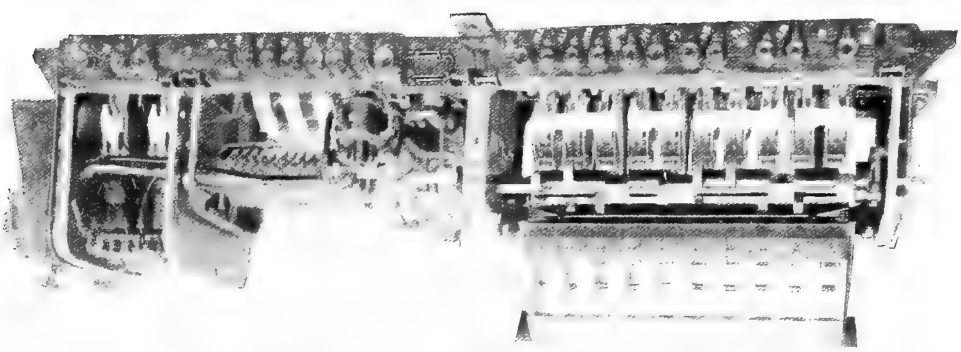


Fig. 2704—Type PC-2A Motor Controller.

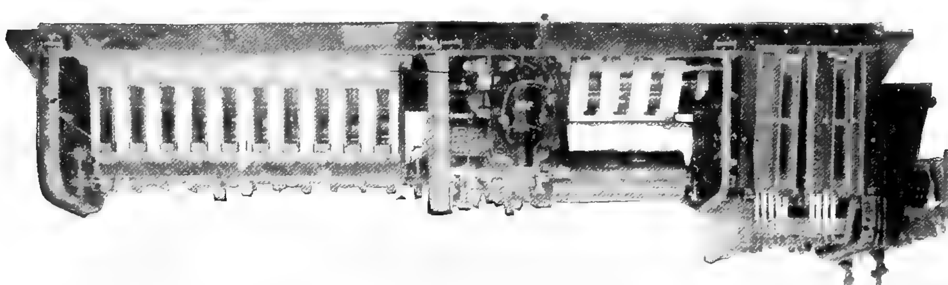


Fig. 2705—Type PC-2A Motor Controller with Arc Chute Unit Lowered.

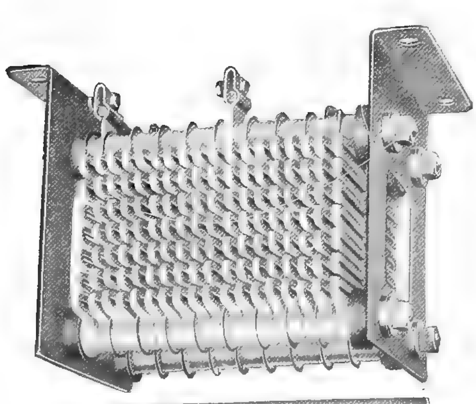


Fig. 2706—Type RG, Form A Rheostat with Improved Terminal.

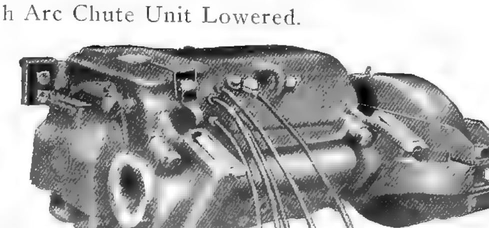


Fig. 2707—Type G. E. 247A Motor

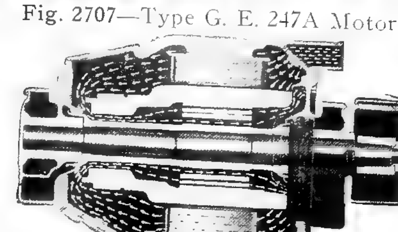


Fig. 2708—Ventilated Railway Motor.

General Electric Company.

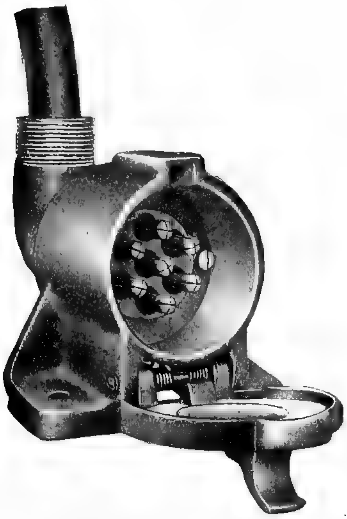


Fig. 2709—Control Coupler Socket.

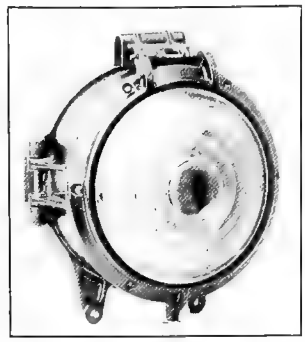


Fig. 2710 — Form 10, 2 Ampere, 550 Volt, Direct Current, Luminous Arc Headlight.

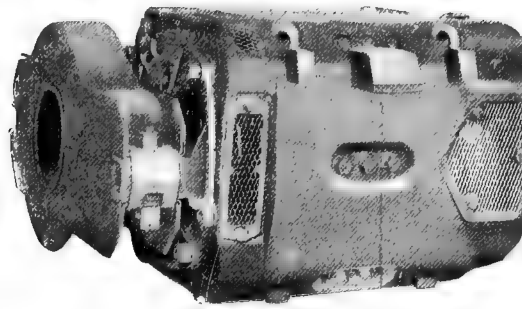


Fig. 2711—G. E. 248A Railway Motor.

Fig. 2712—Control Coupler Jumper.

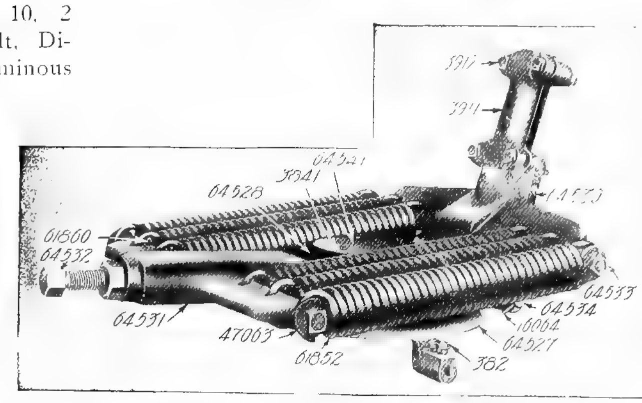


Fig. 2713—Ball Bearing Trolley Base.

Fig. 2714—Circuit Breaker.

Fig. 2715—Three Ampere, 600 Volt, Single Pole, Combined Indicating Switch and Enclosed Fuse Cutout.

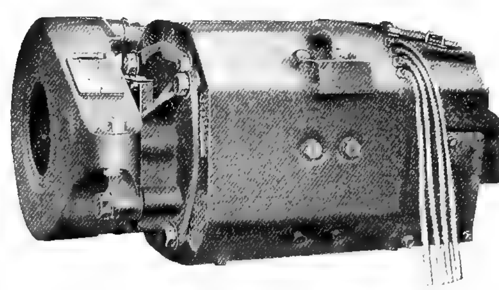


Fig. 2716—G. E. 240A Railway Motor.

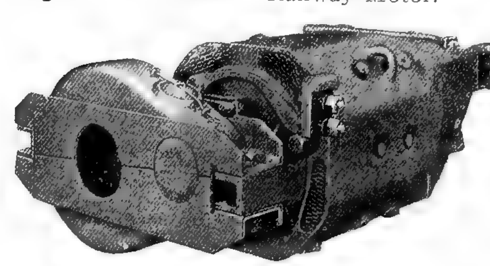


Fig. 2718—G. E. 247A Motor.

Fig. 2717—Three-Way Snap Switch for Lighting Circuit.

Fig. 2721—1,200-Volt Lamp Receptacle.

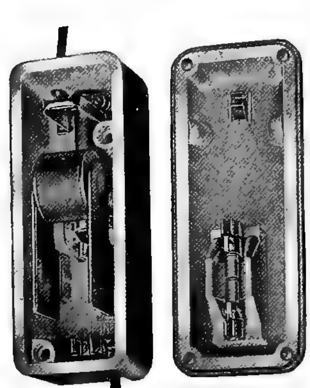


Fig. 2719—Type M, Form D Lightning Arrester.

Fig. 2720—600-Volt Receptacle.

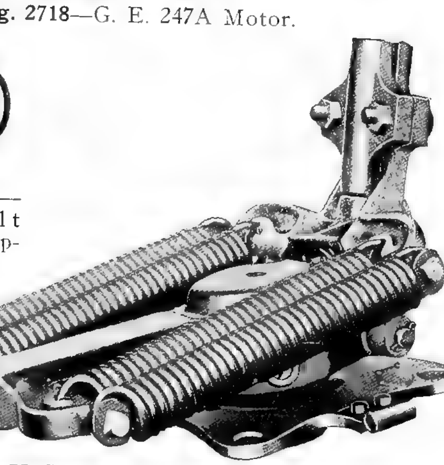


Fig. 2722—U. S. 13 Form D Trolley Base.

General Electric Company.

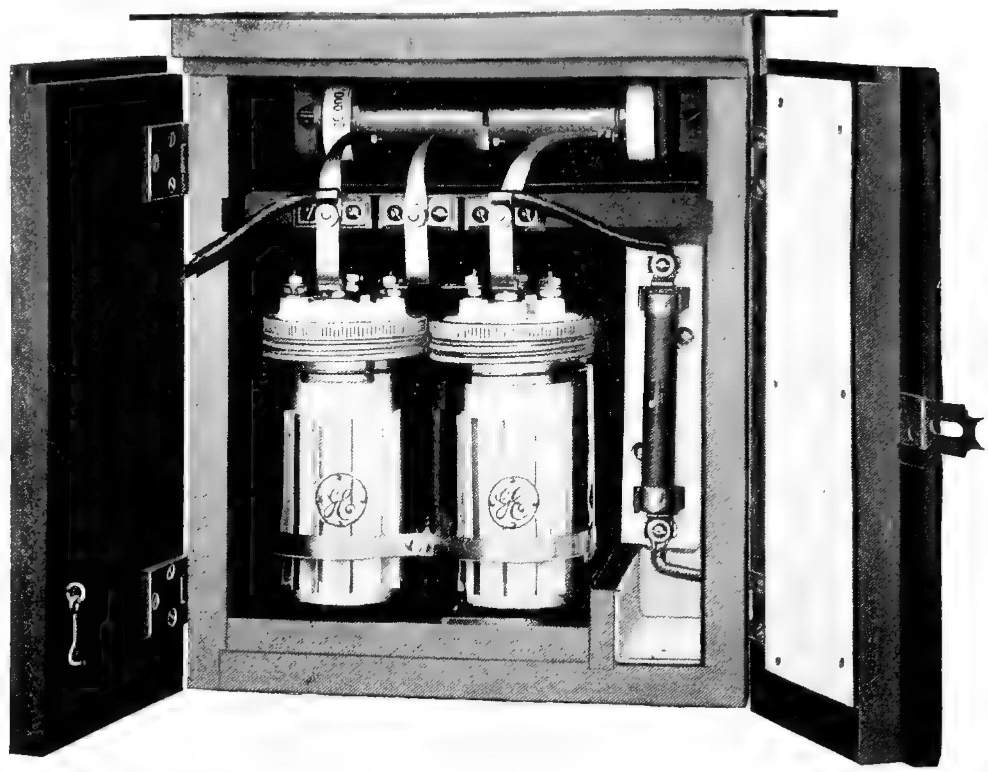


Fig. 2723—Type K, Form A 600-Volt Direct Current Aluminum Lightning Arrester for Car Service.

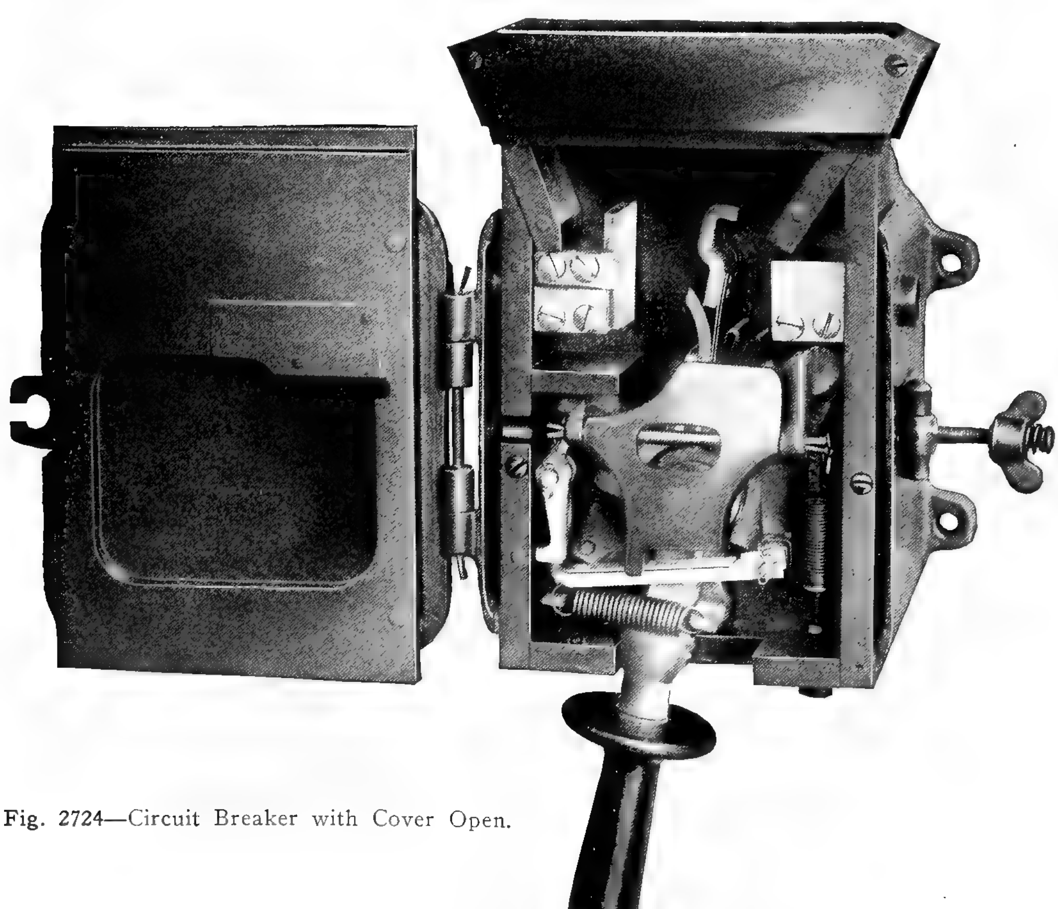


Fig. 2724—Circuit Breaker with Cover Open.

General Electric Company.

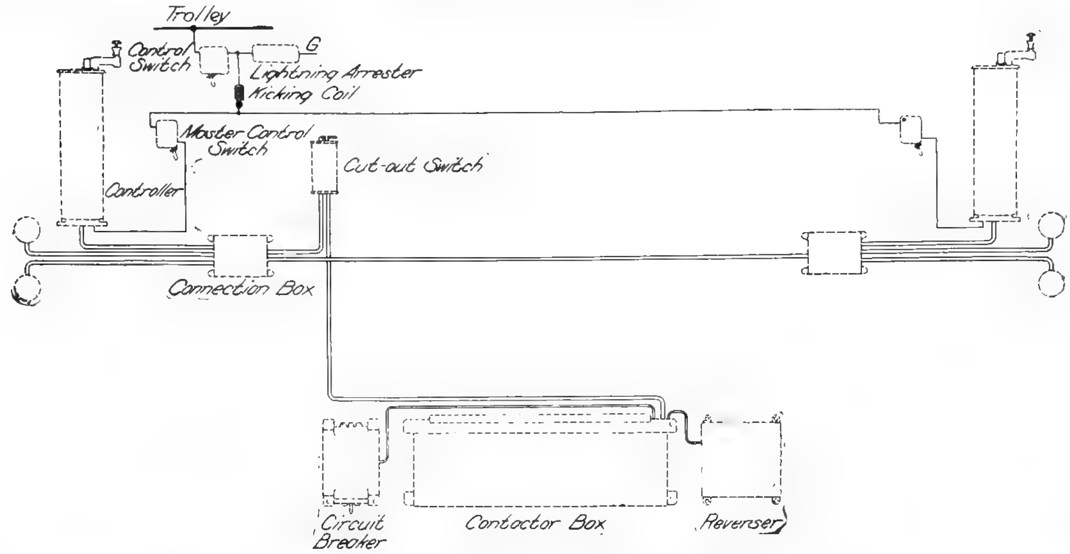


Fig. 2725—Control Wiring for Sprague-General Electric Type M Control.

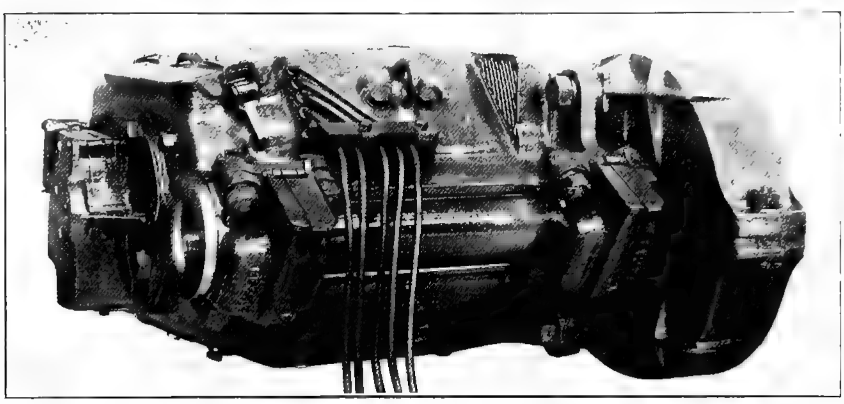


Fig. 2726—G. E. 242-B Railway Motor.

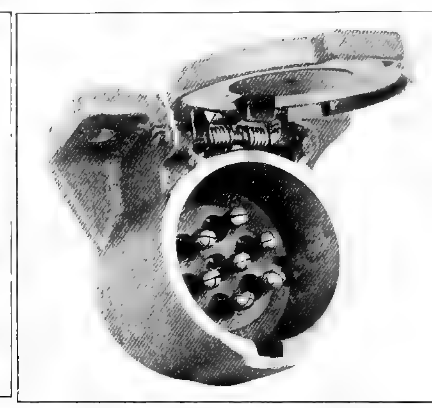


Fig. 2727—Coupler Socket.

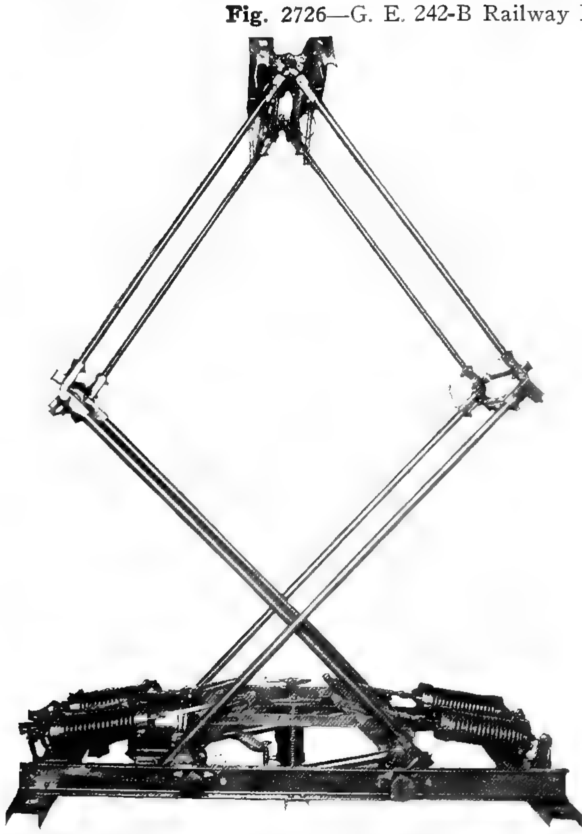


Fig. 2728—Type S, 159-A Slider Trolley

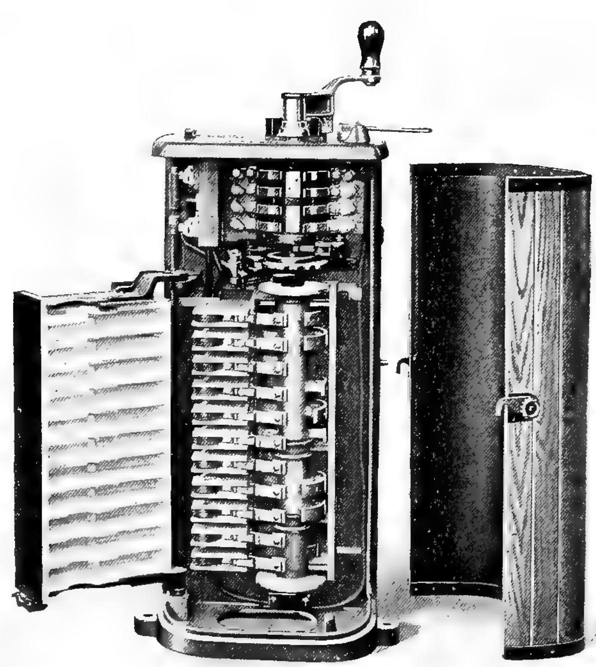


Fig. 2729—Type K, 36-F Controller.

General Electric Company.

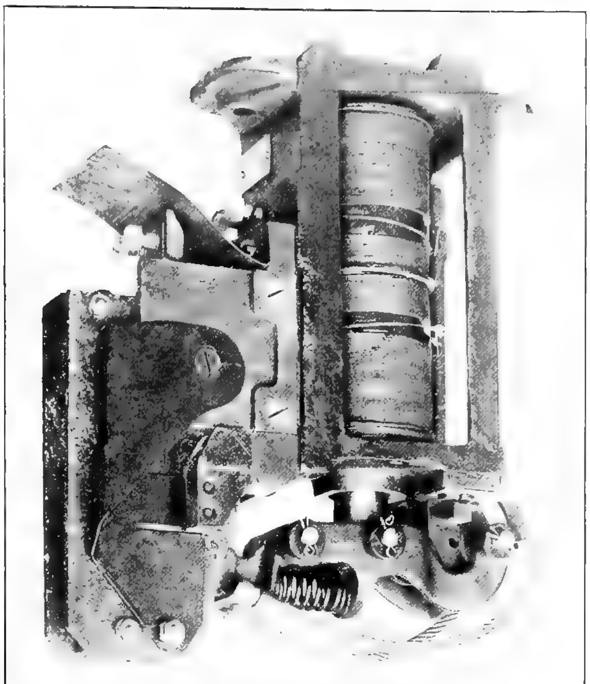


Fig. 2730—Type DD, 266-F Contactor. G. E. Co.

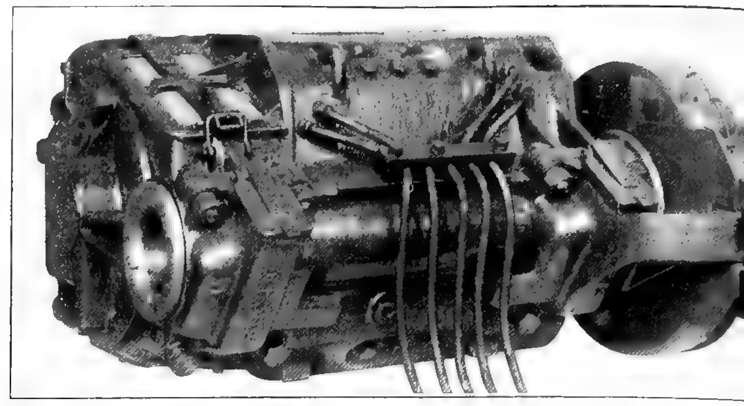


Fig. 2731—G. E. 248-A Railway Motor. General Electric Compa

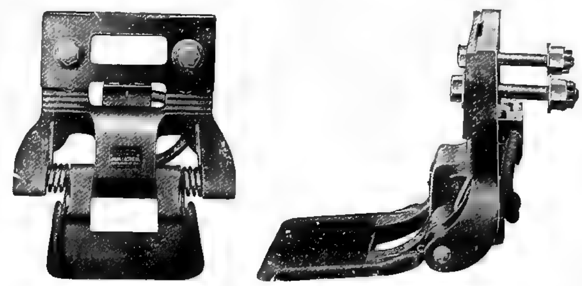


Fig. 2732—Spring Type Current Collector for Over-Running Third Rail. G. E. Co.

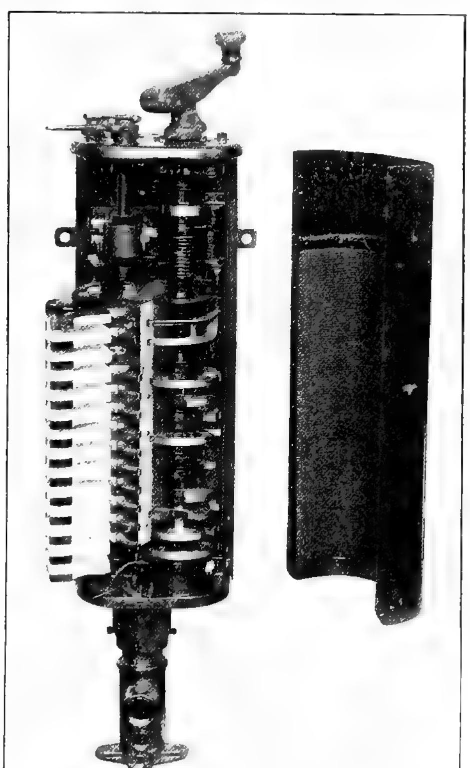


Fig. 2733—Type C, 99A Controller. G. E. Co.

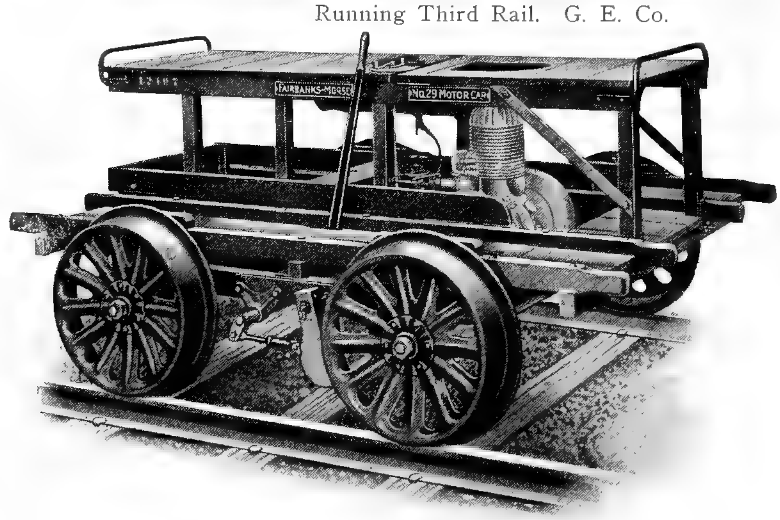


Fig. 2734—No. 29 Section-man's Special Motor Car. Fairbanks, Morse & Company.

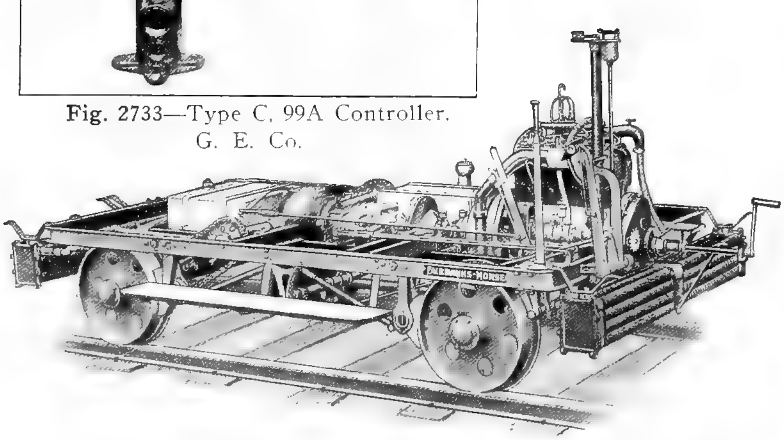


Fig. 2735—Chassis, Motor and Transmission of No. 35 Motor Car. Fairbanks, Morse & Company.

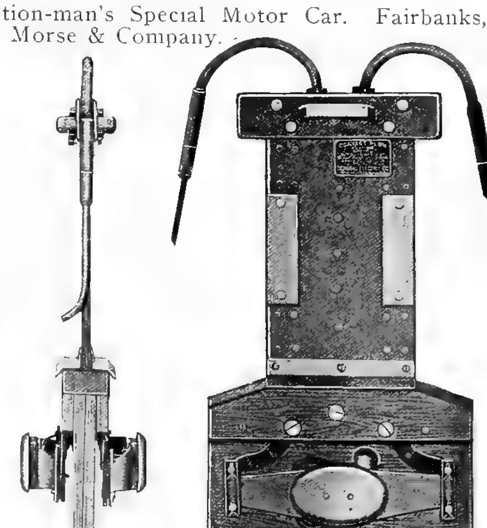


Fig. 2736—Open Conduit Plow or Current Collector. G. E. Co.

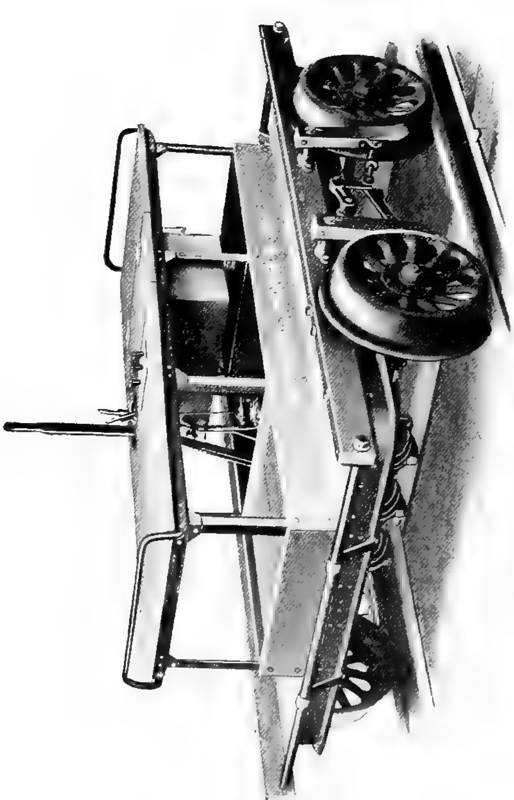


Fig. 2737—No. 33 Gasolene Section Motor Car.

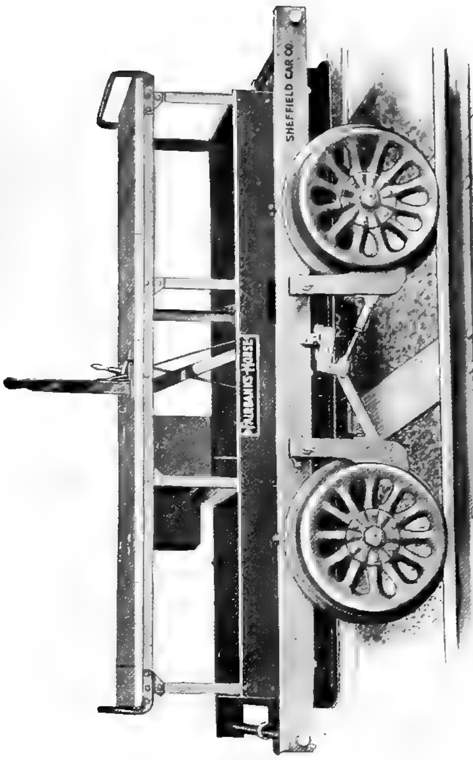


Fig. 2738—No. 32 Gasolene Section Motor Car.

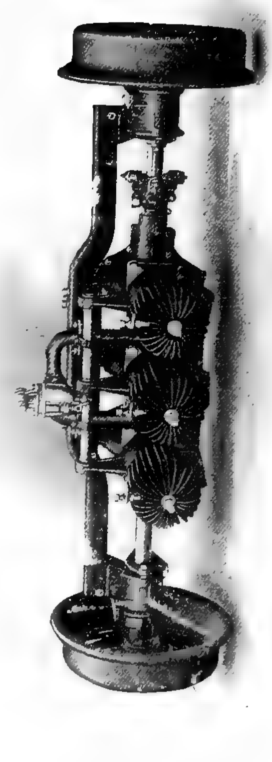


Fig. 2739—Power Plant of No. 33 Motor Car.

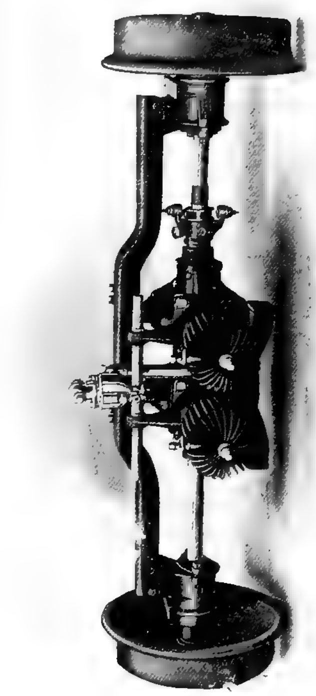


Fig. 2740—Power Unit of No. 32 Motor Car.

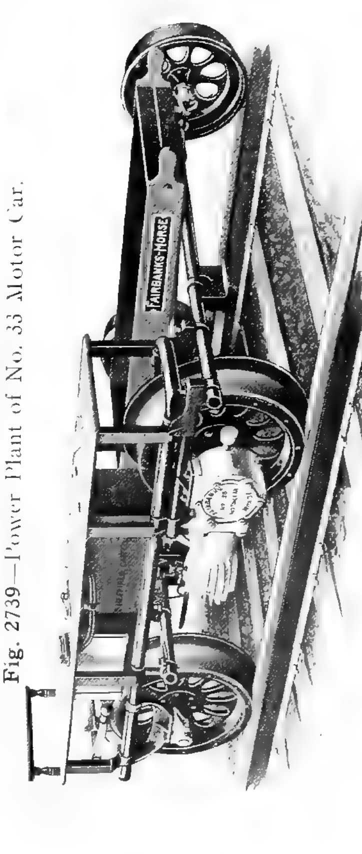


Fig. 2741—No. 30 Signal Maintainer's Car.

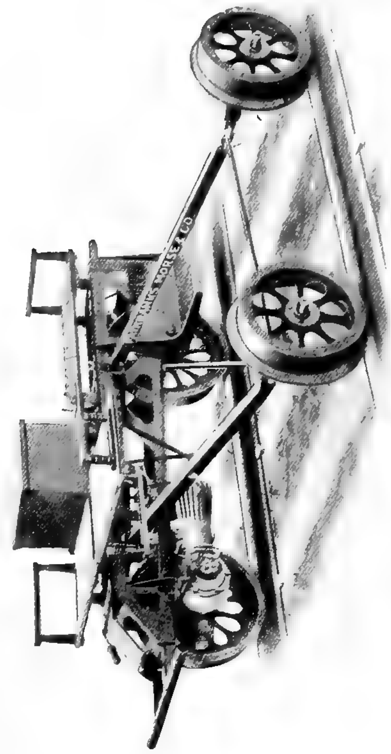


Fig. 2742- No. 28 Gasolene Inspection Car.

Fairbanks, Morse & Company.

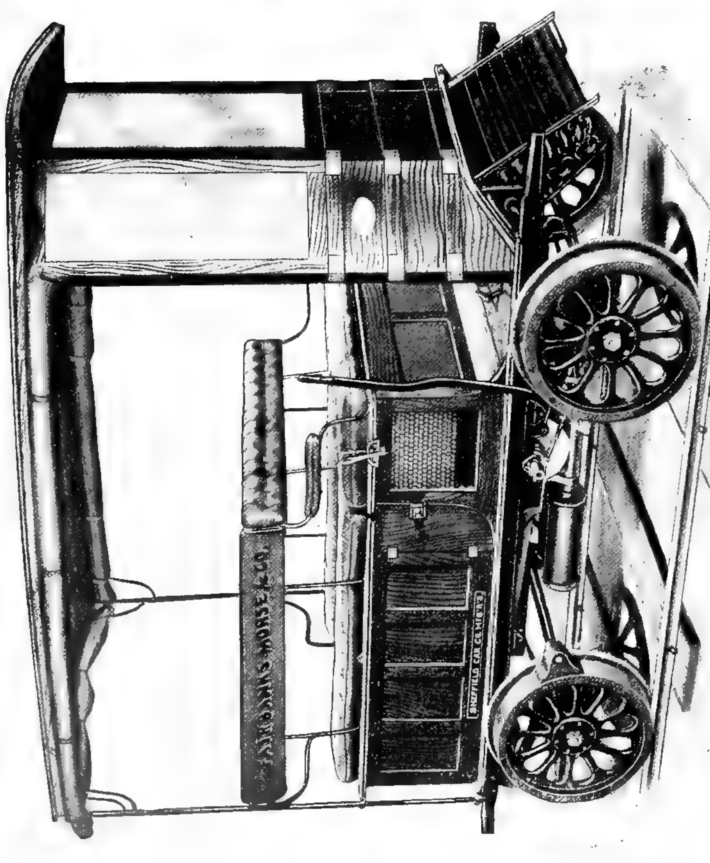


Fig. 2743—No. 16 Inspection Gasolene Motor Car, Type A.

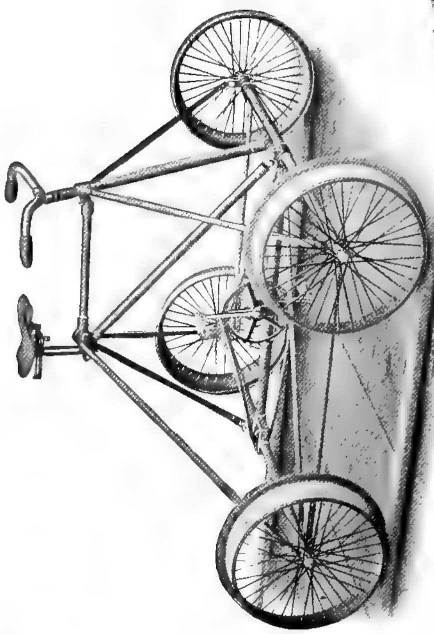


Fig. 2744—Velocipede Car No. 19.

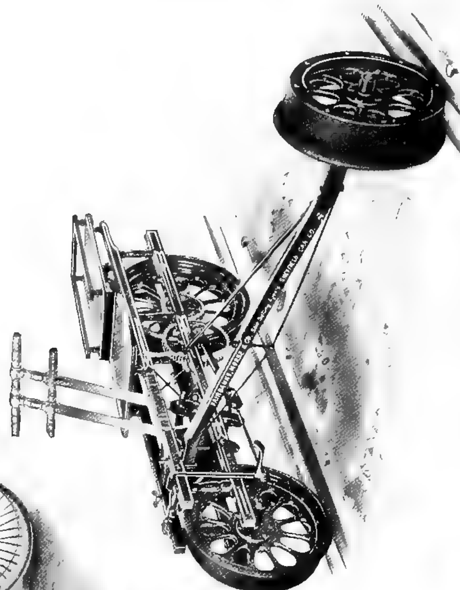


Fig. 2745—Ball Bearing Velocipede Car.

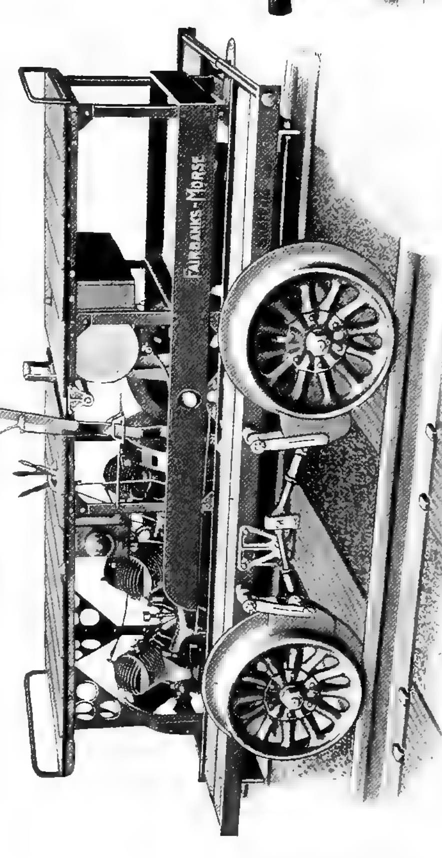


Fig. 2746—No. 34 Gasolene Section Car.

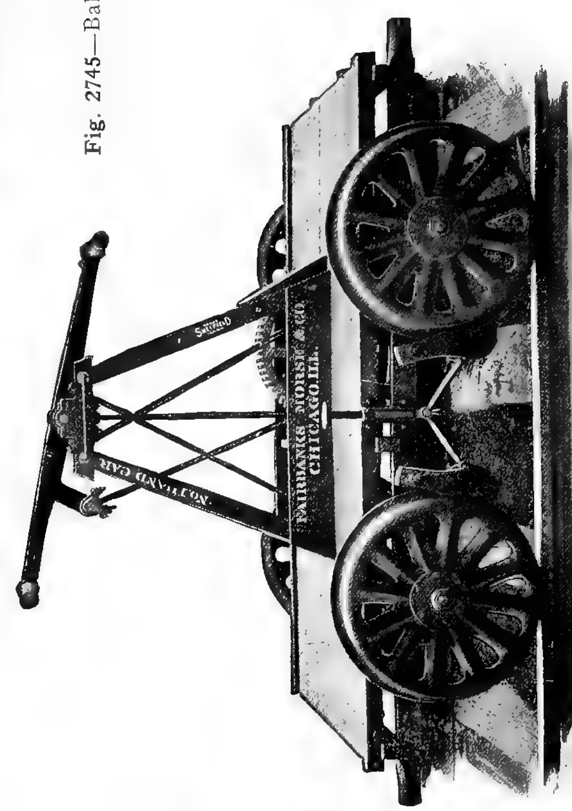


Fig. 2747—Standard Section Hand Car No. 14.
Fairbanks, Morse & Company.

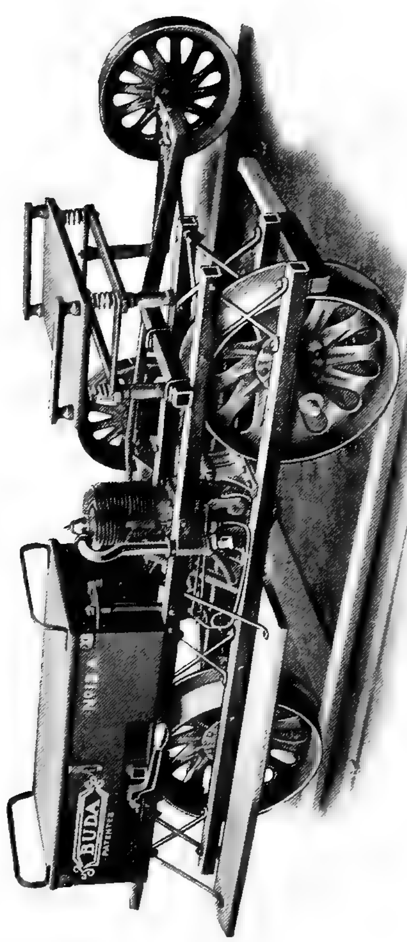


Fig. 2748—Buda No. 12A Motor Velocipede.

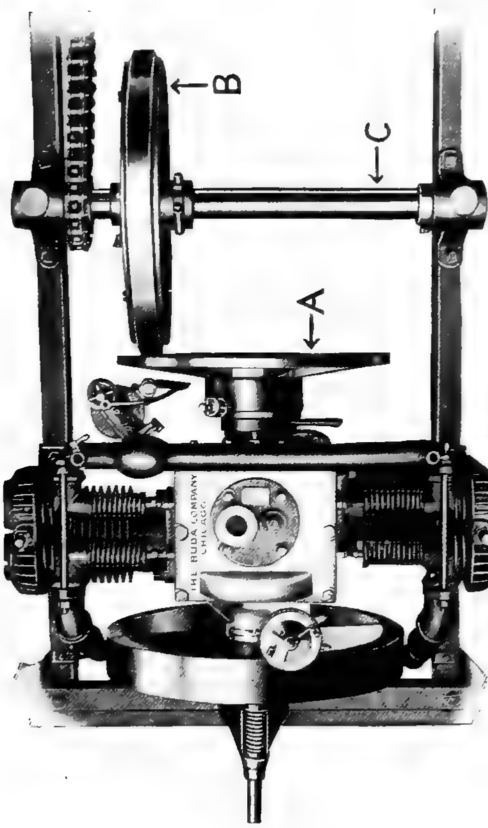


Fig. 2749—Friction Drive on Buda Motor Cars.

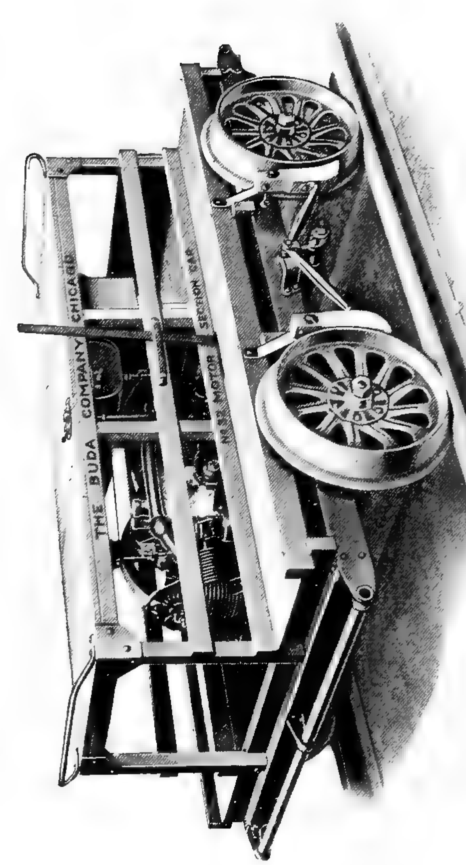


Fig. 2750—Buda No. 32 Motor Car.

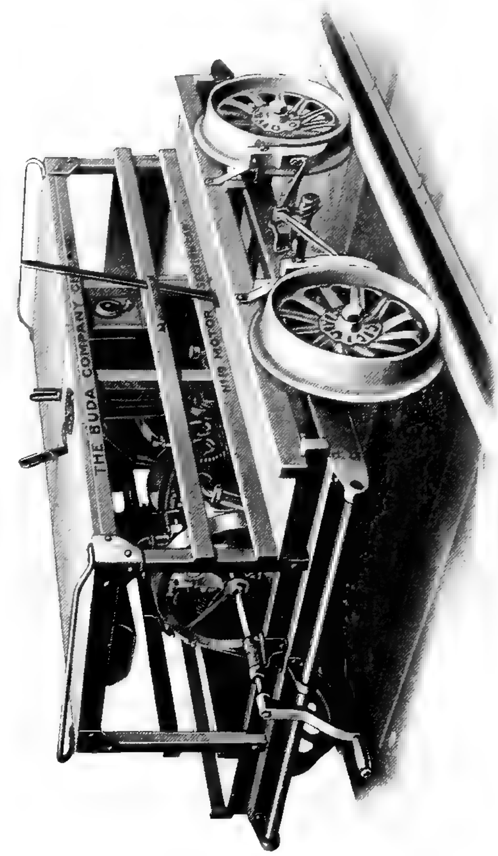


Fig. 2751—Buda No. 19 Motor Car.

The Buda Company.

Fig. 2752—No. 116 Buda Motor Inspection Car.
The Buda Company.

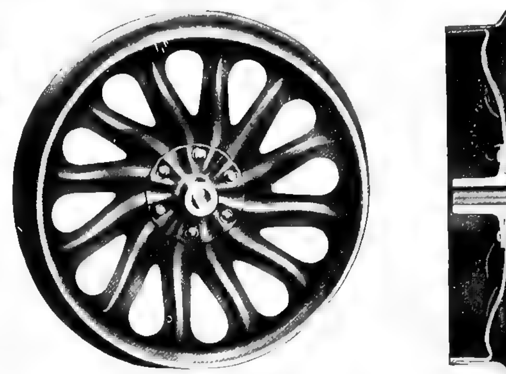


Fig. 2753—Pressed Steel Hand Car Wheel.
The Buda Company.

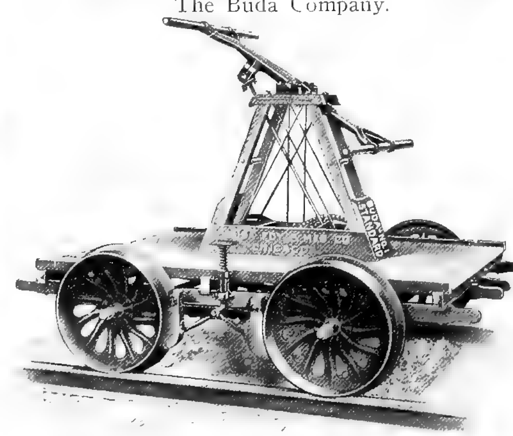


Fig. 2754—No. 1 Hand Car.
The Buda Company.

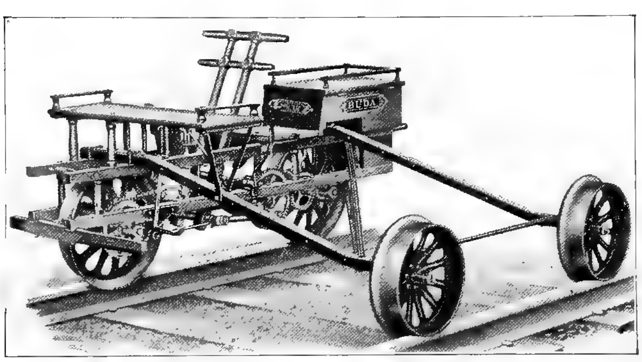


Fig. 2755—Motor Velocipede Car. No. 12.
The Buda Company.

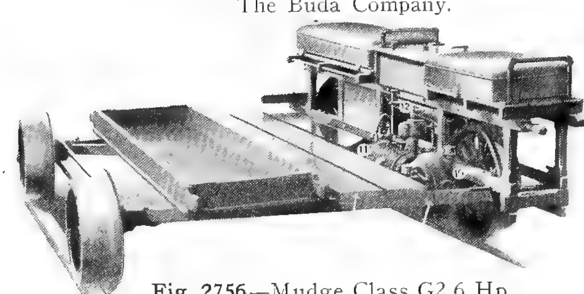


Fig. 2756—Mudge Class G2 6 Hp.
Inspection Car. Four-Man Capacity.

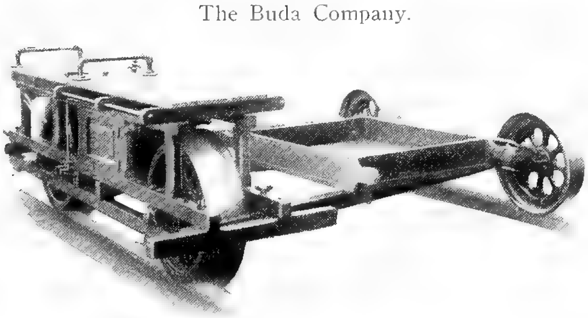


Fig. 2757—Mudge Class E1 Inspection Car, 4 Hp.

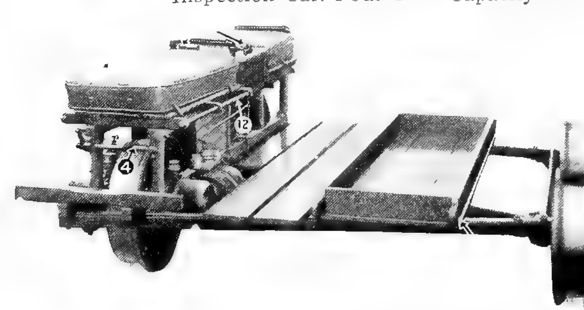


Fig. 2758—Mudge Class E4 Twin-Engine,
8 Hp. Inspection Car, Four-Man Capacity.

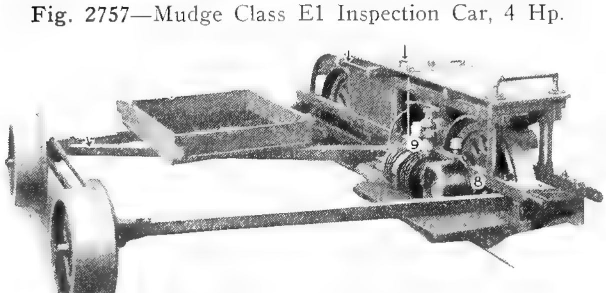


Fig. 2759—Mudge Class E2 Inspection Car,
4 Hp., Suitable for Two Men.

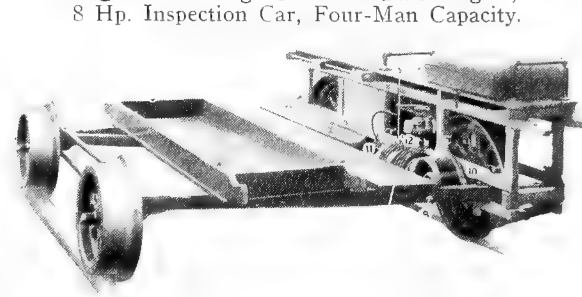


Fig. 2760—Mudge Class E3 Inspection Car, 4 Hp.,
Suitable for Three Men.

Mudge & Company.

Fig. 2761—Mudge Class GQ2 "Wonder Pull" Hand Car, Engine or Complete Section Car Top, 6 Hp., Geared 3 to 1. Mudge & Company.

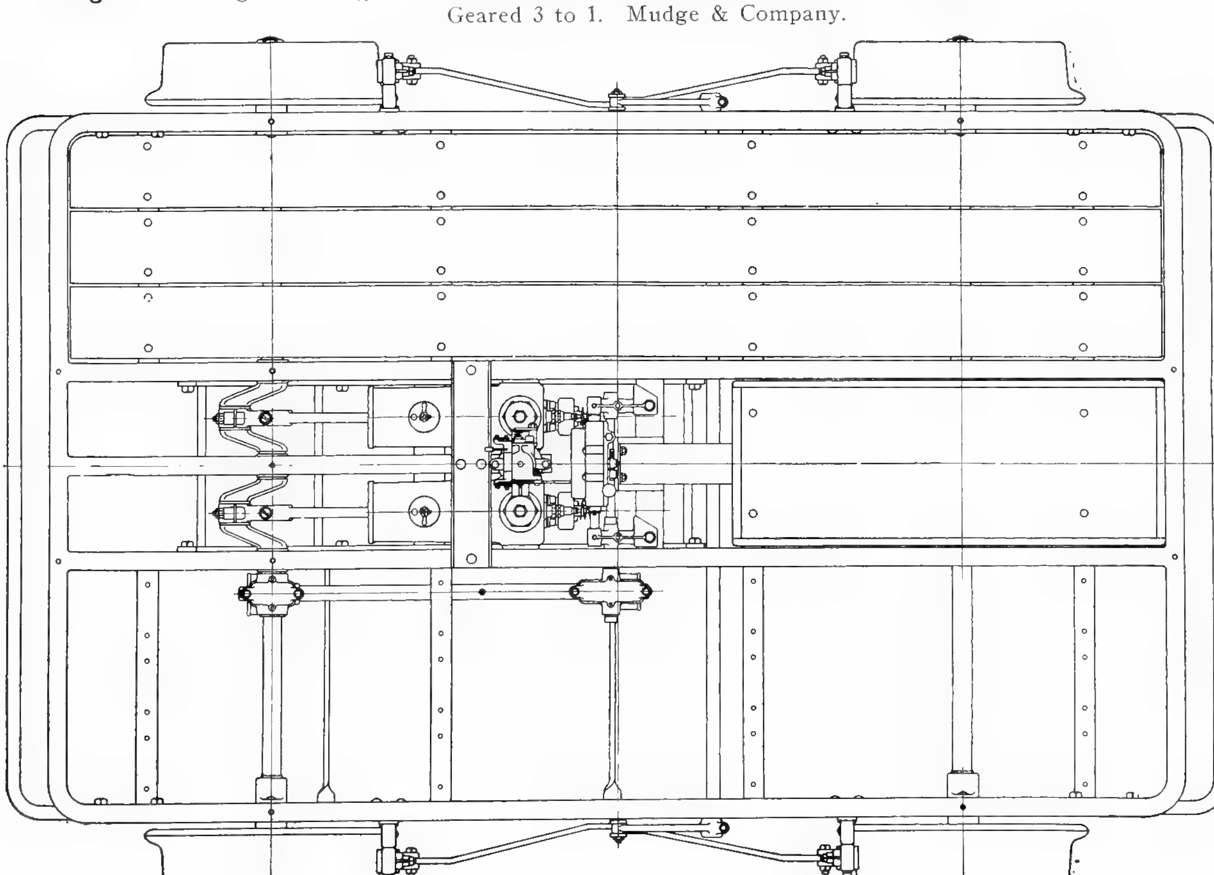
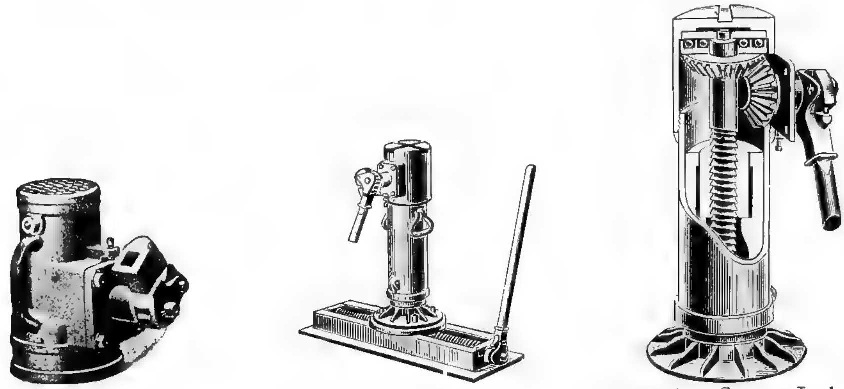


Fig. 2762—Bottom View of Rockford Motor Car, Showing Engine Arrangement. Chicago Pneumatic Tool Company.

Fig. 2763—Hydraulic Journal Box Jack. Watson-Stillman Company.



Journal Jack. Capacity, 25 Tons.

Traversing Jack.

Ratchet Screw Jack.

Fig. 2764—Types of Norton Ball Bearing Jacks. A. O. Norton, Incorporated.

Fig. 2765 — Hydraulic Wrecking Jack. Watson-Stillman Company.

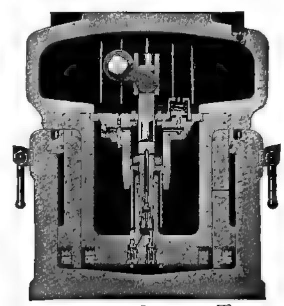


Fig. 2766 — Low Type Telescope Hydraulic Jack. Duff Manufacturing Company.

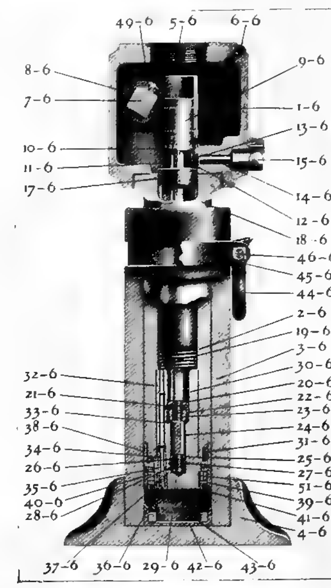


Fig. 2767—Universal Railroad Hydraulic Jack. Richard Dudgeon.

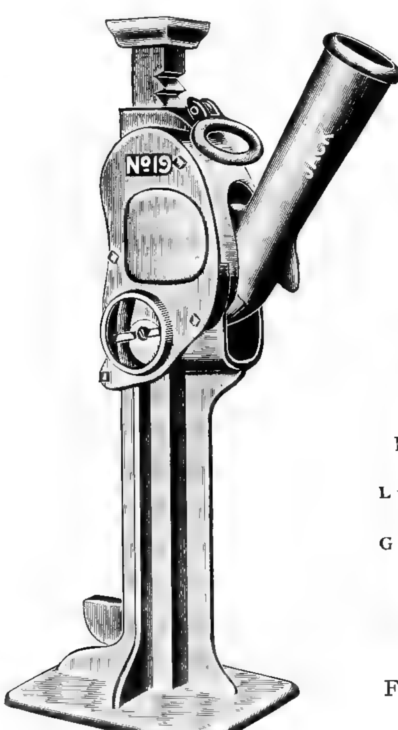


Fig. 2768 — Buckeye Automatic Lowering Jack for General Car Work.

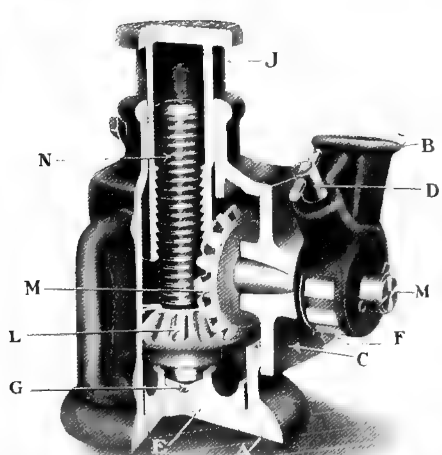


Fig. 2769— Ball Bearing Journal Jack. Duff Manufacturing Company.

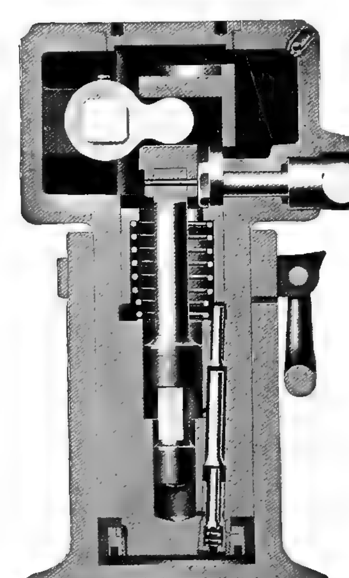


Fig. 2770—Hydraulic Plain Type Car Inspector's Double Pump Jack. Richard Dudgeon.

Fig. 2771—Cone Bearing Postop Journal Jack.

Fig. 2772—Cone Bearing Postop Journal Jack for Car Inspectors.

Fig. 2773—Ball Bearing Journal Jack with Wheel Holding Device.

Fig. 2774—Jack No. 110, Equipped with Foot Lift.

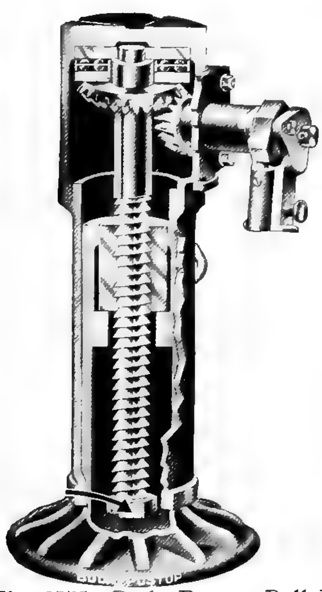


Fig. 2775—Buda Postop Ball Bearing Jack.

Fig. 2776—Car Jack No. 101. The Buda Company.

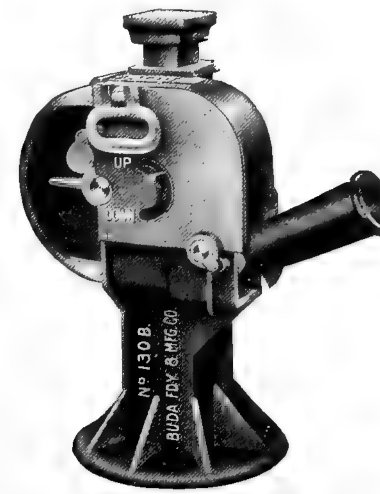


Fig. 2777—Single Acting, Automatic Lowering, Geared Ratchet Jack; Capacity, 40 Tons.

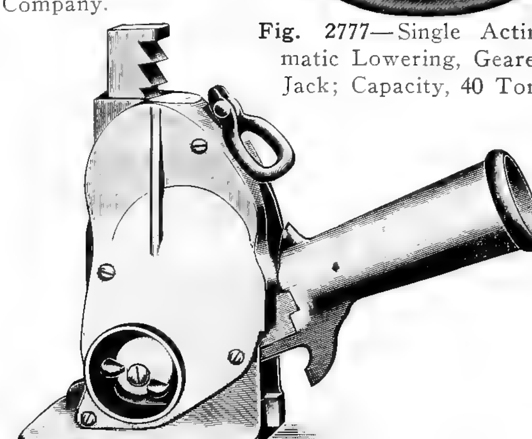


Fig. 2779—Buckeye Automatic Lowering Jack for Journal Box Work; Capacity, 10 Tons. Buckeye Jack Manufacturing Company.

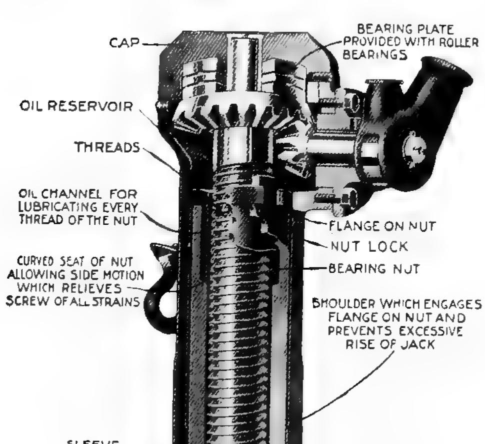


Fig. 2778—Geared Screw Jack. The Joyce-Cridland Company.

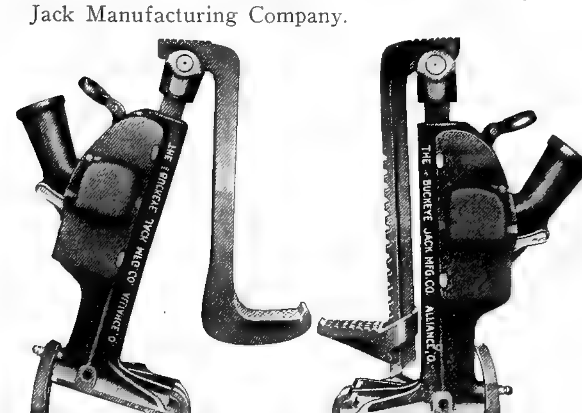


Fig. 2780—Buckeye Emergency Jacks. Buckeye Jack Manufacturing Company.

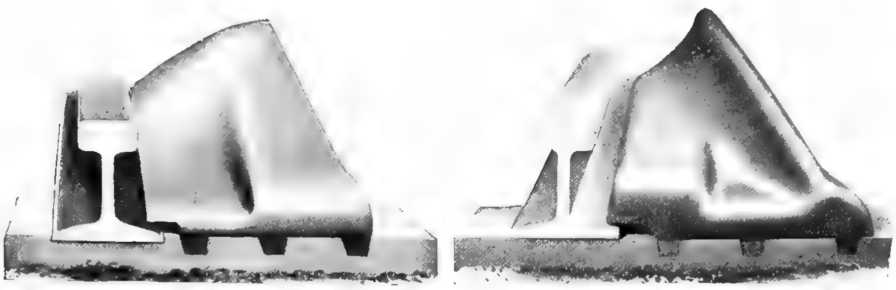


Fig. 2781—Inside and Outside Car Replacers. The Buda Company.

Fig. 2782—Alexander Car Replacers. Alexander Car Replacer Company.

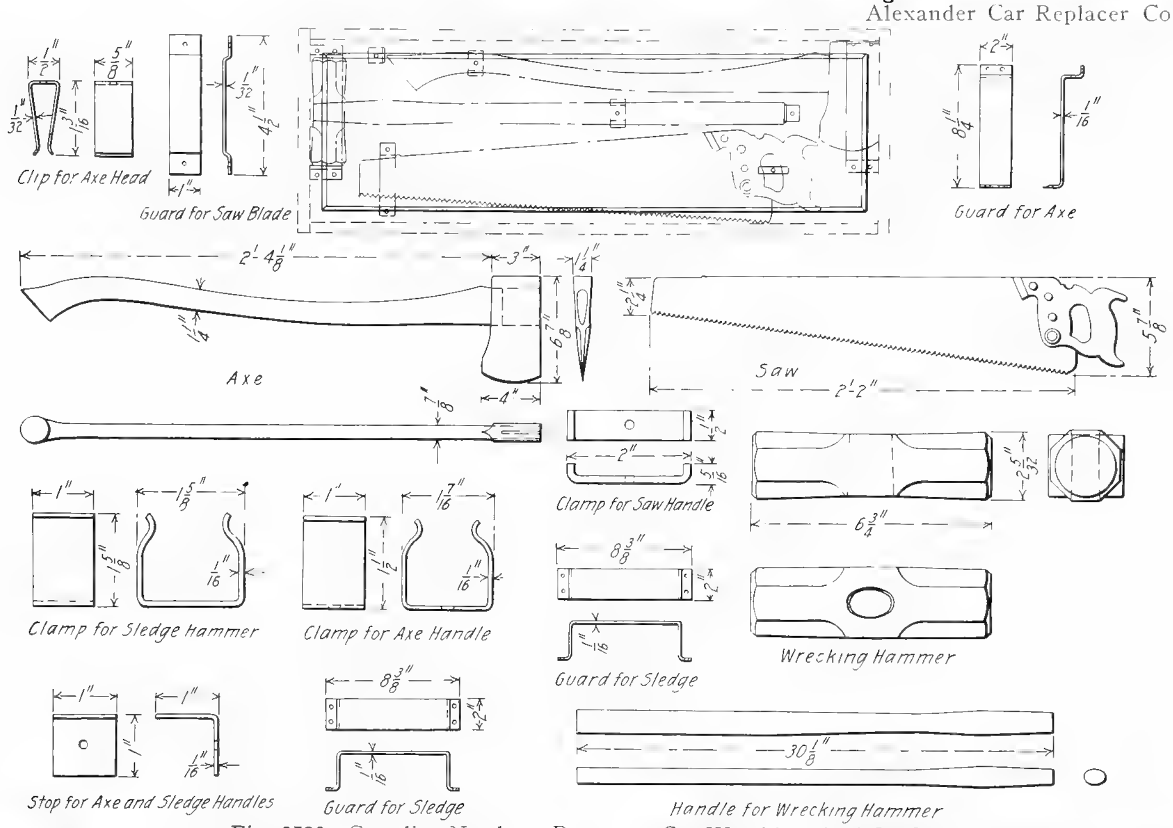


Fig. 2783—Canadian Northern Passenger Car Wrecking Tool Outfit.

Fig. 2784—Fewings Wrecking Frogs.

Fig. 2785—R. A. Skid Shoe for Sliding Damaged Wheels. The Q. & C. Company.

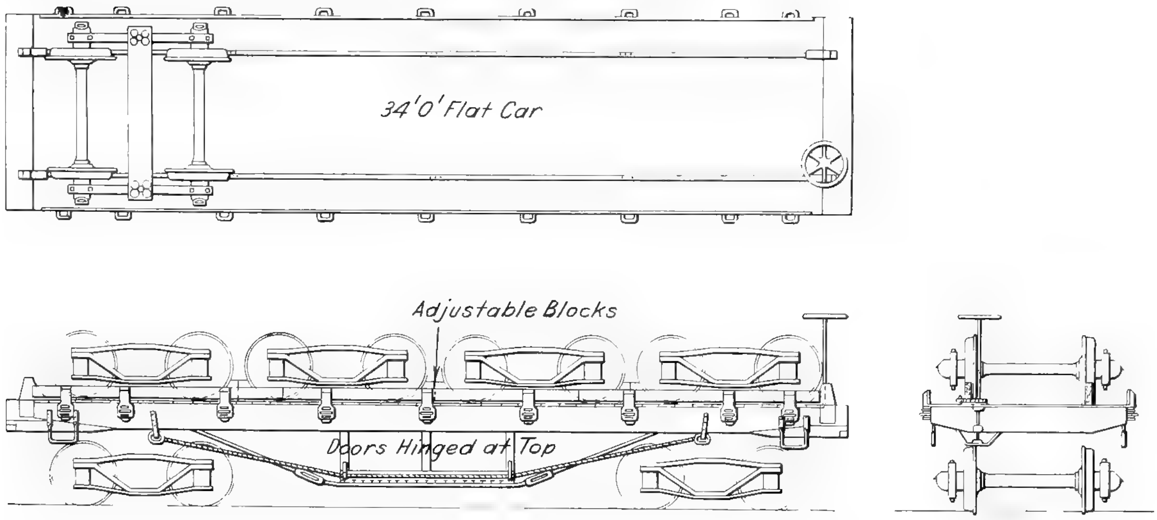


Fig. 2786—New York, New Haven & Hartford Truck Car.

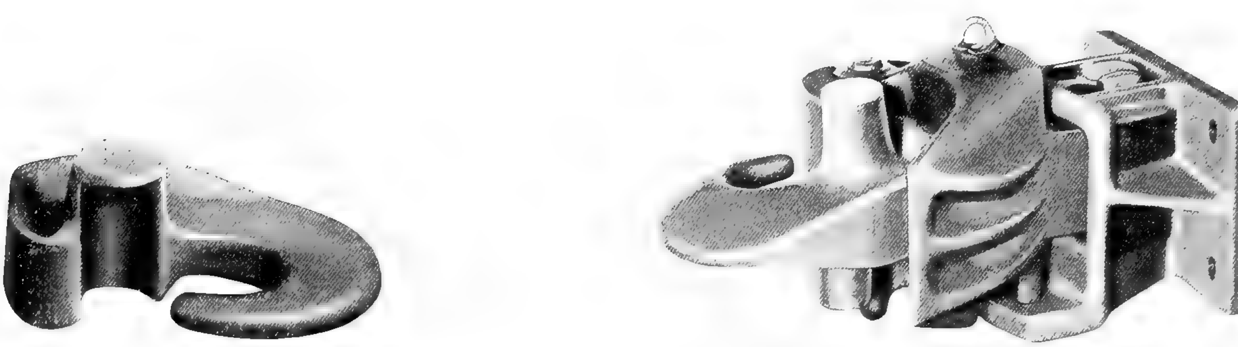


Fig. 2787—Goodman Wrecking Hook (Patented).
The National Malleable Castings Company.

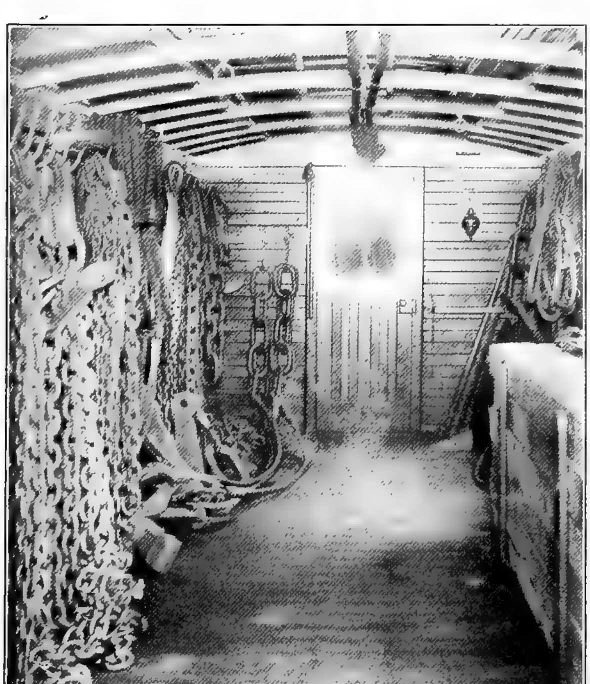


Fig. 2788—Interior of New York Central Tool Car.

Fig. 2789—Interior of Erie Railroad Tool Car.

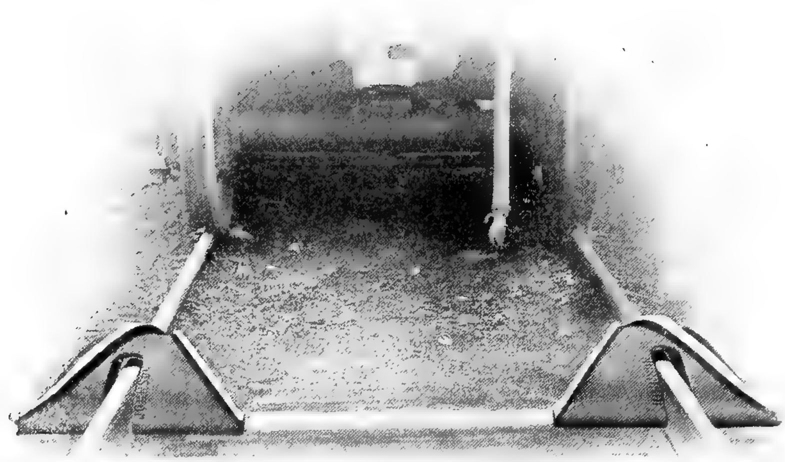


Fig. 2790—Johnson Wrecking Frog. Johnson Wrecking Frog Company.

Fig. 2791—Interior of Dining Car of New York Central Wreck Train.

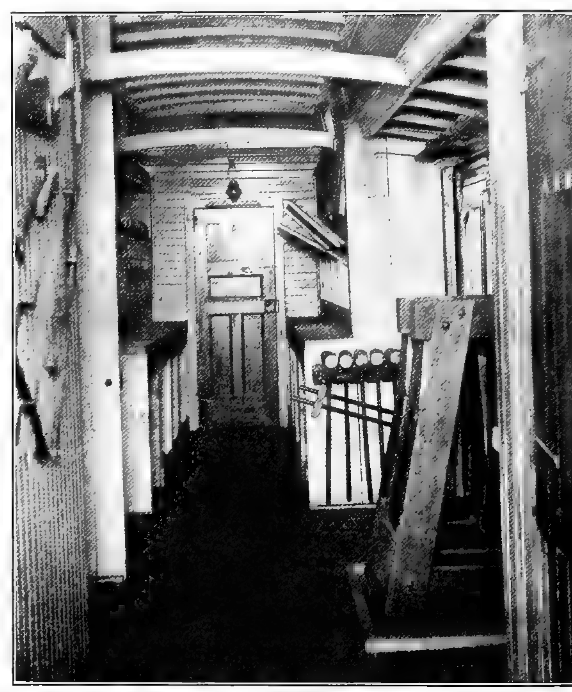


Fig. 2792—Interior of Tool Car of New York Central Wreck Train.

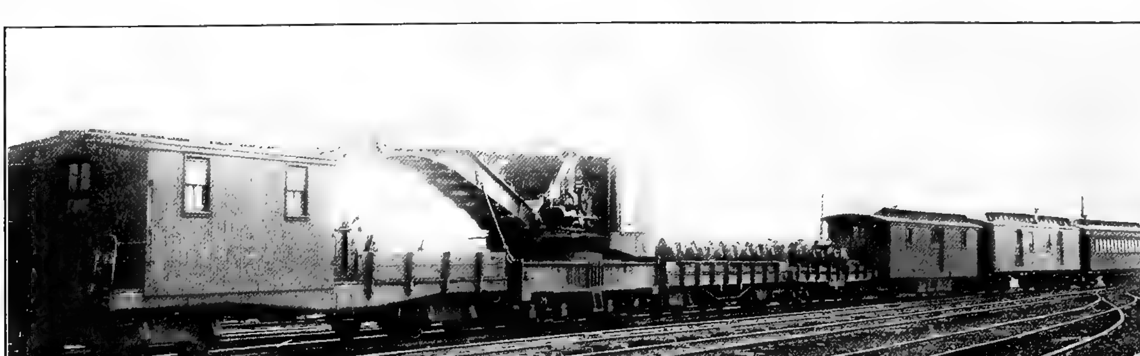


Fig. 2793—Arrangement of Cars in New York Central Wreck Train. From Left to Right—Crane Tender, Crane, Truck Cars, Tool Cars, Sleeping and Dining Cars.

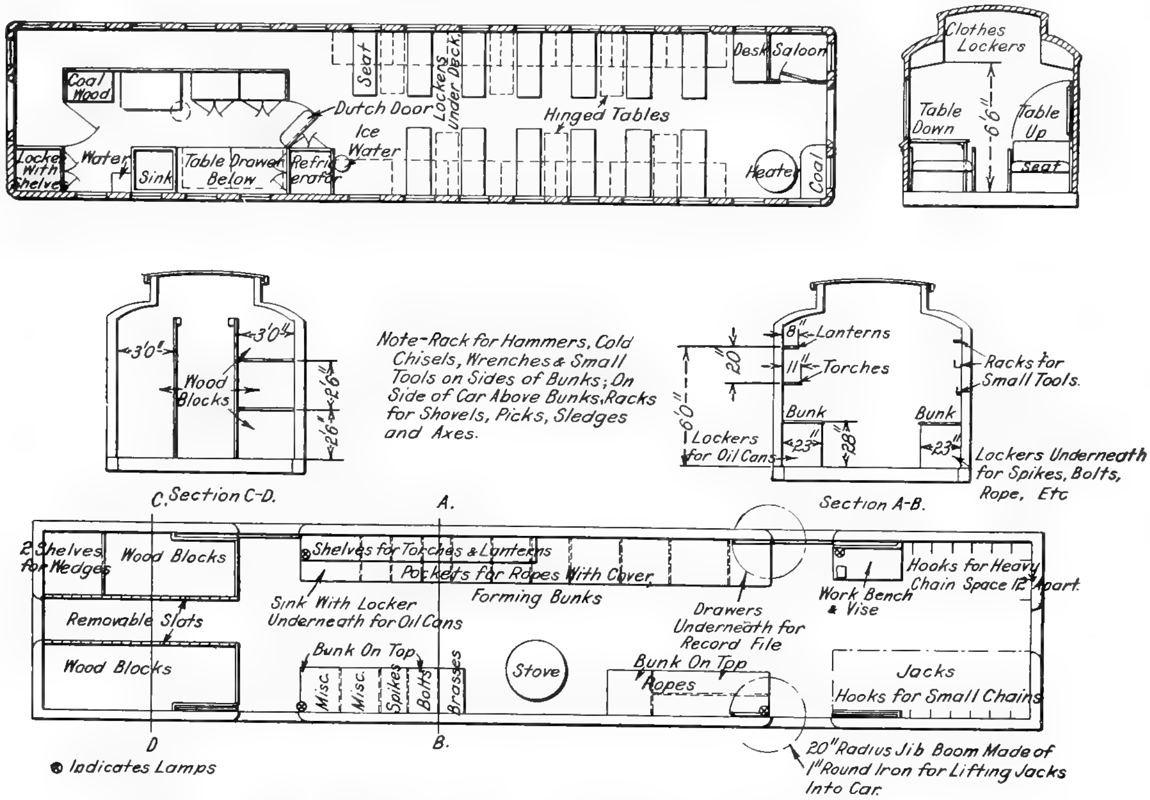


Fig. 2794—New York, New Haven & Hartford Dining, Tool and Sleeping Cars.

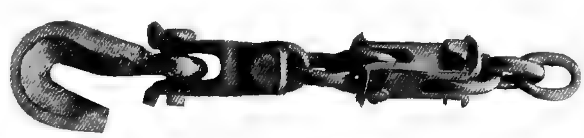


Fig. 2795—Buda Repair Links for Wrecking Chains. The Buda Company.

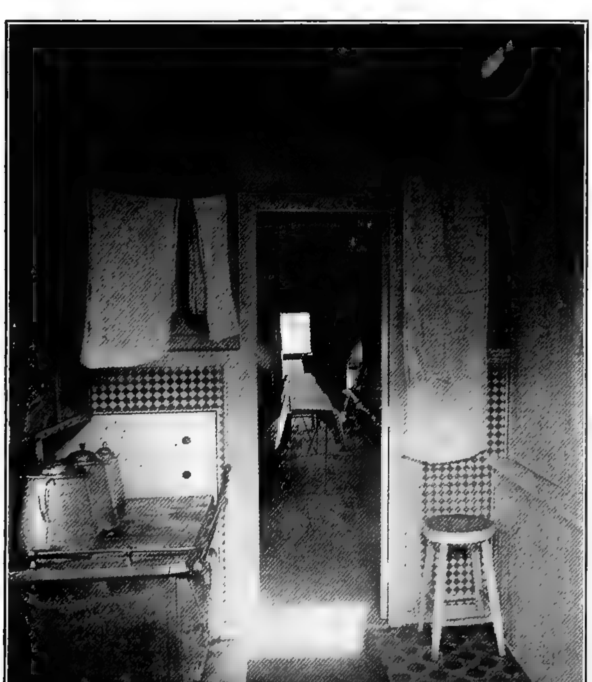


Fig. 2796—Interior of Erie Railroad Dining and Sleeping Car.

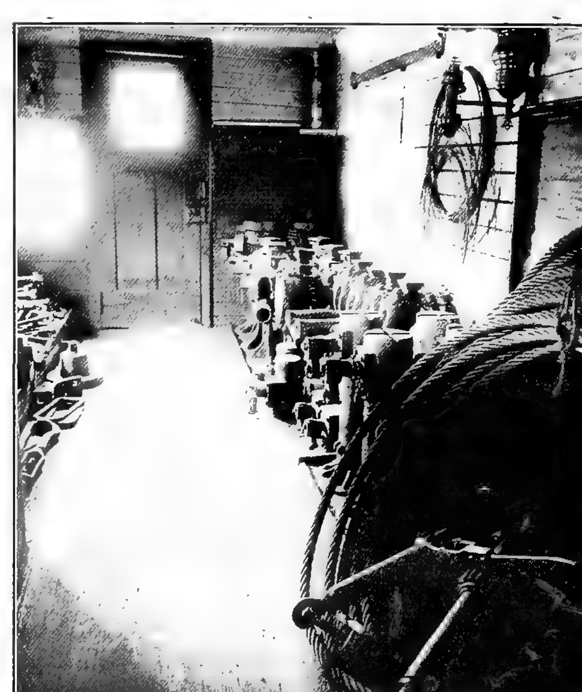


Fig. 2797—Interior of Baltimore & Ohio Tool Car.

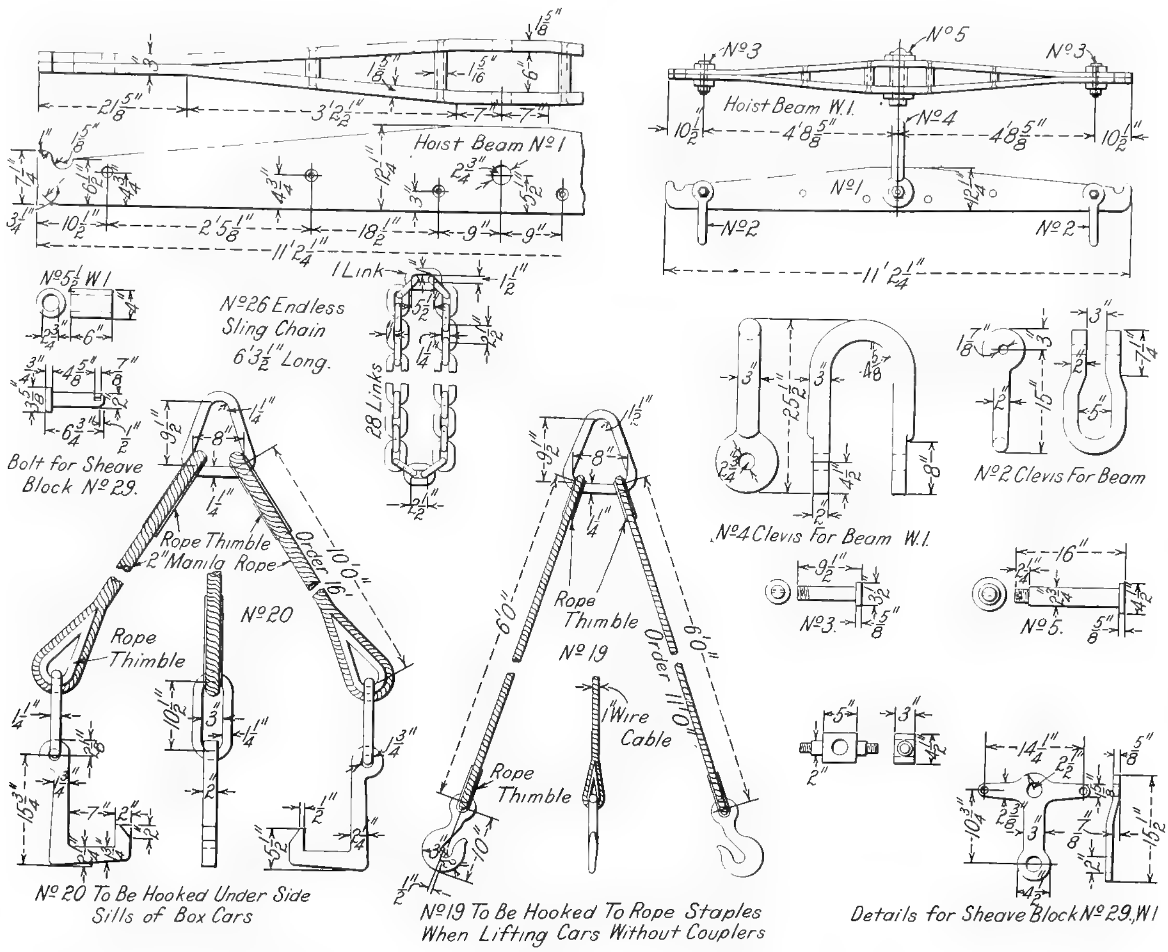


Fig. 2798—Chicago, Burlington & Quincy Wreck Train Tools.

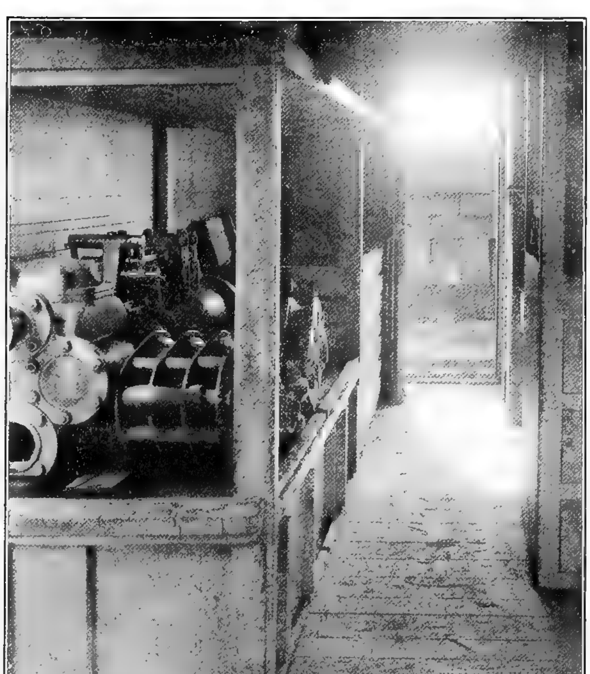


Fig. 2799—Interior of Southern Pacific Tool Car. The Pump is Used for Transferring Oil from Wrecked Tank Cars.

Fig. 2800—Interior of Southern Pacific Tool Car, Showing Portable Lights and Bins for Cable Storage.

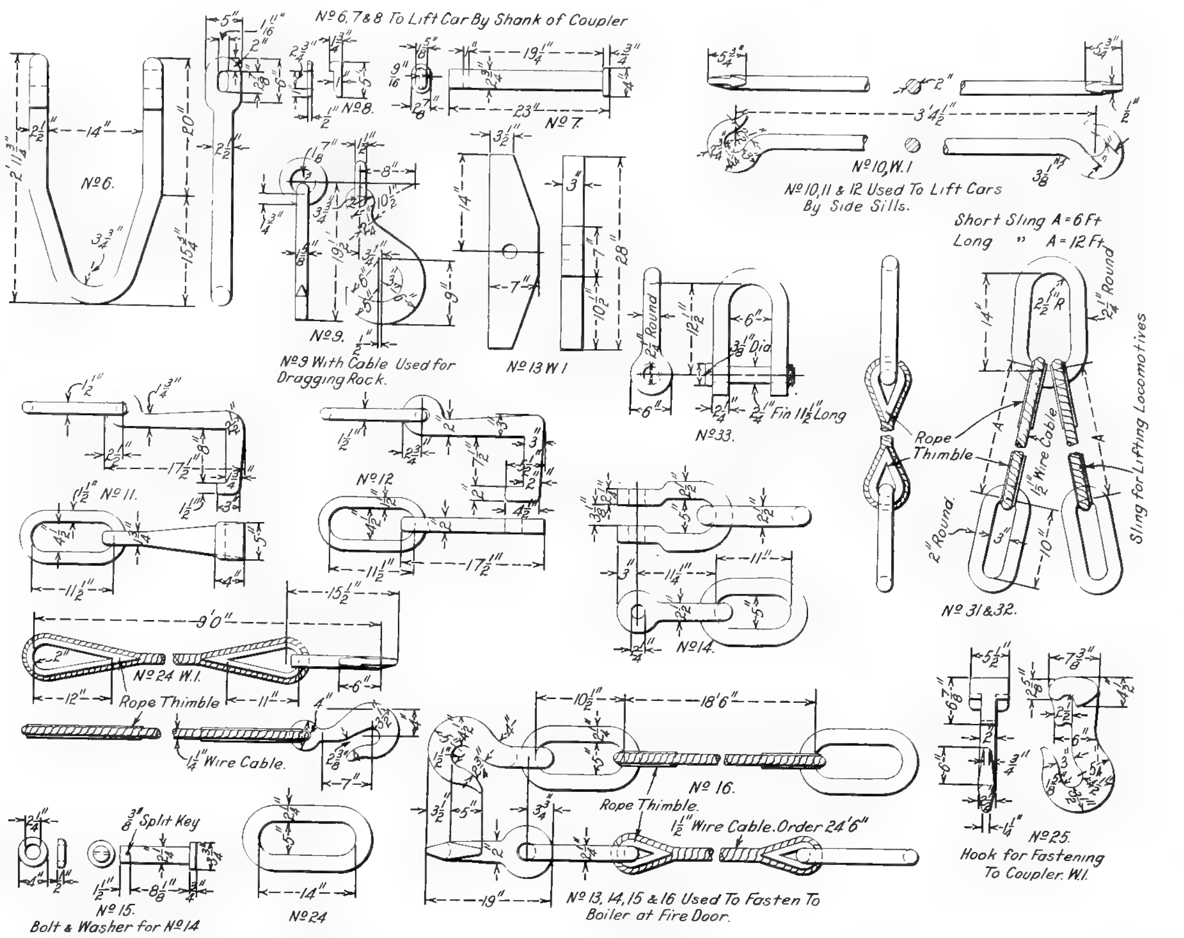


Fig. 2801—Chicago, Burlington & Quincy Wreck Train Tools.

Fig. 2802—Interior of Chicago, Burlington & Quincy Sleeping Car.

Fig. 2803—Interior of Chicago, Burlington & Quincy Tool Car, Showing Arrangement of Blocking.

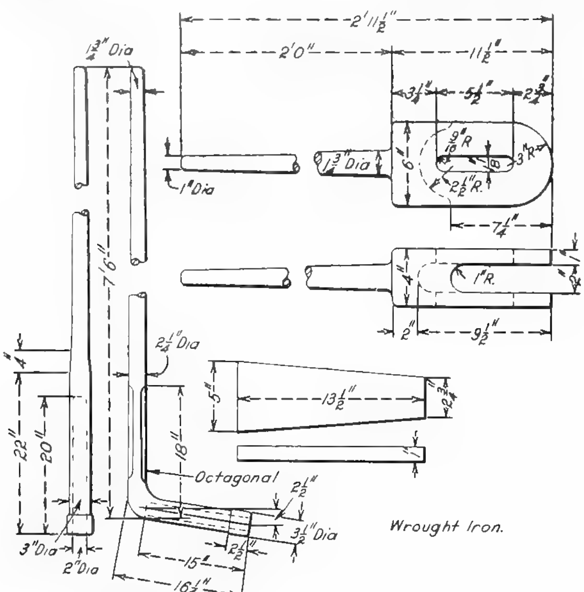
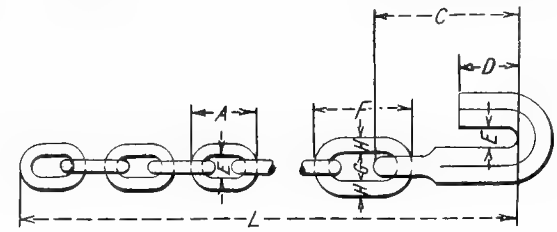


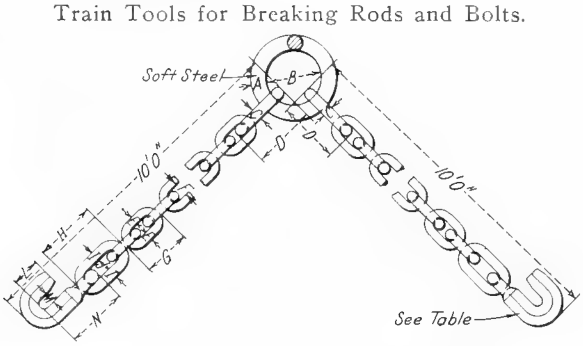
Fig. 2804—Chicago, Burlington & Quincy Wreck Train Tools for Breaking Rods and Bolts.



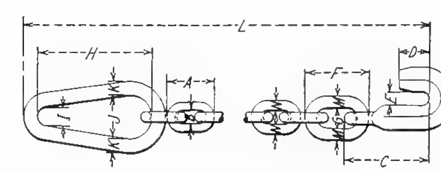
H	No. In Service	Iron Size	Iron Length L	A	B	C	D	E	F	G	Hook Size
⅝"	8	½"	7'0"	2¾	⅞"	6"	2½"	⅝"	4"	1¼"	1"□ Iron
¾"	15	⅝"	7'0"	3½"	1"	6"	2¼"	¾"	4½"	1¼"	1¼"□ Iron
⅞"	8	¾"	7'0"	4"	1"	7½"	3"	⅞"	6"	1¾"	1½□ Iron
1"	4	⅞"	7'0"	4"	1¼"	8"	3½"	1"	6"	1¾"	1¾□ Iron
1¼"	4	1⅛"	10'0"	5"	1⅜"	8½"	3½"	1⅛"	6½"	2"	2"□ Iron
1⅜"	4	1¼"	10'0"	5½"	1½"	9"	4"	1¼"	7"	2"	2¼"□ Iron

Sling Chains Table of Dimensions

Fig. 2805—Dimensions of Southern Railway Wreck Chains.



Ring	Hook	A	B	C	D	E	F	G	H	I	J	K	L	M	N
OSD 13"	2½"□	2½"	8"	1½"	9½"	1¼"	1½"	6¼"	9"	1½"	2"	1⅝"	5"	1⅜"	11"
" " " 15½"	2⅝"□	2¾"	10"	1¾"	10¼"	1½"	2"	7¾"	10"	1¾"	2¼"	1⅞"	5"	1⅝"	11"
" 16"	2¾"□	3"	10"	2"	11"	1⅝"	2¼"	8½"	10½"	2"	2½"	2¼"	5½"	1¾"	11½"



No. of Chains In Service	Kind of Chains		A	B	C	D	E	F	G	H	I	J	K	L	Size M	Size N	Hook Size
10	Common		4½"	1¼"	8"	3½"	1⅛"	6"	2"	10½"	2"	4"	1¼"	16'-0"	1"	⅞"	1¾"□ Iron
4		Special	5½"	1½"	10"	4½"	1¼"	8"	2¼"	11"	2¼"	4"	1⅜"	22'-0"	1⅛"	1"	2"□ Iron
6		"	5¾"	1½"	10"	5"	1¼"	8¼"	2¼"	11"	2¼"	4"	1½"	22'-0"	1¼"	1⅛"	2⅛"□ Iron
8		"	6"	1¾"	10½"	5"	1⅜"	8½"	2¼"	11"	3"	4½"	1¾"	24'-0"	1⅜"	1¼"	2¼"□ Iron
		"	7"	2"	11½"	6"	1¾"	9"	2½"	12"	3¼"	5½"	2"	20'-0"	1⅝"	1½"	2¾"□ Iron

Wrecking Chains

Fig. 2806—Dimension of Southern Railway Wreck Chains.

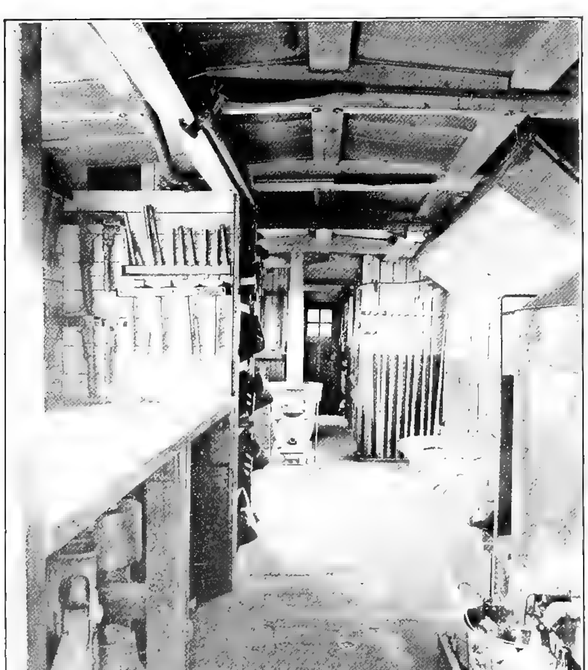


Fig. 2807—Interior of New York Central (West) Tool Car.

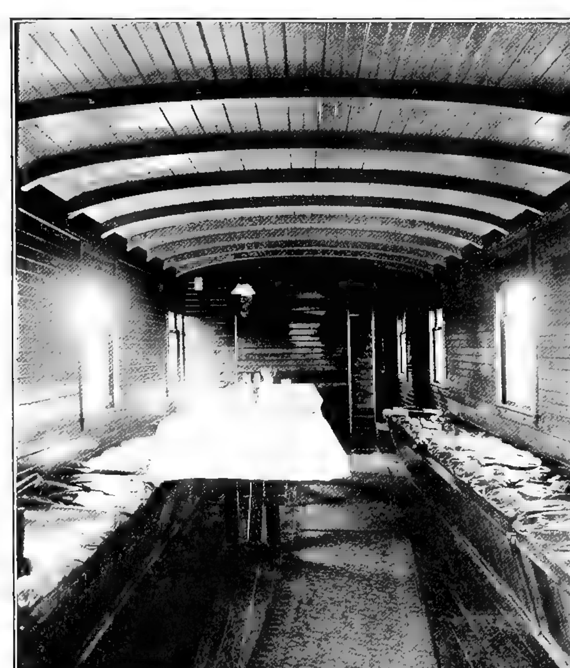


Fig. 2808—Interior of New York Central (West) Dining and Sleeping Car.

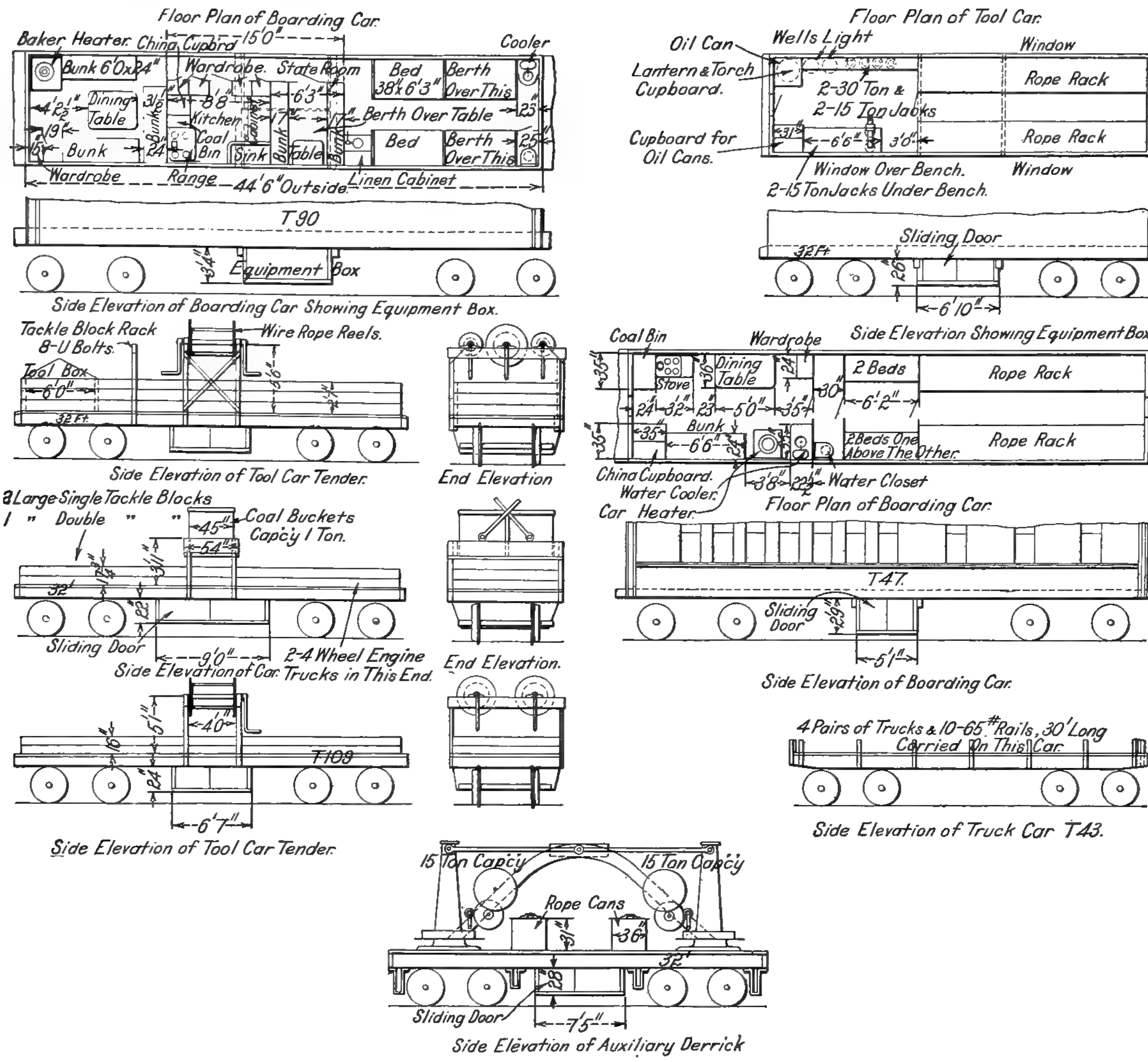


Fig. 2809—Southern Railway Wreck Train Cars.

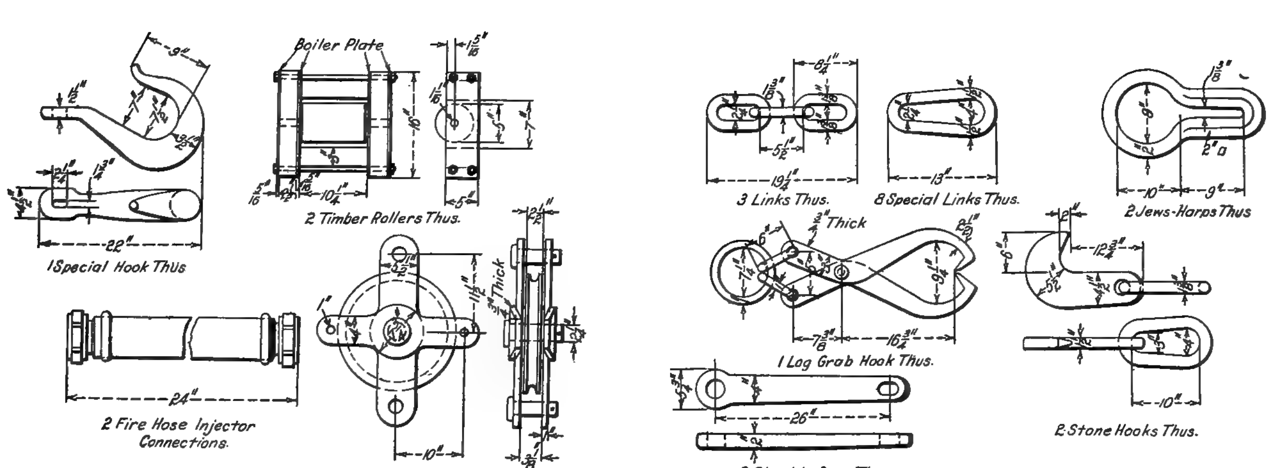


Fig. 2810—Southern Railway Wreck Train Tools.

Cars and Tools Used in Northern Pacific Wreck Trains.

Tools in Tool Car.

2 40-Ton Hydraulic Jacks with Levers
2 30-Ton Norton Jacks with Levers
2 Foot Lifts for Hydraulic Jacks
4 12 in. Pony Jacks
600 ft. in. Rope
600 ft. 2 in Rope
300 ft. 1½ in. Rope
300 ft. 1¼ in. Rope
300 ft. 1 in. Rope.
2 Pieces 1¼ in. Rope, 100 ft. Long
1 Piece 3 in. Rope, 300 ft. Long, for Rolling Line
1 Complete Set of Splicing Tools
2 2½ in. Rope Slings, 50 ft. Long
2 Wire Cables, 1½ in. diameter, 60 ft. Long, with Heavy Links at Each End
1 3-Sheave Tackle Block for 3 in. Rope
1 2-Sheave Tackle Block for 3 in. Rope with Becket
1 3-Sheave Tackle Block for 2 in. Rope
1 2-Sheave Tackle Block for 2 in. Rope with Becket
2 2-Sheave Tackle Blocks for 1¼ in. Rope, One with Becket
2 2-Sheave Tackle Blocks for 1 in. Rope, One with Becket
2 3½ in. Iron Snatch Blocks
2 2½ in. Iron Snatch Blocks
2 1½ in. Iron Snatch Blocks
1 1¼ in. Iron Snatch Block
1 1 in. Iron Snatch Block.
2 1¼ in. Chains, 25 ft. Long, with Ring in Center and Grabs at Both Ends
2 ¾ in. Chains, 30 ft. Long, with Ring in Center and Grabs at Both Ends
1 ⅝ in. Chain, with Ring in Center and 4 Ends with Hooks
6 ½ in. Chains, 4 to 6 ft. Long, Ring at One End, Hooks at Other End
6 1¼ in. Switch Chains, 16 ft. Long
20 ⅞ in. Switch Chains, 16 ft. Long
2 Coupling bars
12 Coupling Links
24 Knuckle Pins, Assorted Sizes
4 Clevises, 1½ in., with 3½ in. Jaws
2 Links, with Thimbles for Rope
6 S Hooks, 2 in. to 3 in. in diameter
2 Wells-Buckeye Lights No. 5
2 Extra Burners for Wells-Buckeye Lights
1 Tent for Field Telegraph Service
1 Complete Telegrapher's Outfit
1 Portable Telephone, Complete with All Attachments
3 5 gallon Cans of Headlight Oil.
2 3 gallon Cans of Car Oil
3 Buckets of Prepared Packing for Journal Boxes
3 Packing Irons
3 Packing Hooks
2 Small Squirt Cans
1 Small Funnel
1 5 gallon Can of Wood Alcohol for Hydraulic Jacks
12 Hand Torches
4 White Lanterns
4 Red Lanterns
6 White Globes, Extra
4 Red Globes, Extra
2 Blue Globes, Extra
6 1¼ in. Air Brake Hose
2 Dummy Hose
2 Signal Hose
6 Pairs Rubber Boots
6 Cant Hooks
2 Cutting Bars, 4 ft. Long
3 Axes
4 Axe Handles
1 Hand Axe
2 Carpenter's Foot Adzes
1 5 ft. Cross Cut Saw
2 30 in. Hand Saws
12 Scoop Shovels
6 No. 2 Track Shovels
2 Long Handled Shovels
4 Picks
4 Extra Pick Handles
4 Spike Mauls
2 Spike Maul Handles
4 Lining Bars
2 Claw Bars
1 Track Level
2 12 lb. Sledges
1 16 lb. Sledge
1 8 lb Sledge
2 3 lb. Hammers
2 2 lb. Hammers
6 Cold Chisels
4 Track Chisels
1 18 in Stilson Wrench
2 18 in. Monkey Wrenches
2 15 in. Comb Wrenches
4 12 in. Monkey Wrenches
15 Assorted Open End Wrenches
1 5 Wheel Pipe Cutter
Assortment of Brasses and Wedges for Cars
2 Center Pin Drifts
2 Cranes at Side Door for Handling Jacks
2 Hand Barrows for Carrying Jacks
2 Fire Extinguishers
2 Fire Axes
200 Grain Sacks
2 Pairs Aldon Car Replacers for 90 lb. Rails
3 Pairs Aldon Car Replacers for Lighter Rails
2 Pairs Alexander Car Replacers for Lighter Rails
2 Iron Wedges, 8 in. Wide, 2 ft. 9 in. long, 5 in thick
1 Track Gauge
4 Track Wrenches
12 Iron Buckets and 12 Iron Baskets for Handling Grain
1 Car Wheel Gauge
1 Box with Assortment of Nails
5 Pipe Rollers, 3 in. by 2 ft. Long
1 Carpenter's Brace
1 ¾ in. Car Bit
1 ⅞ in Car Bit
1 1 in Car Bit
1 2 in. Auger
2 Heavy Iron Dollies
1 Tool Chest for Small Tools
4 Drifts, for ¾ in., ⅞ in., 1 in. and 1¼ in. Bolts
4 Gilman Emergency Knuckles
25 lbs. Nuts and Bolts, Assorted Sizes
200 lbs. Assorted Bolts
2 Tarpaulins, 20 ft. by 40 ft., for Protecting Freight
1 First Aid Medicine Case

Material on Truck Car.

2 80,000 lbs. Capacity Steel Car Trucks
2 60,000 lbs. Capacity Steel Car Trucks
150 Pieces Blocking
25 Oak Wedges
6 30 ft. Cables
2 1½ in. Cable Slings, with Heavy Links at Each End
4 1½ in. Chains, 20 ft. to 30 ft. Long, Rings Each End
4 Kegs Track Spikes in Cellar
30 Pairs Angle Bars
4 Kegs Track Bolts

Material on Tie and Rail Car.

75 Ties
8 85 lb. Rails
8 72 lb. Rails
12 66 lb. Rails

Material in Bunk Car.

10 Bunks
10 Mattresses
Complete Set of Cooking Utensils
1 Steel Kitchen Range
1 Ice Box
1 Stretcher, Complete with Blankets, Pillows, etc.
Complete Set of Porcelain Dishes

1 100 Tons Capacity Steam Wreck Crane.

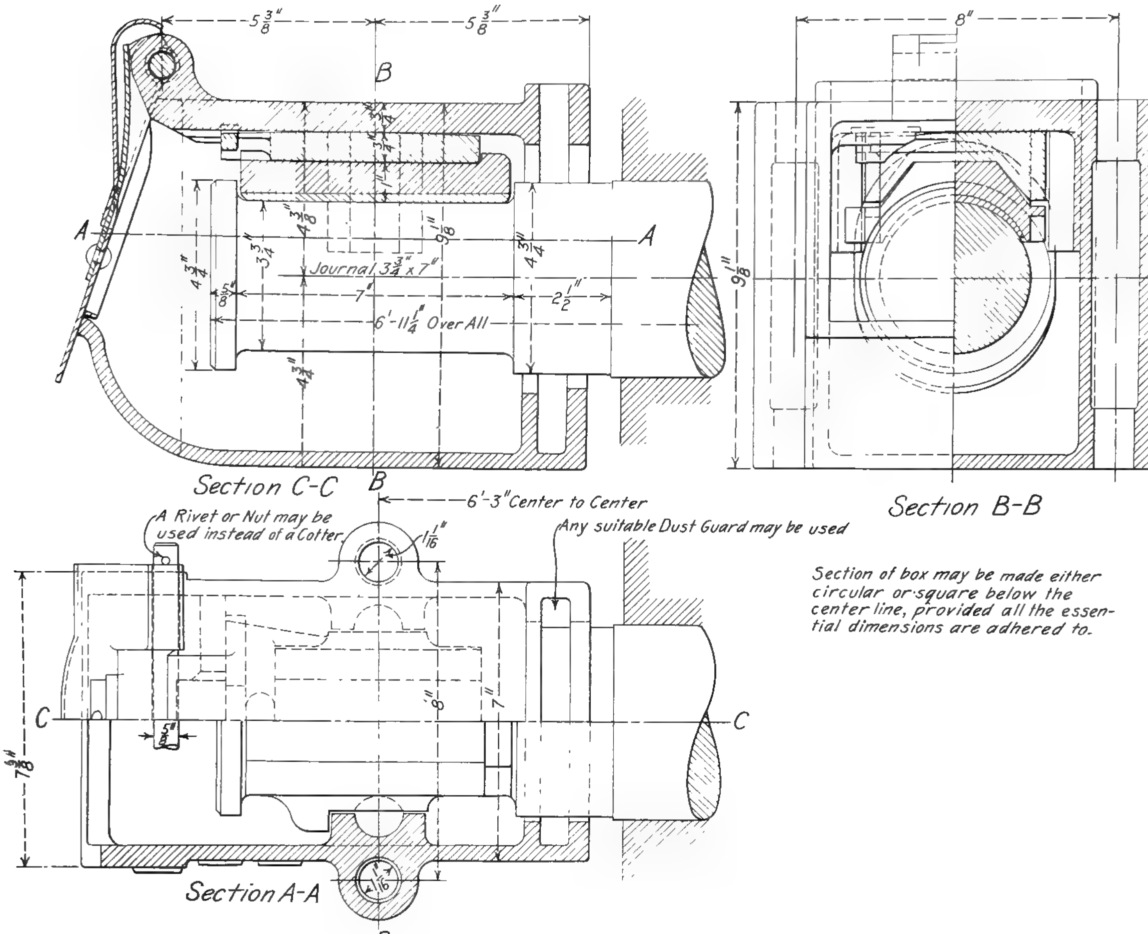


Fig. 2811—M. C. B. Standard Box and Contained Parts for 3¾ in. by 7 in. Freight Car Journal. (M. C. B. Sheet 1.)

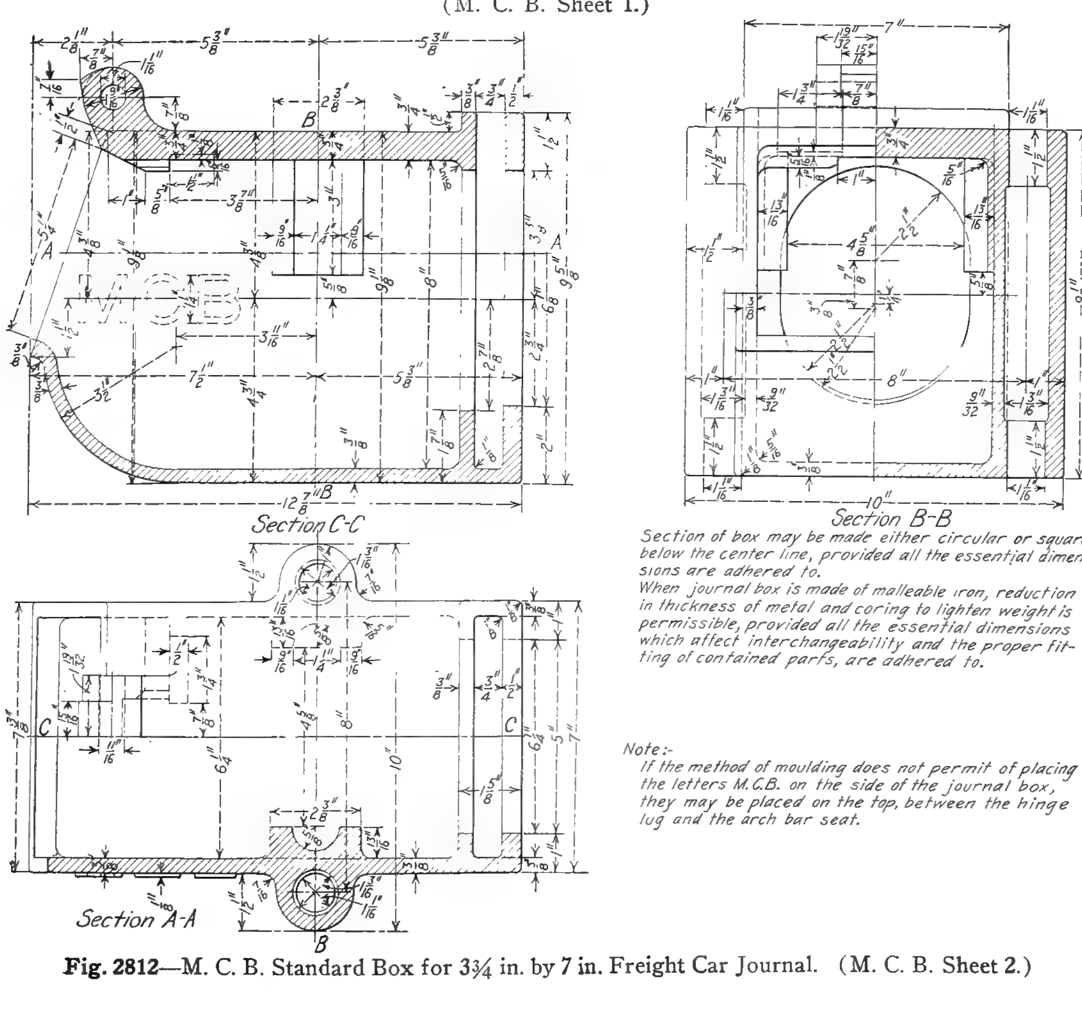


Fig. 2812—M. C. B. Standard Box for 3¾ in. by 7 in. Freight Car Journal. (M. C. B. Sheet 2.)

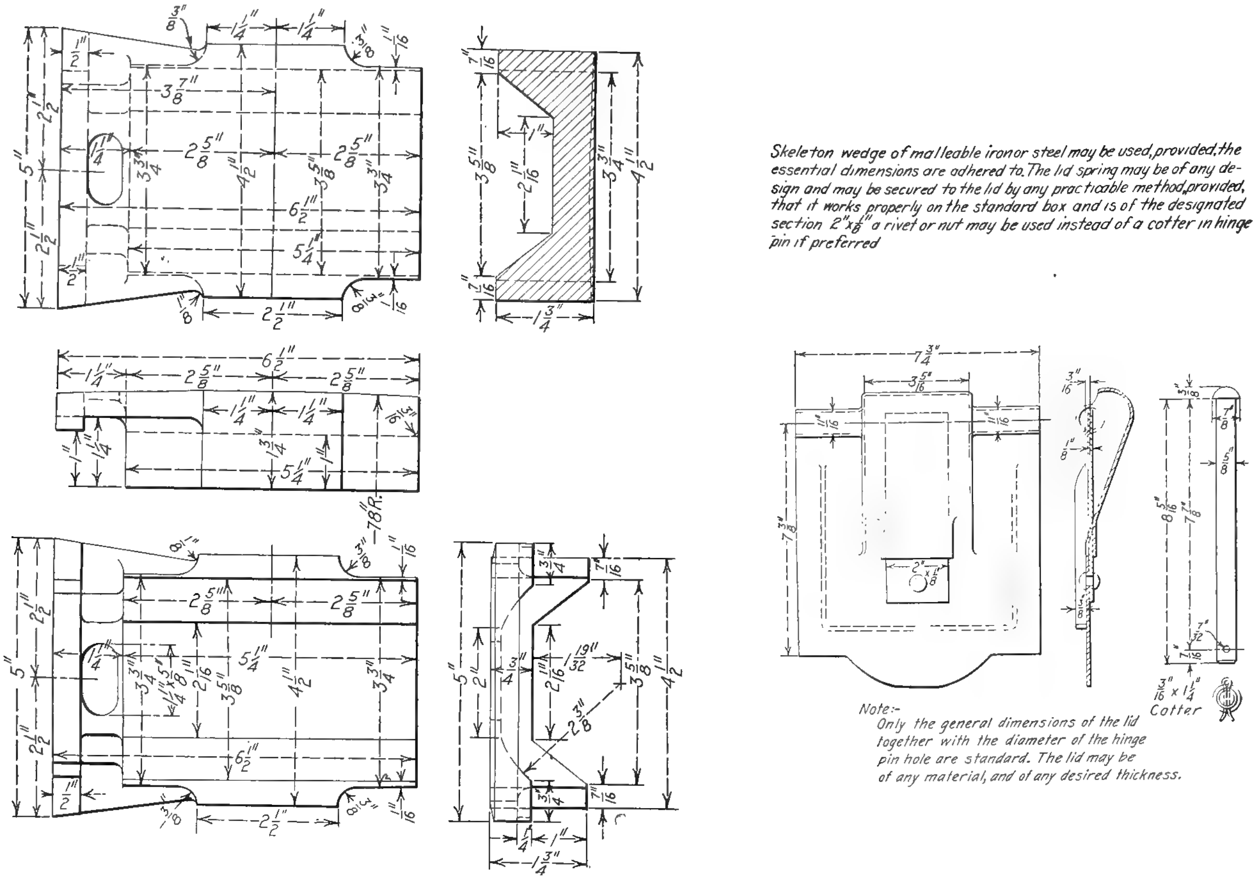


Fig. 2813—M. C. B. Standard Wedge and Journal Box Lid for 3¾ in. by 7 in. Journal. (M. C. B. Sheet 3.)

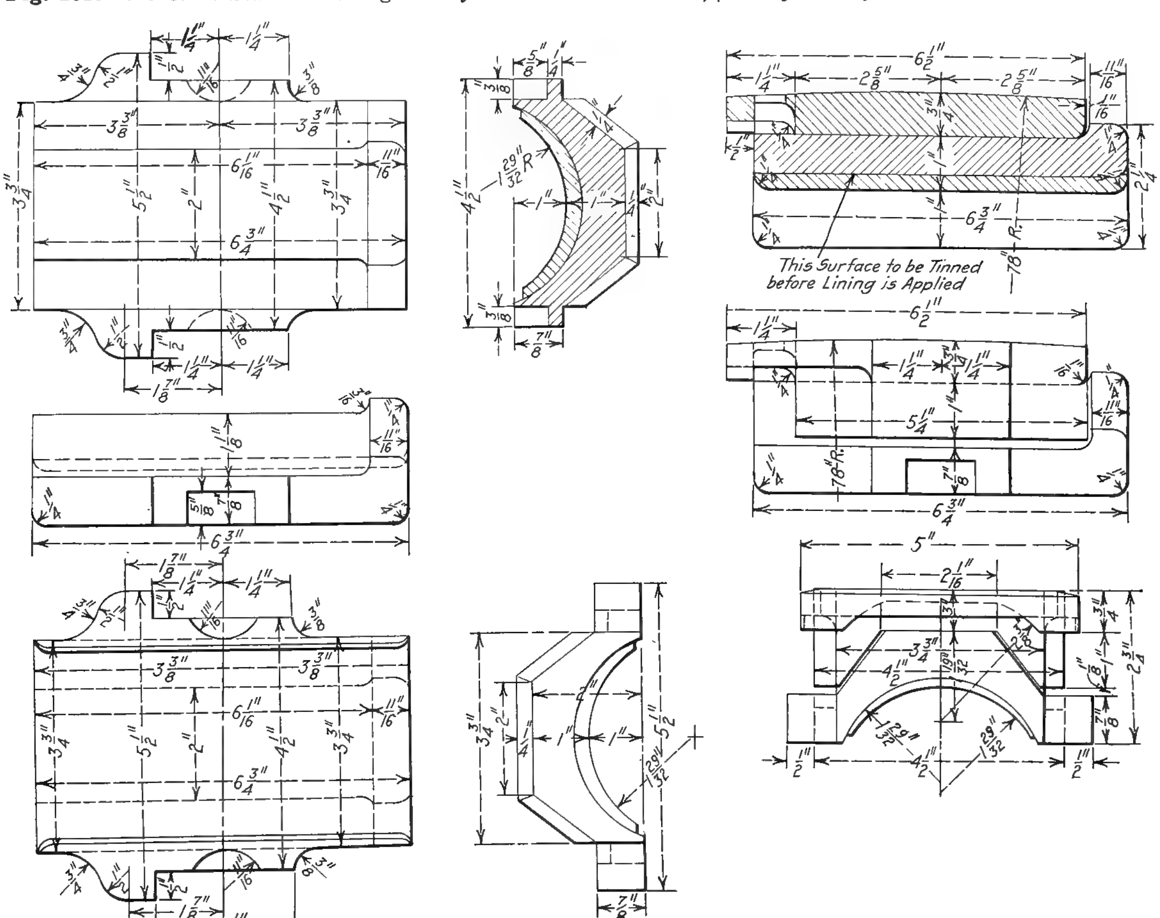
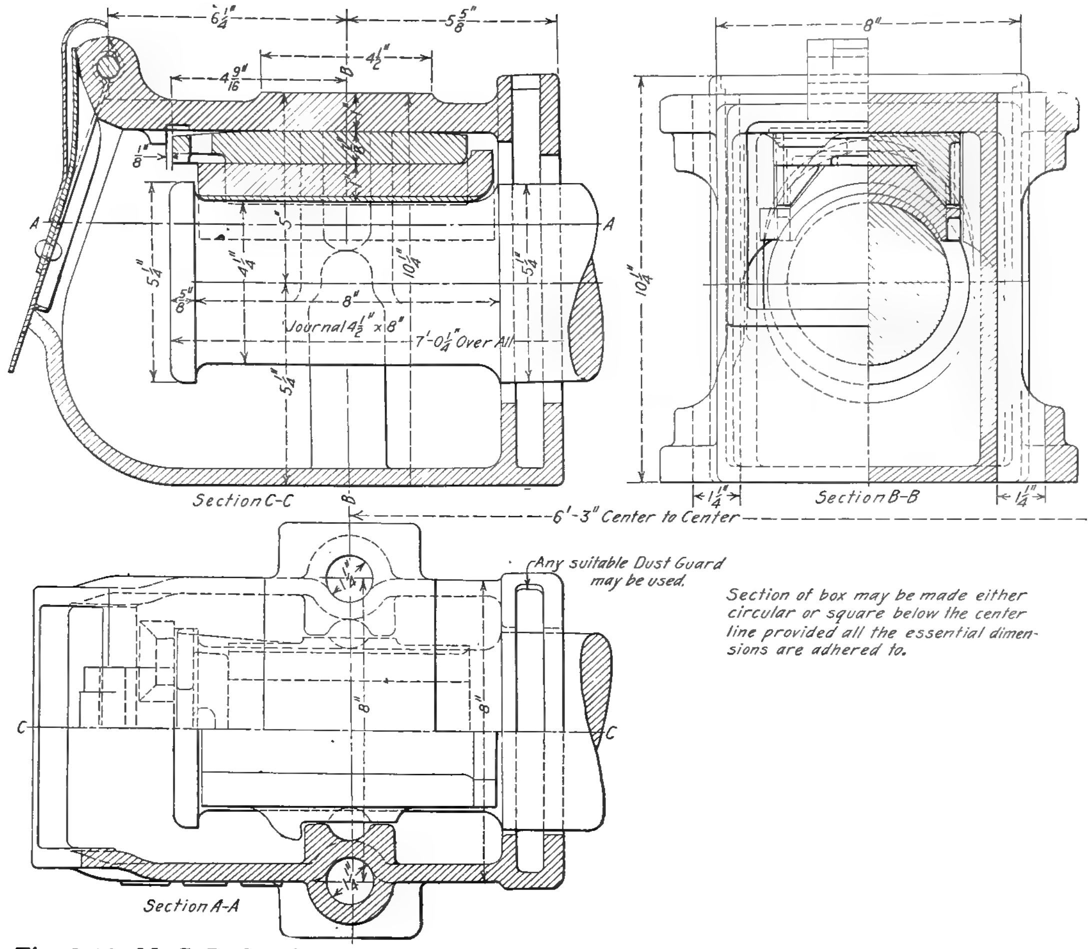
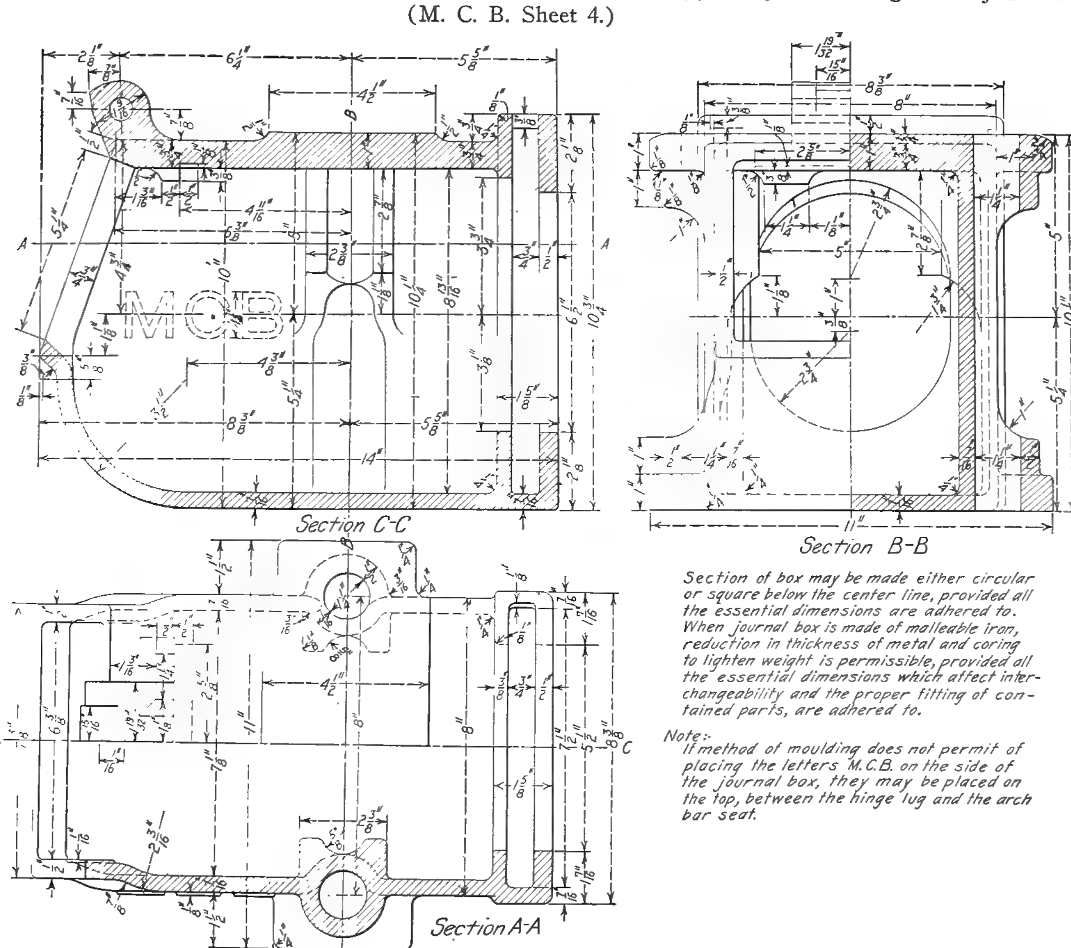


Fig. 2814—M. C. B. Standard Bearing and Wedge for 3¾ in. by 7 in. Journal. (M. C. B. Sheet 3.)



Section of box may be made either circular or square below the center line provided all the essential dimensions are adhered to.

Fig. 2815—M. C. B. Standard Box and Contained Parts for 4¼ in. by 8 in. Freight Car Journal. (M. C. B. Sheet 4.)



Section of box may be made either circular or square below the center line, provided all the essential dimensions are adhered to. When journal box is made of malleable iron, reduction in thickness of metal and coring to lighten weight is permissible, provided all the essential dimensions which affect interchangeability and the proper fitting of contained parts, are adhered to.

Note:-
If method of moulding does not permit of placing the letters M.C.B. on the side of the journal box, they may be placed on the top, between the hinge lug and the arch bar seat.

Fig. 2816—M. C. B. Standard Box for 4¼ in. by 8 in. Freight Car Journal. (M. C. B. Sheet 5.)

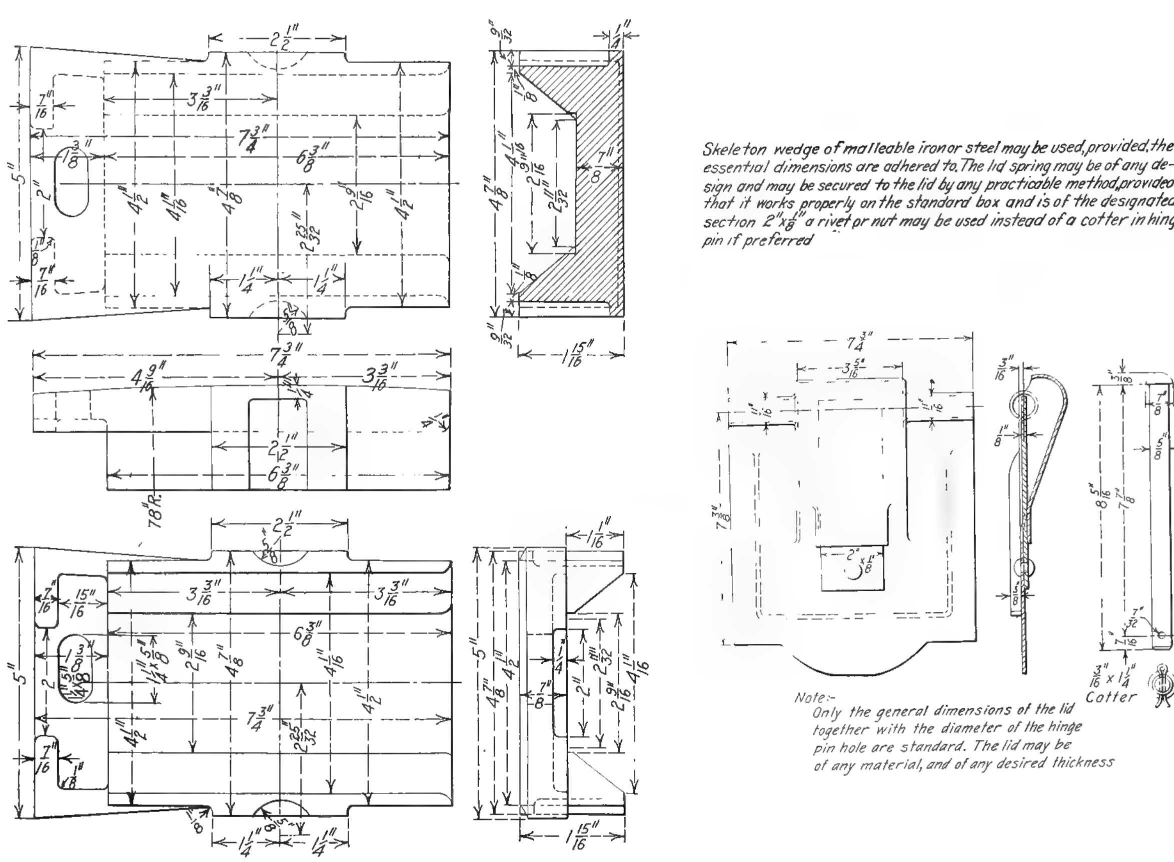


Fig. 2817—M. C. B. Standard Wedge and Journal Box Lid for 4¼ in. by 8 in. Journal. (M. C. B. Sheet 6.)

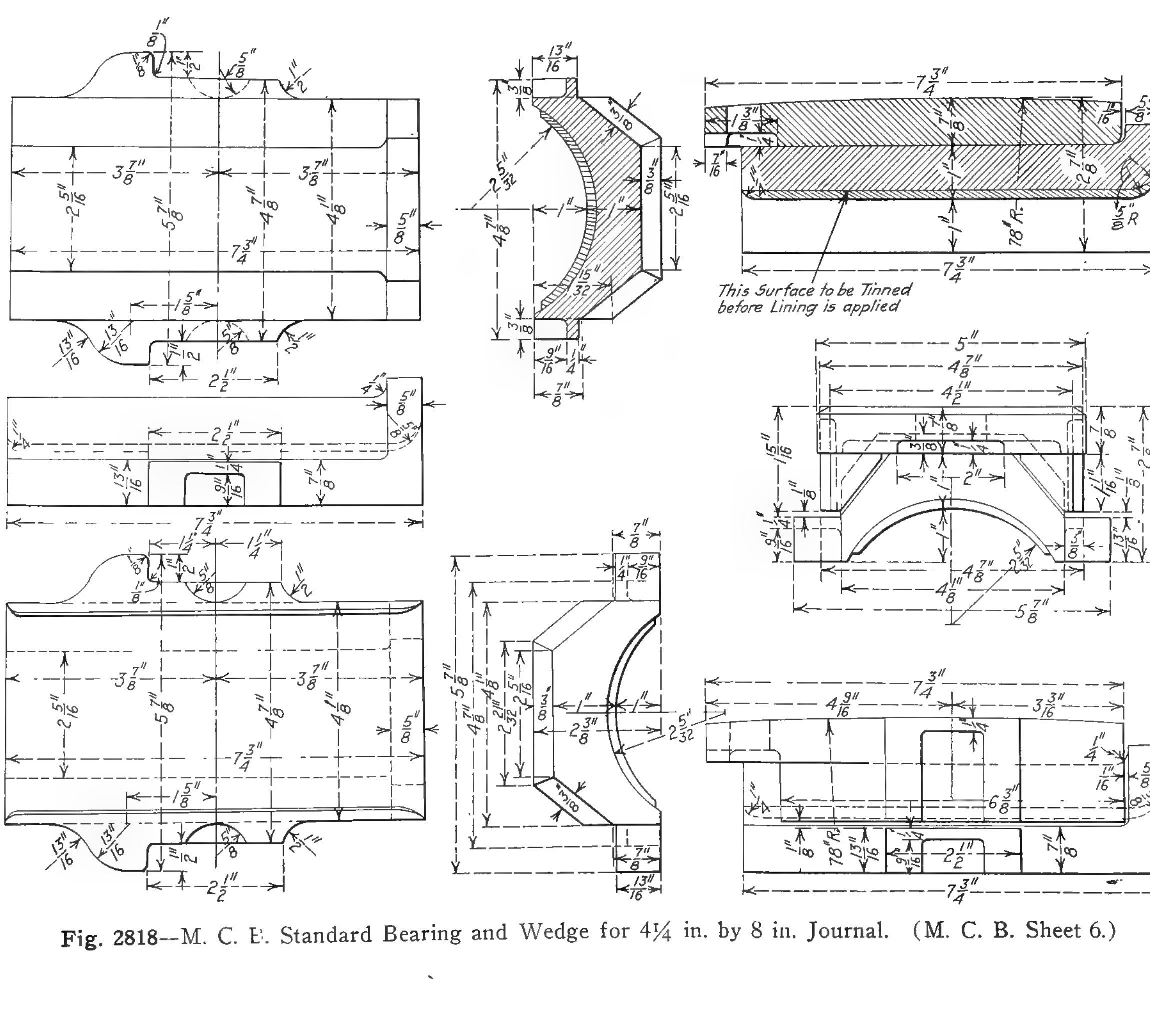


Fig. 2818—M. C. B. Standard Bearing and Wedge for 4¼ in. by 8 in. Journal. (M. C. B. Sheet 6.)

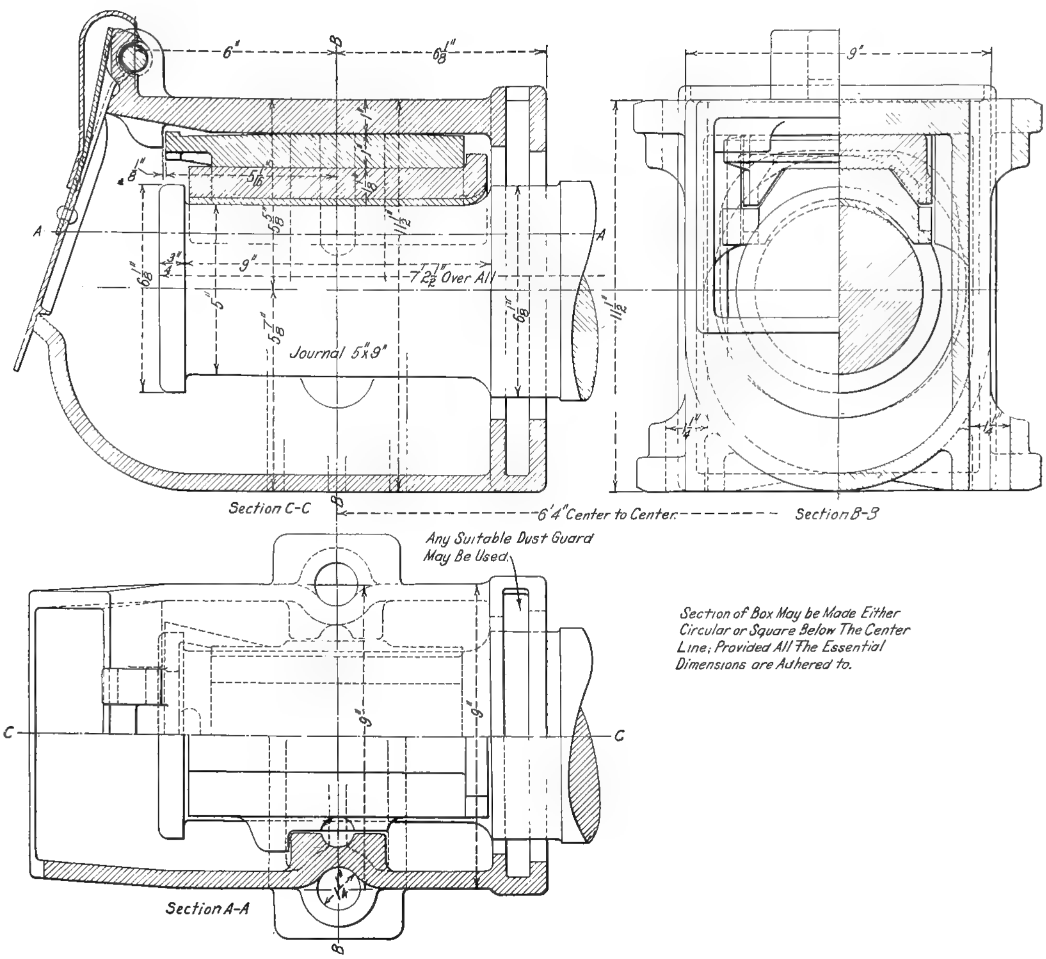


Fig. 2819—M. C. B. Standard Box and Contained Parts for 5 in. by 9 in. Freight Car Journal. (M. C. B. Sheet 7.)

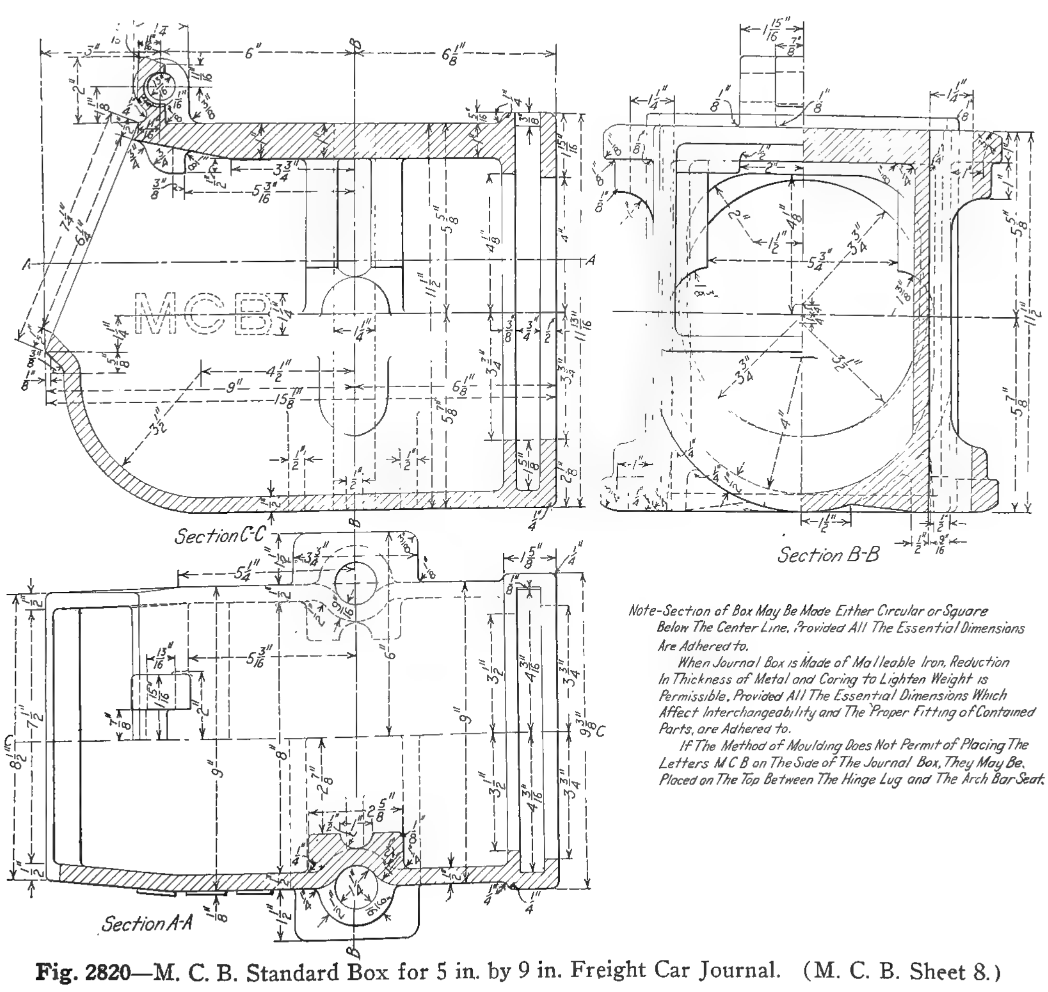


Fig. 2820—M. C. B. Standard Box for 5 in. by 9 in. Freight Car Journal. (M. C. B. Sheet 8.)

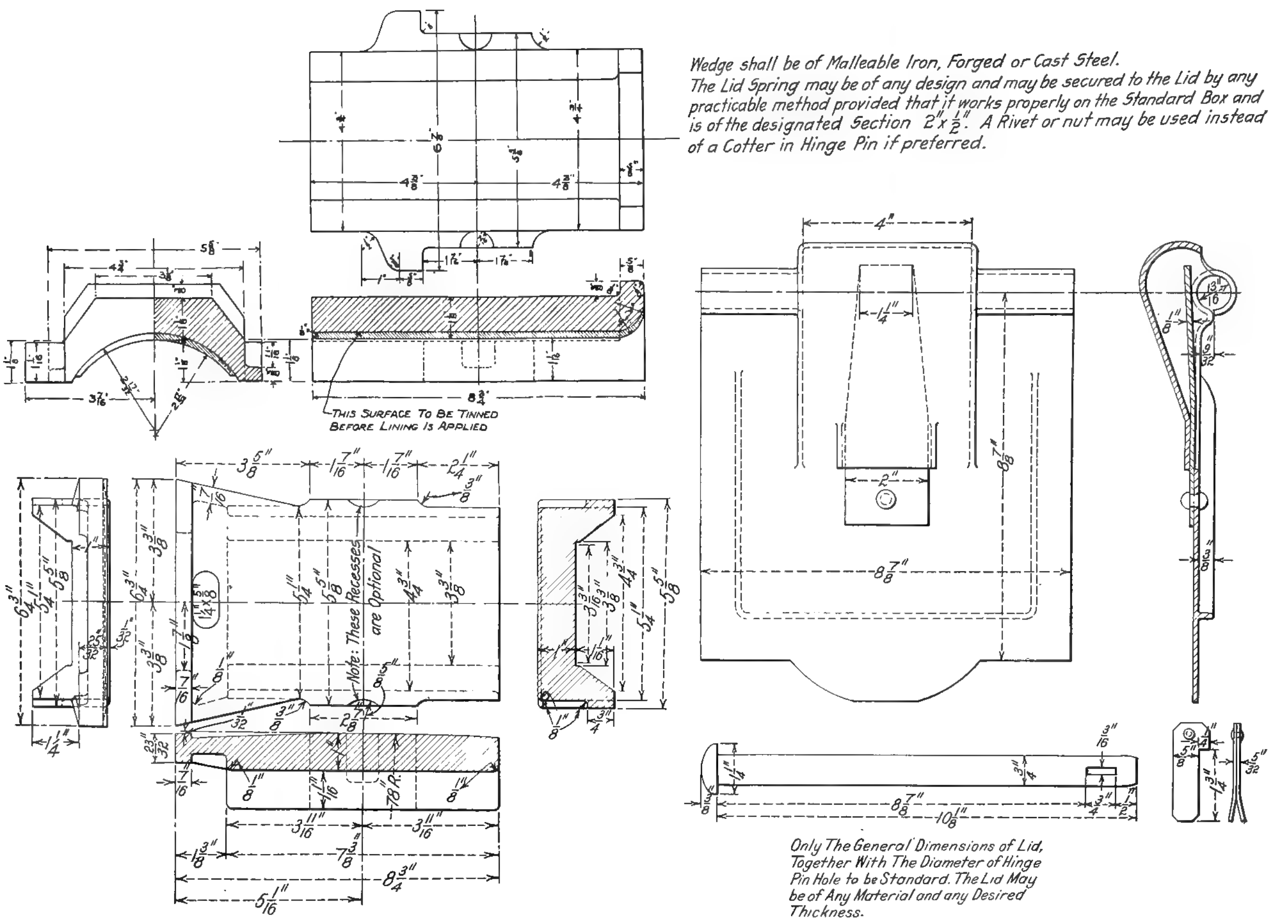


Fig. 2821—M. C. B. Standard Bearing, Wedge and Journal Box Lid for 5 in. by 9 in. Journal. (M. C. B. Sheet 9.)

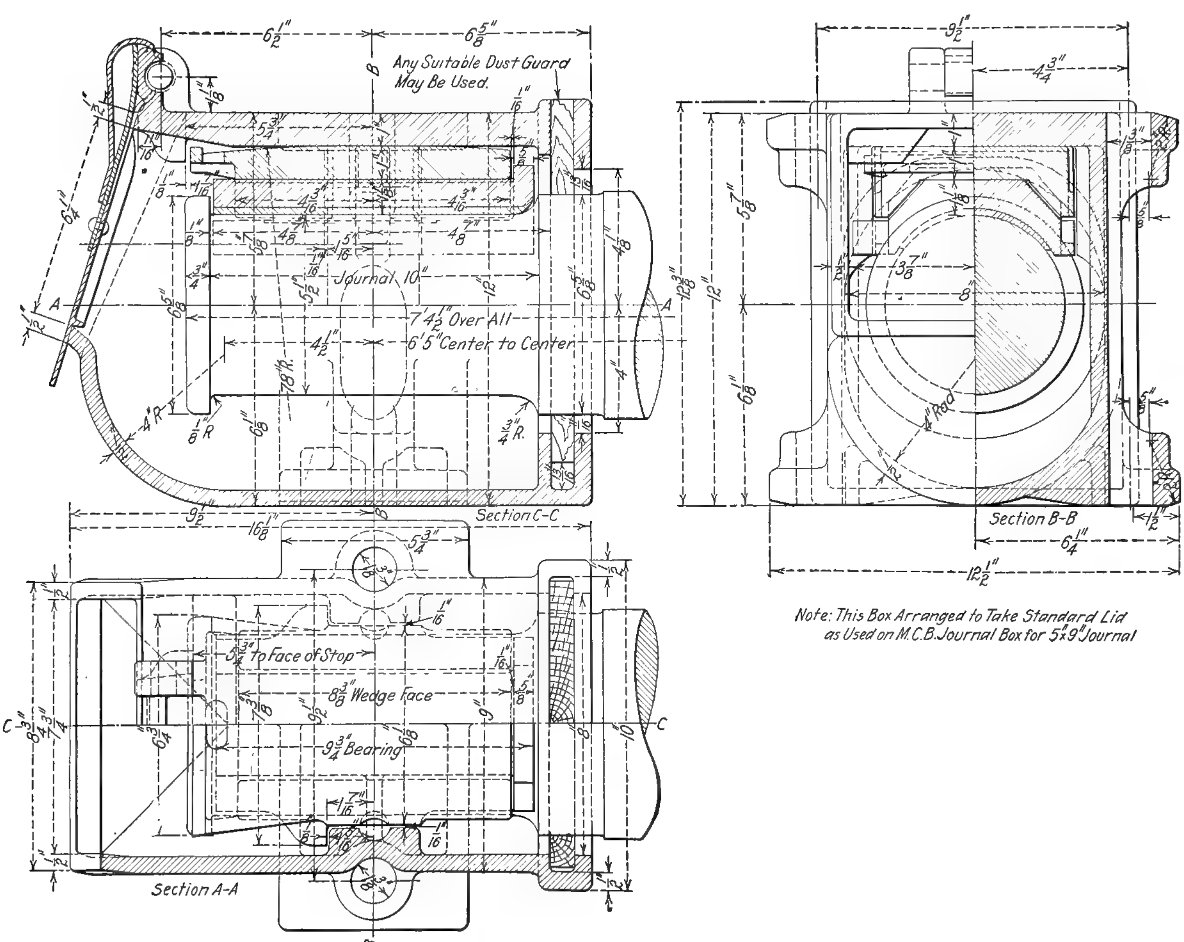


Fig. 2822—M. C. B. Standard Box and Contained Parts for 5½ in. by 10 in. Freight Car Journal. (M. C. B. Sheet 10.)

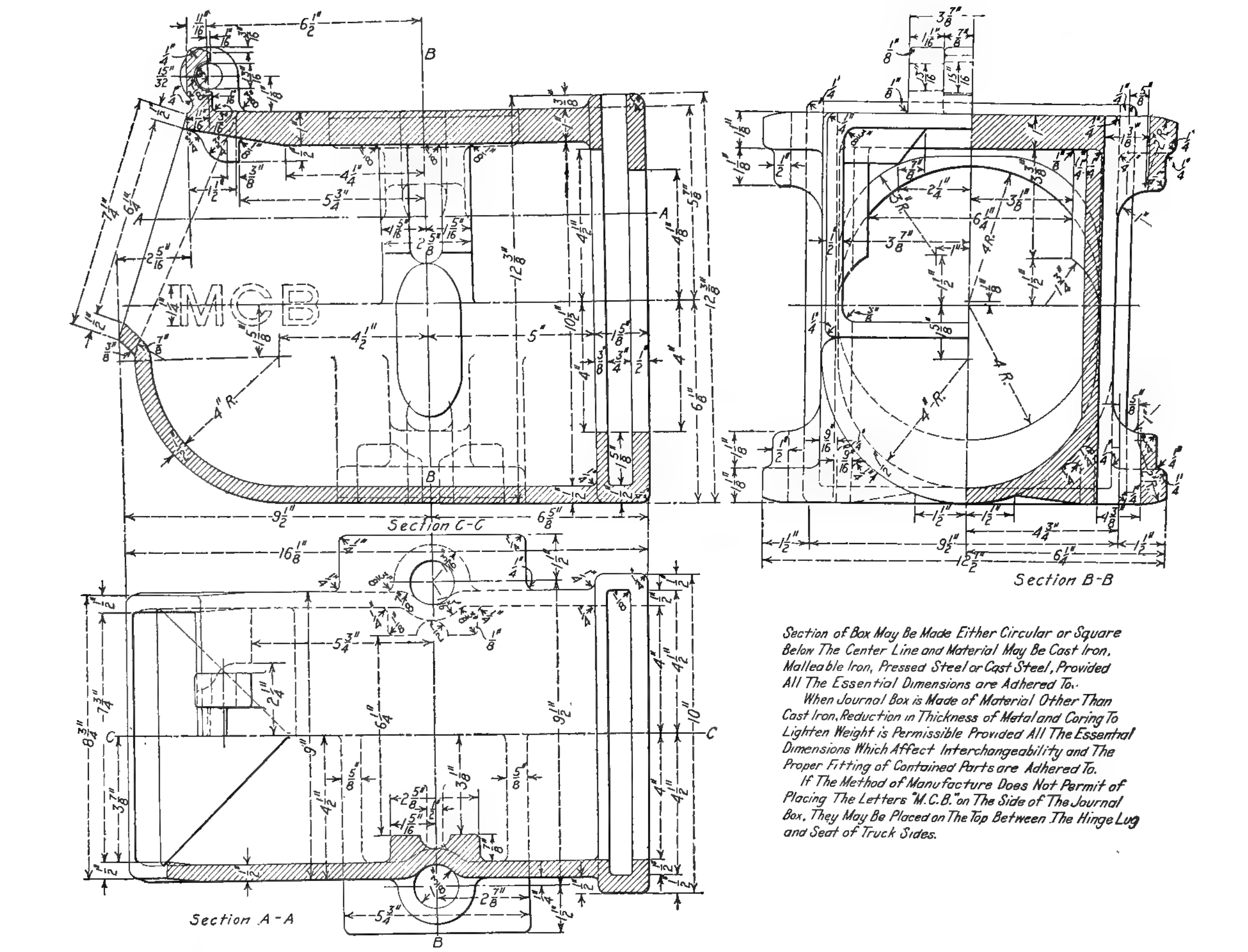


Fig. 2823—M. C. B. Standard Box for 5½ in. by 10 in. Freight Car Journal. (M. C. B. Sheet 11.)

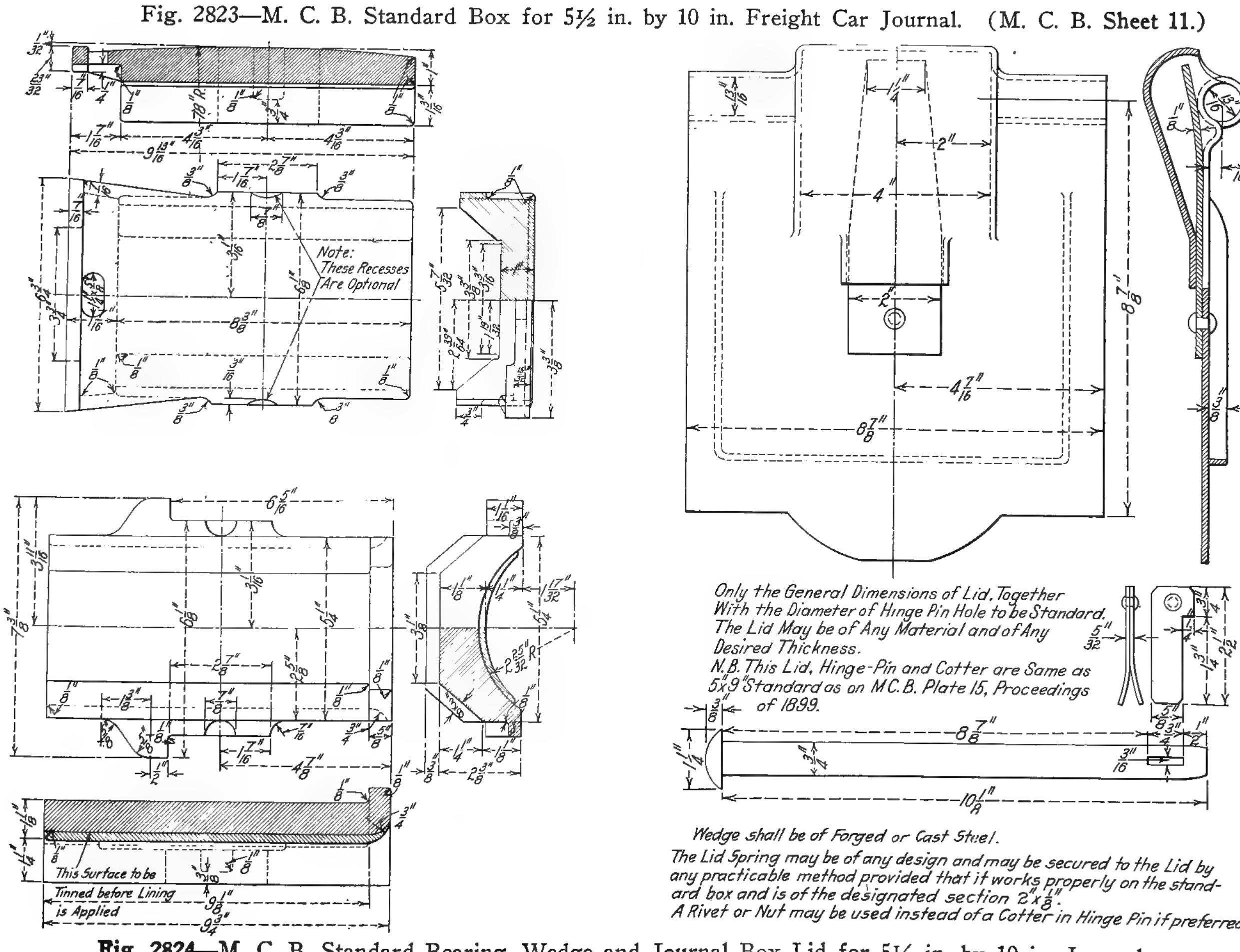


Fig. 2824—M. C. B. Standard Bearing, Wedge and Journal Box Lid for 5½ in. by 10 in. Journal. (M. C. B. Sheet 12.)

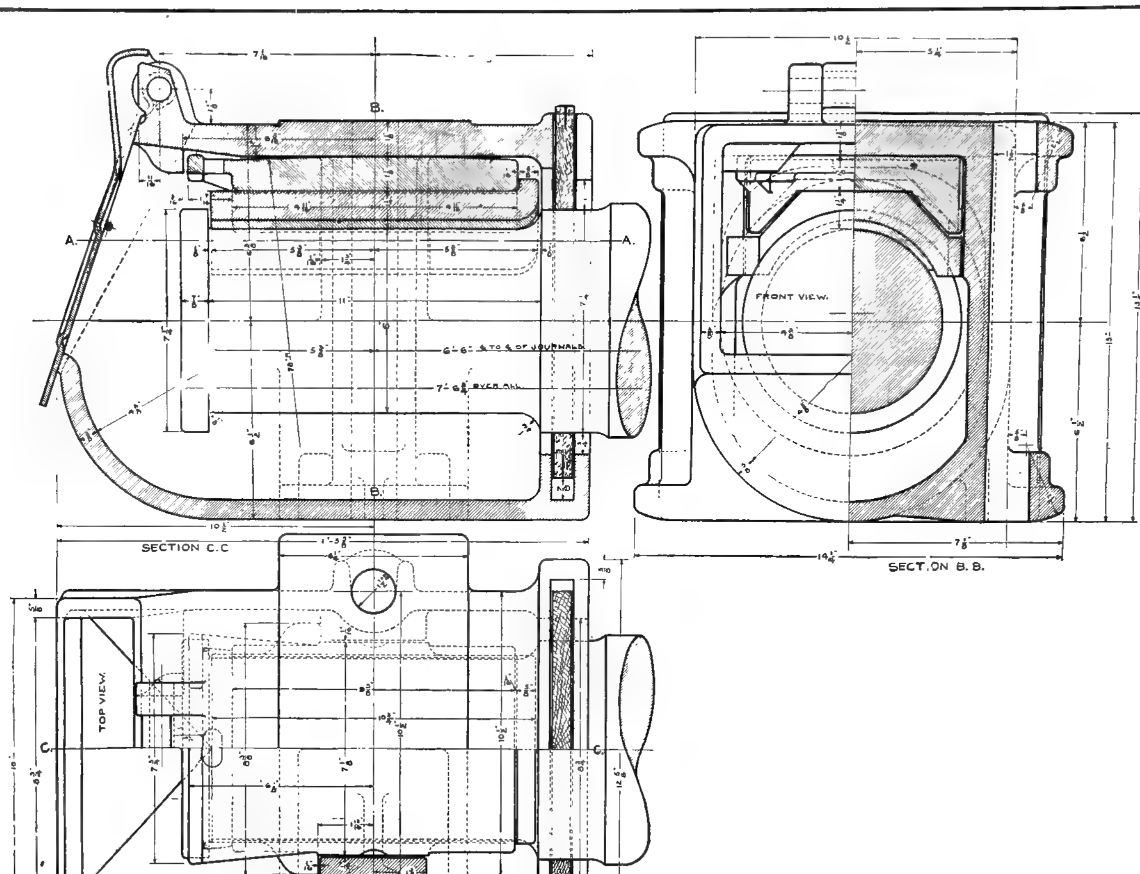
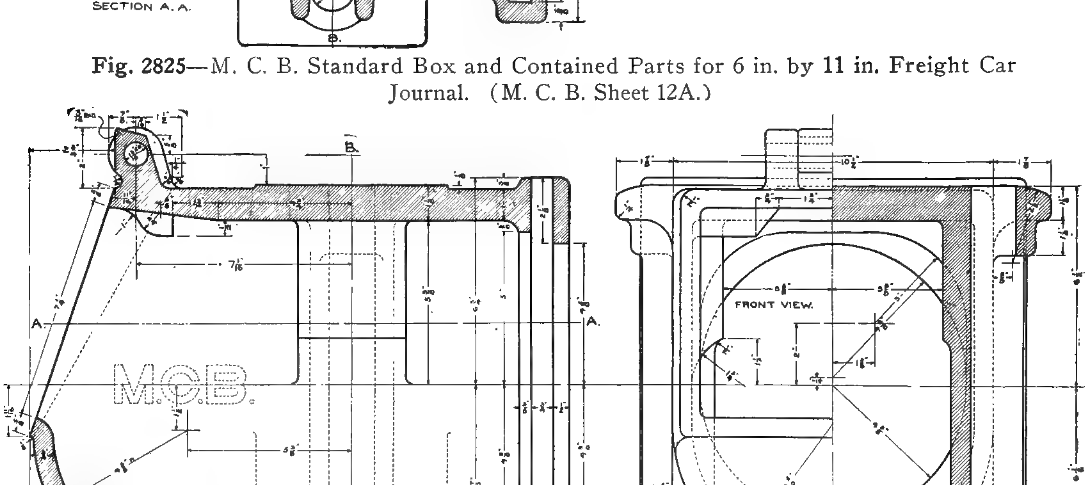
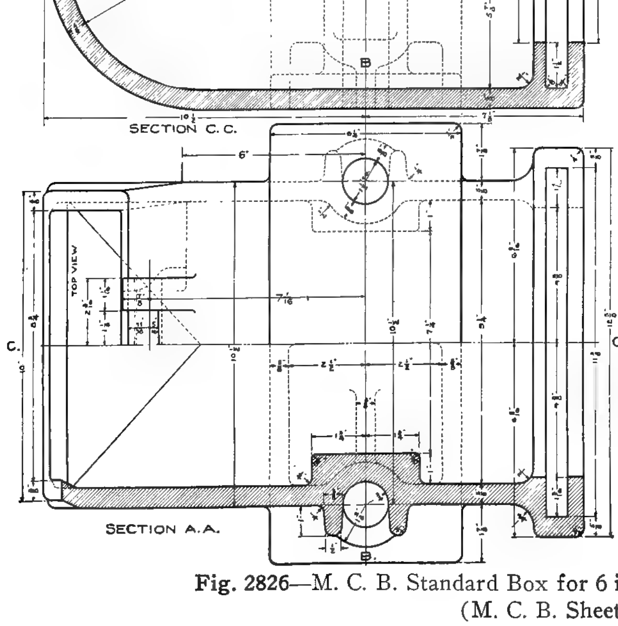


Fig. 2825—M. C. B. Standard Box and Contained Parts for 6 in. by 11 in. Freight Car Journal. (M. C. B. Sheet 12A.)





SECTION OF BOX MAY BE MADE EITHER CIRCULAR OR SQUARE BELOW THE CENTER LINE AND MATERIAL MAY BE CAST IRON, MALLEABLE IRON, PRESSED STEEL OR CAST STEEL, PROVIDED ALL THE ESSENTIAL DIMENSIONS ARE ADHERED TO.

WHEN JOURNAL BOX IS MADE OF MATERIAL OTHER THAN CAST IRON REDUCTION IN THICKNESS OF METAL AND CORING TO LIGHTEN WEIGHT IS PERMISSIBLE PROVIDED ALL THE ESSENTIAL DIMENSIONS WHICH AFFECT INTERCHANGEABILITY AND THE PROPER FITTING OF CONTAINED PARTS ARE ADHERED TO.

IF THE METHOD OF MANUFACTURE DOES NOT PERMIT OF PLACING THE LETTERS "M.C.B." ON THE SIDE OF THE JOURNAL BOX, THEY MAY BE PLACED ON THE TOP BETWEEN THE HINGE LUG AND SEAT OF TRUCK SIDES.

Fig. 2826—M. C. B. Standard Box for 6 in. by 11 in. Freight Car Journal (M. C. B. Sheet 12B.)

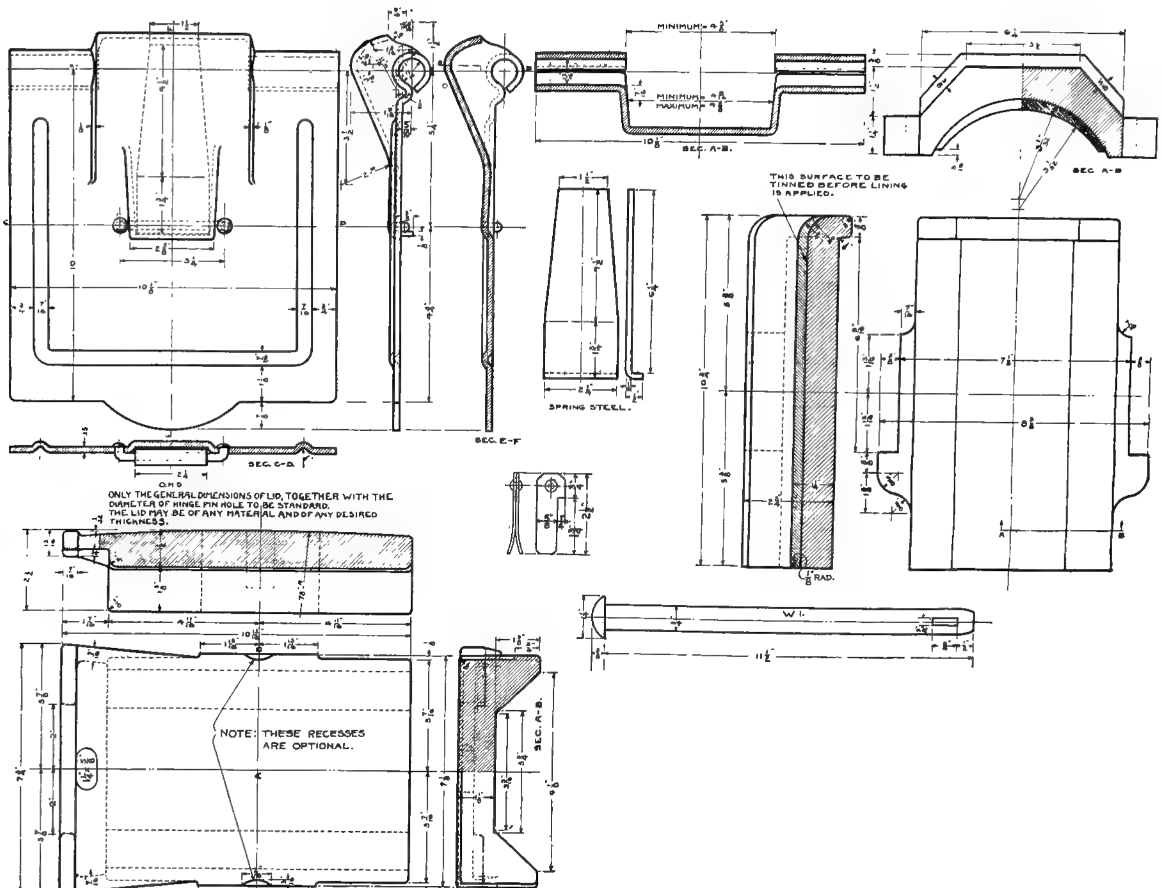
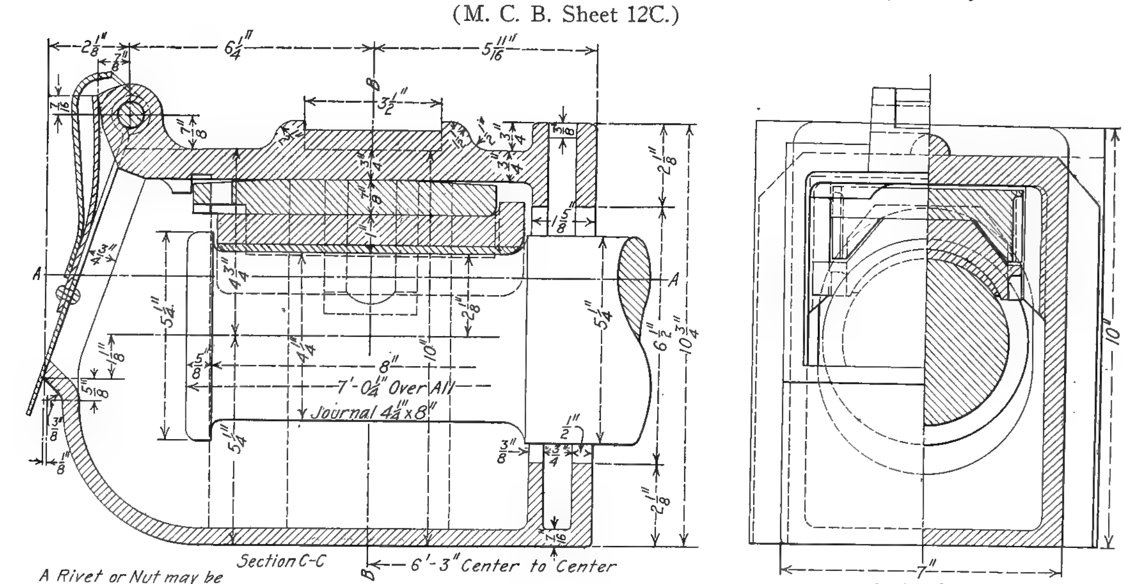


Fig. 2827—M. C. B. Standard Bearing, Wedge and Journal Box Lid for 6 in. by 11 in. Journal. (M. C. B. Sheet 12C.)



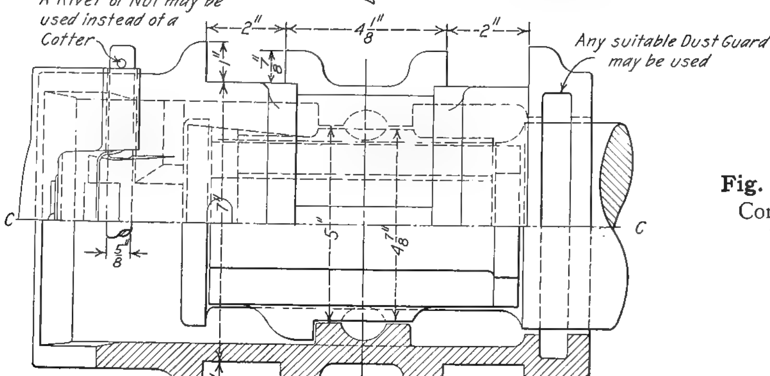


Fig. 2828—M. C. B. Standard Box and Contained Parts for 4¼ in. by 8 in. Passenger Train Car Journal.

(M. C. B. Sheet 13.)

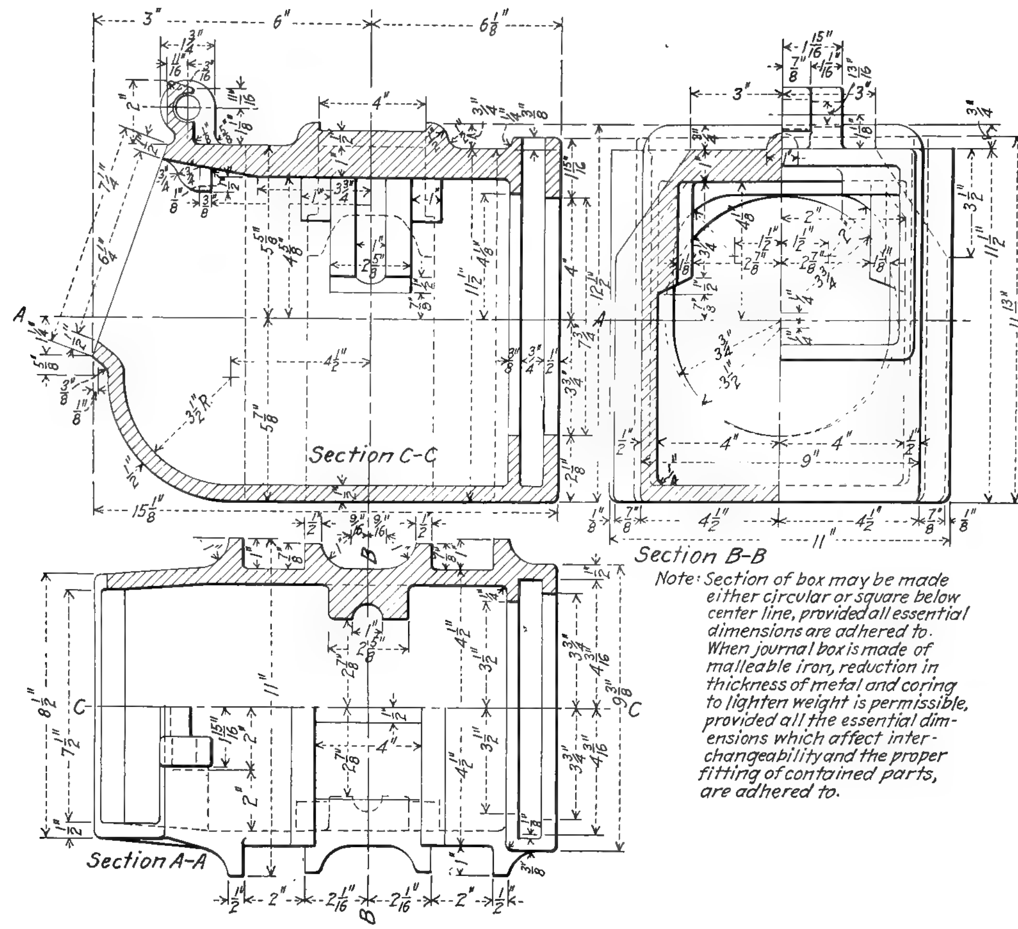


Fig. 2829—M. C. B. Standard Box for 5 in. by 9 in. Passenger Train Car Journal. (M. C. B. Sheet 8A.)

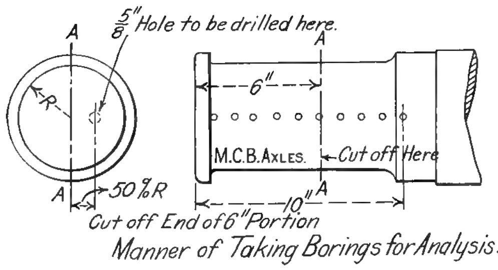


Fig. 2830—Manner of Taking Borings for Analysis of M. C. B. Standard Axles. M. C. B. Sheet 15.)

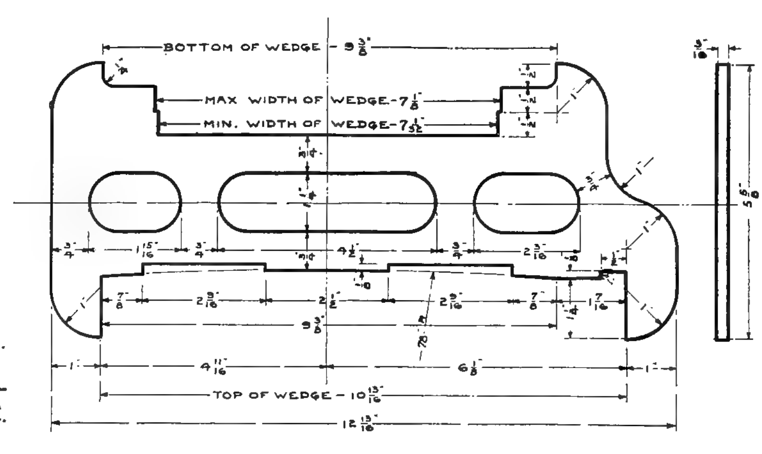


Fig. 2831—Gage for 6 in. by 11 in. Journal Box Wedges. (M. C. B. Sheet 14A.)

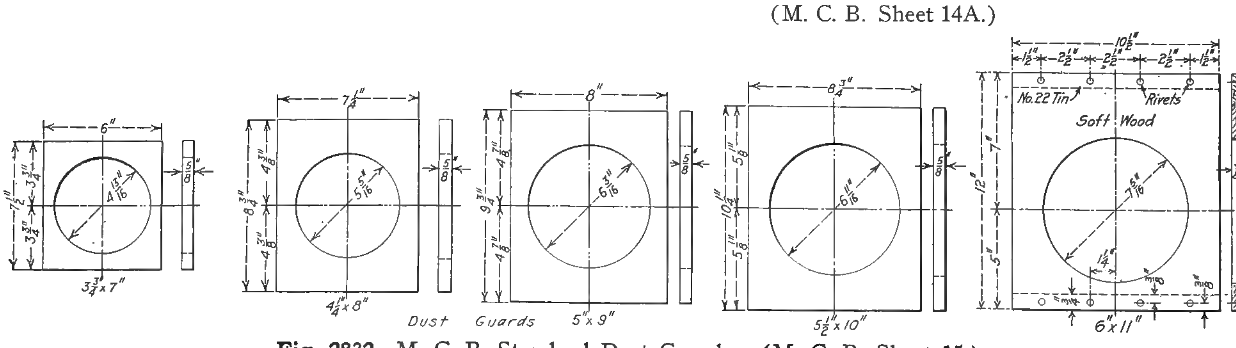


Fig. 2832—M. C. B. Standard Dust Guards. (M. C. B. Sheet 15.)

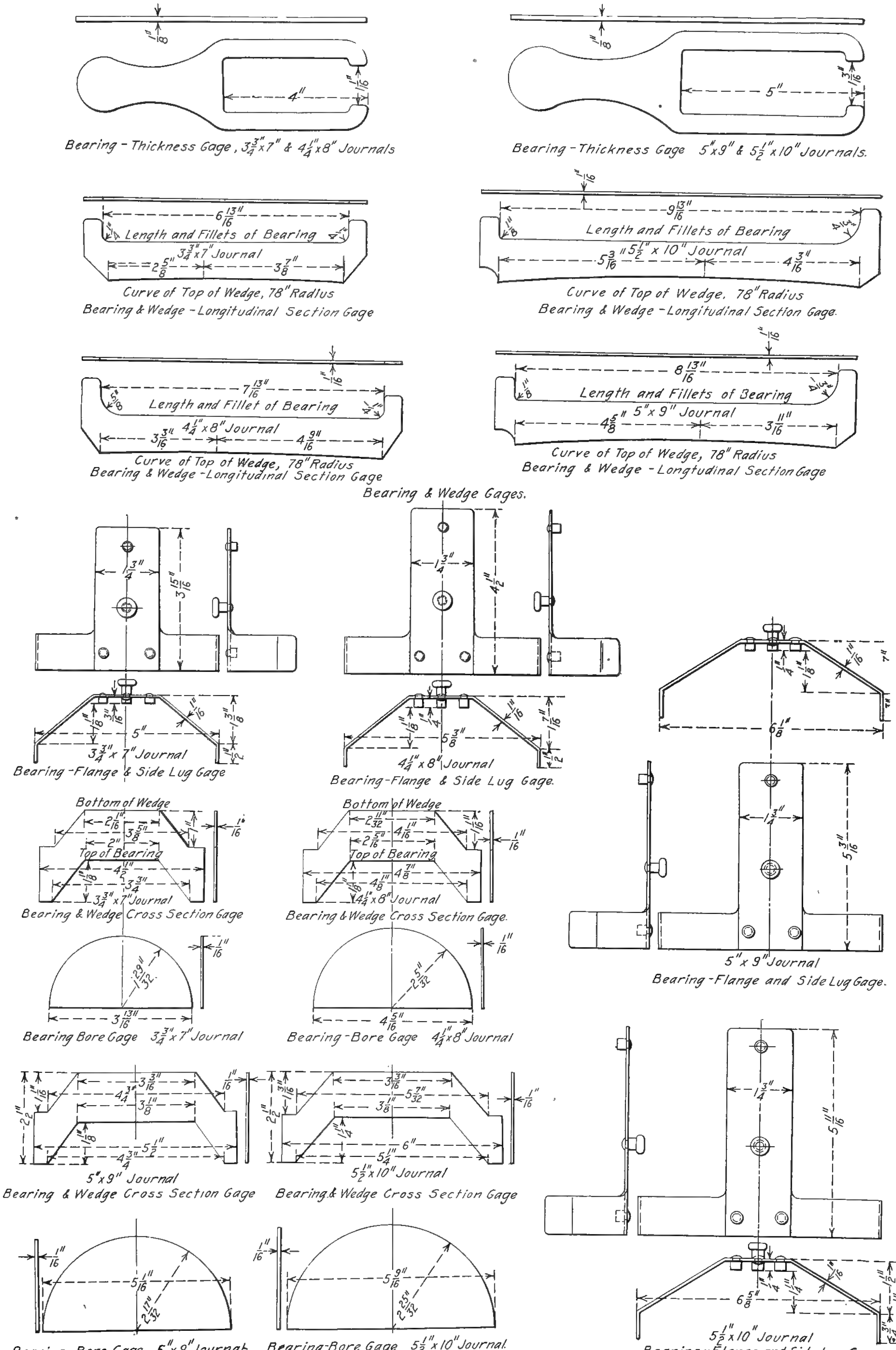


Fig. 2833—Journal Bearing and Wedge Gages. (M. C. B. Sheet 14.)

See Figs. 2831, 2835 *and* 2836 *for Gages for* 6 *in. by* 11 *in. Journal Bearings and Wedges.*

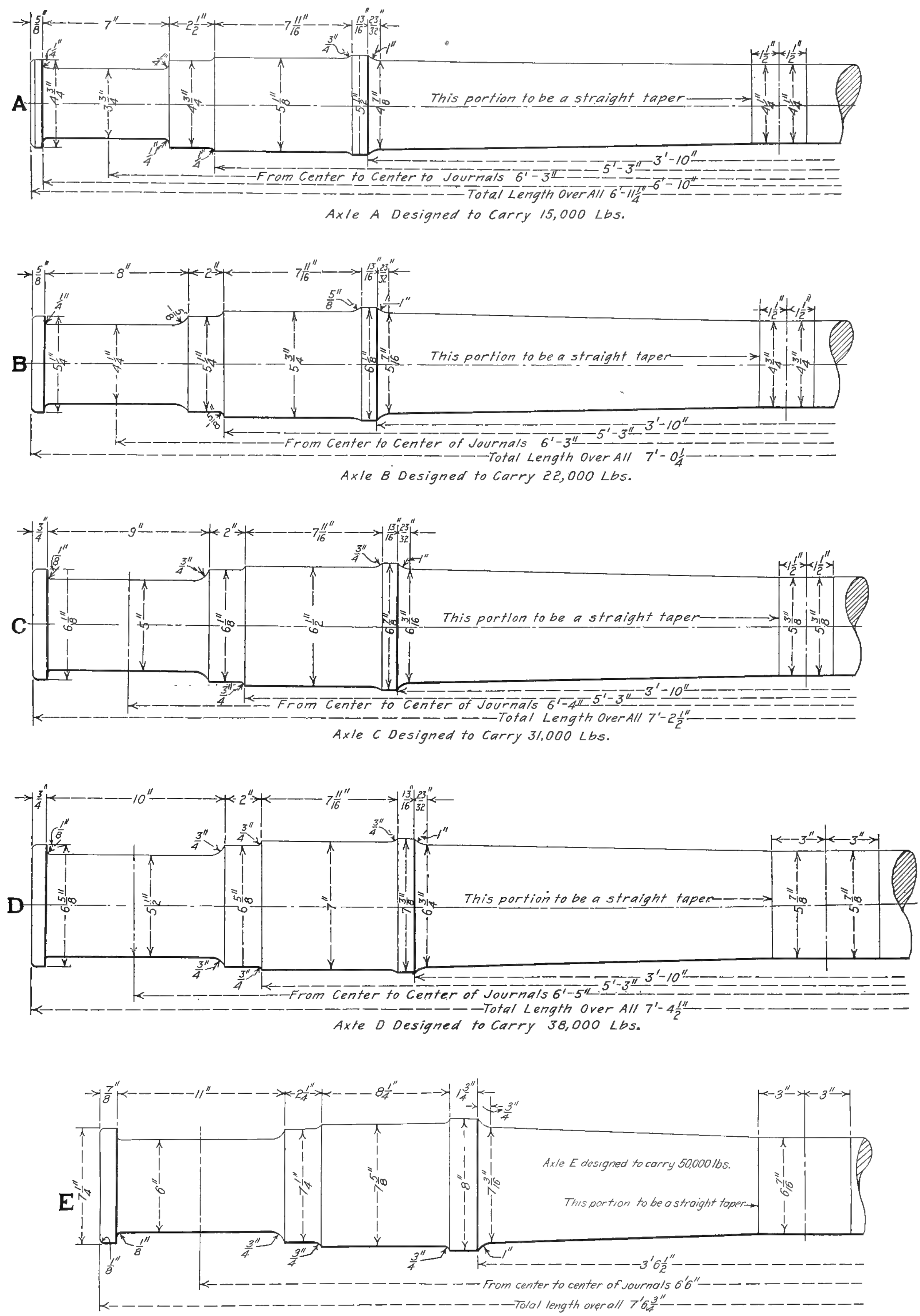


Fig. 2834—M. C. B. Standard Axles. (M. C. B. Sheet 15.)

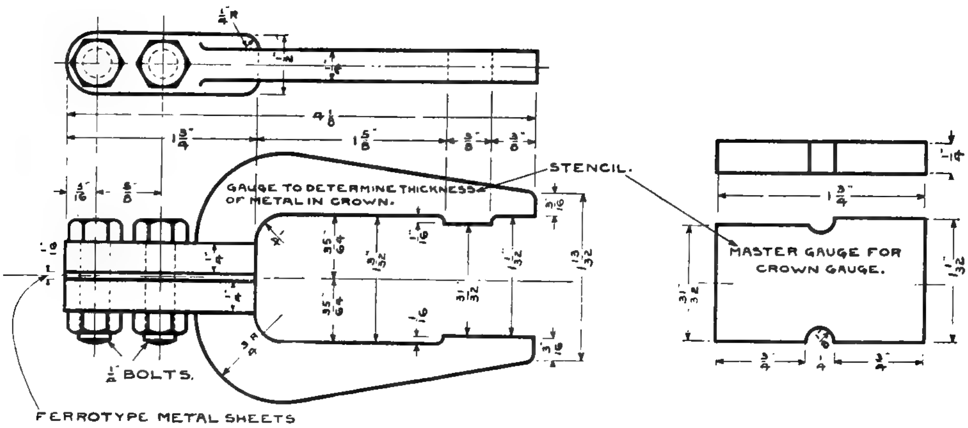


Fig. 2835—Gage for 6 in. by 11 in. Journal Bearings. (M. C. B. Sheet 14A.)

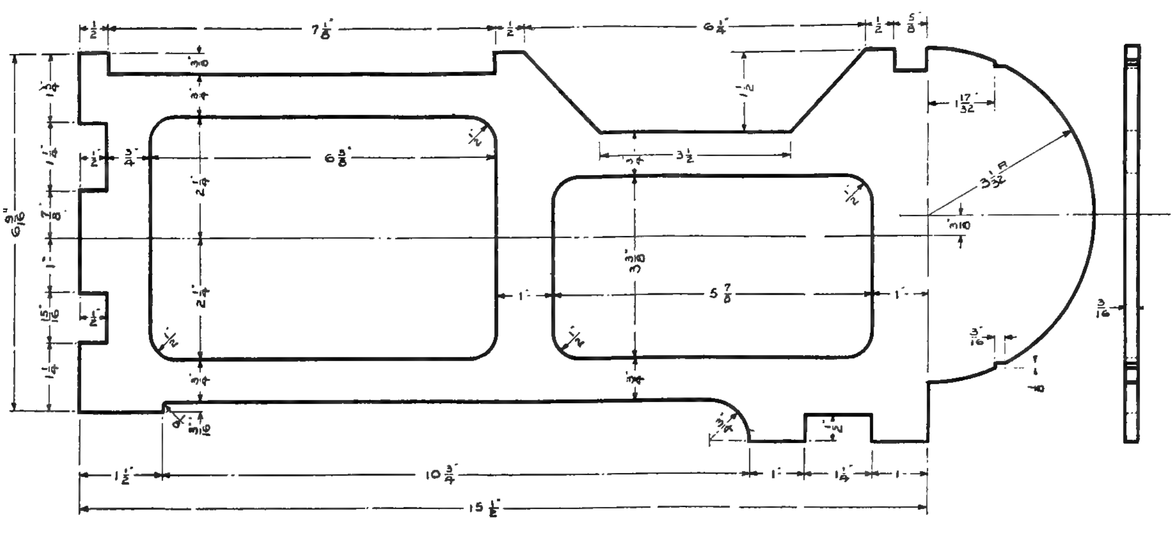
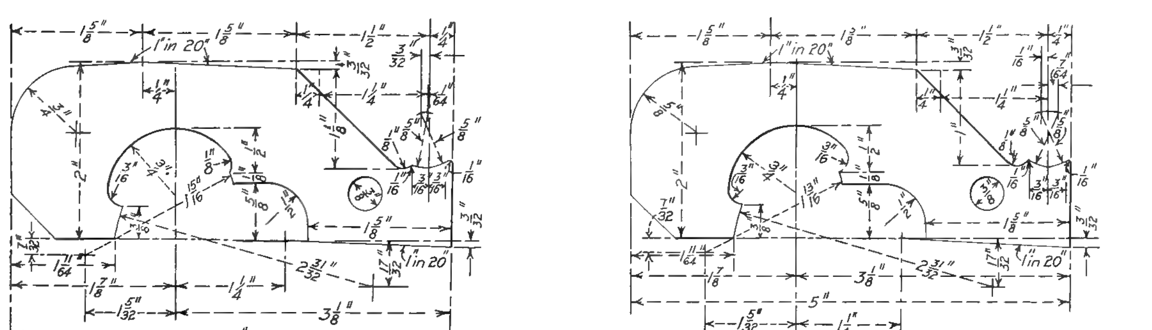


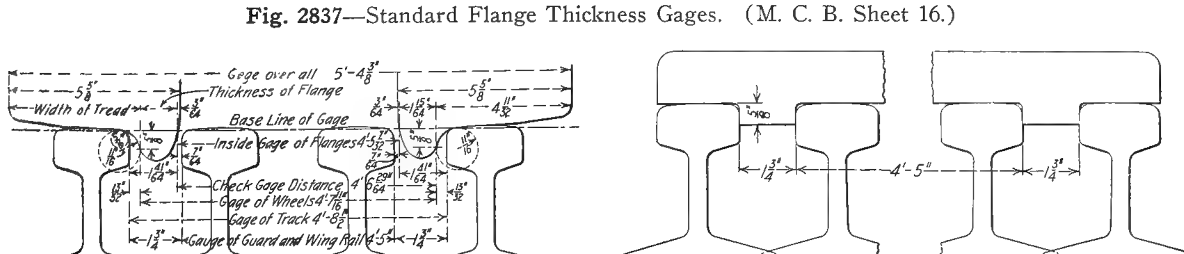
Fig. 2836—Gage for 6 in. by 11 in. Journal Bearings. (M. C. B. Sheet 14A.)



Maximum Flange Thickness Gage for Cast Iron Wheels and Maximum Flange Thickness, Height and Throat Radius Gage for Solid Steel and Steel Tired Wheels.

Minimum Flange Thickness Gage for Cast Iron Wheels and Minimum Flange Thickness, Height and Throat Radius Gage for Solid Steel and Steel Tired Wheels.

Fig. 2837—Standard Flange Thickness Gages. (M. C. B. Sheet 16.)



Terms and Gaging Points for Wheels and Track

Guard Rail and Frog Wing Gage

Fig. 2838—Wheel and Track Gages. (M. C. B. Sheet 16.)

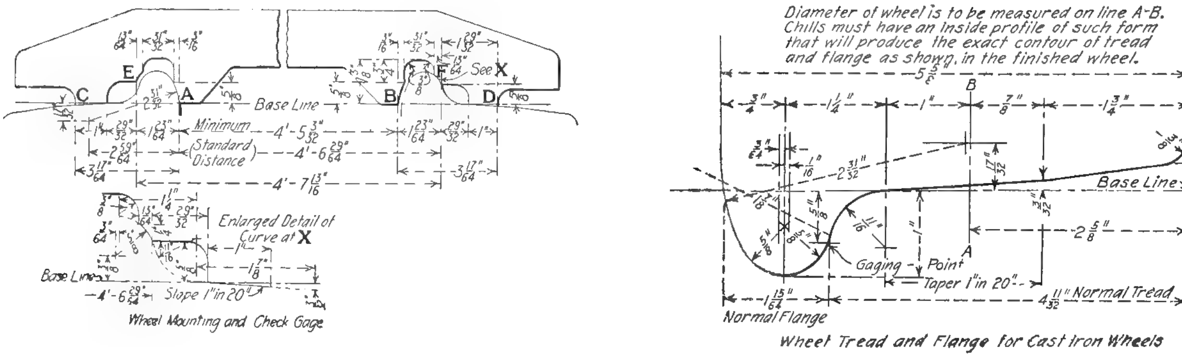


Fig. 2839—Standard Wheel Gages. (M. C. B. Sheet 16.)

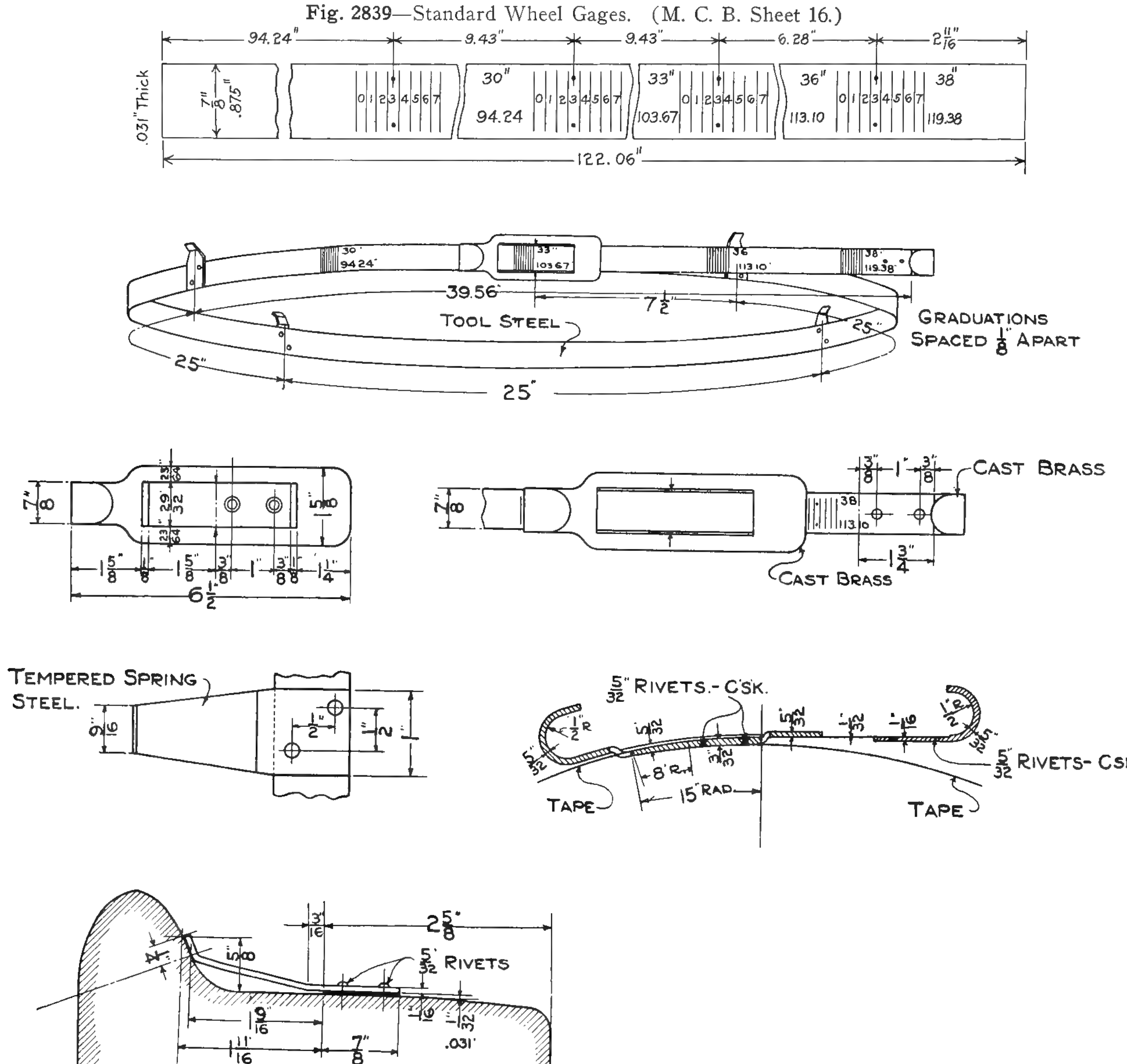


Fig. 2840—Standard Wheel Circumference Measure for Cast Iron Wheels.

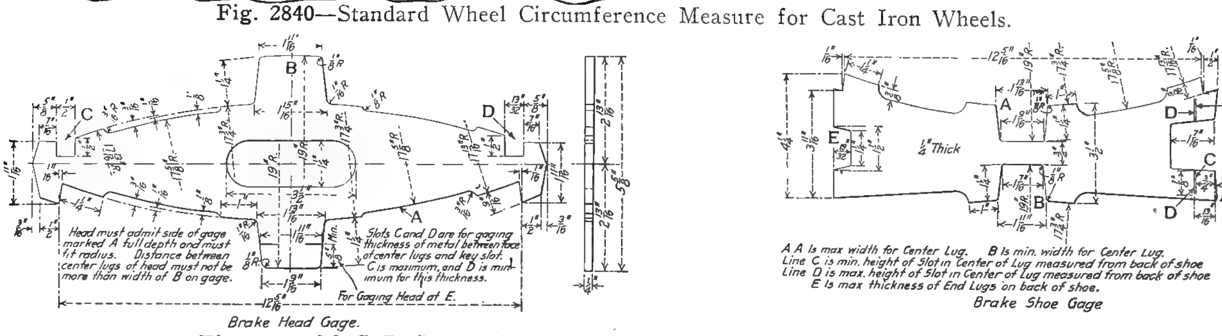


Fig. 2841—M. C. B. Standard Brake Head and Shoe Gages. (M. C. B. Sheet 17.)

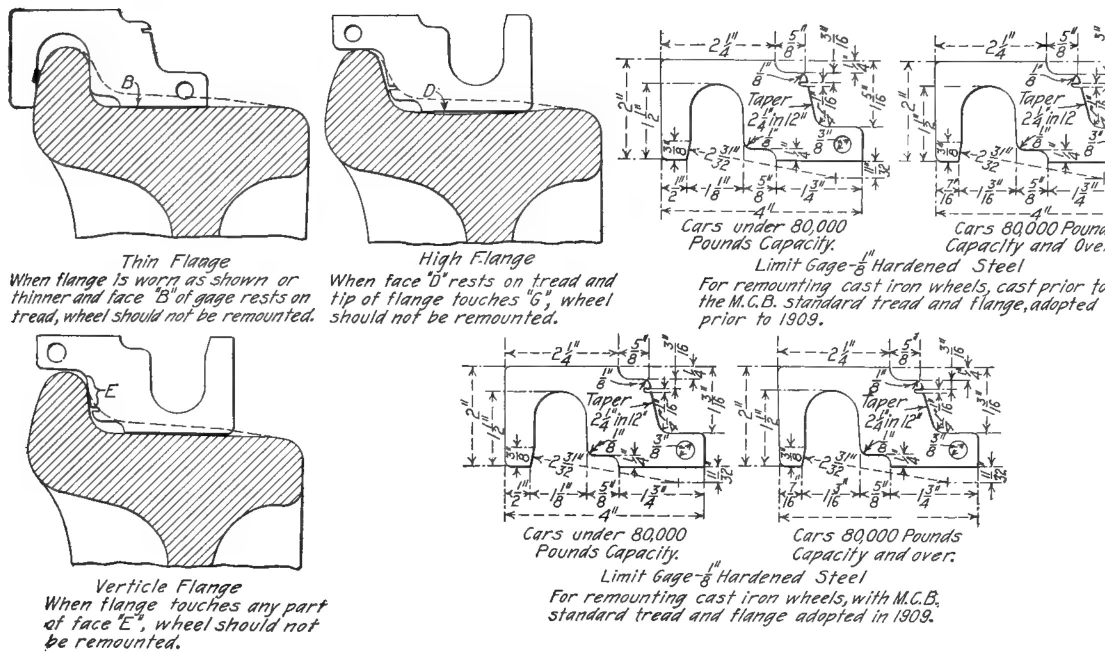


Fig. 2842—Standard Limit Gage for Remounting Cast Iron Wheels. (M. C. B. Sheet 16A.)

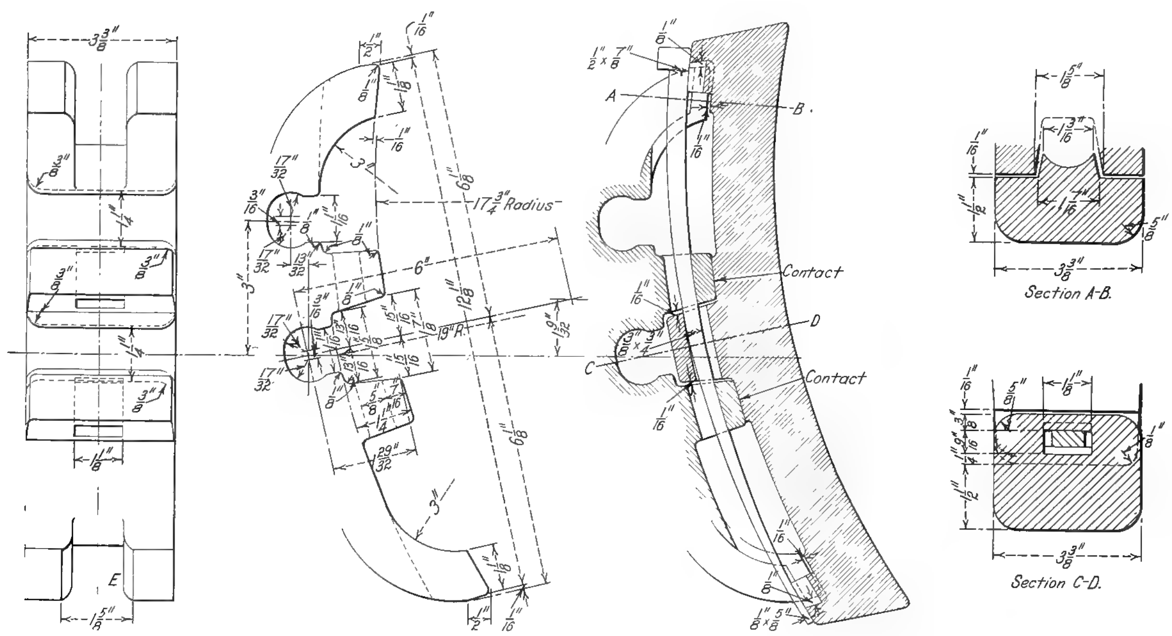


Fig. 2843—Standard Brake Head. (M. C. B. Sheet 17.)

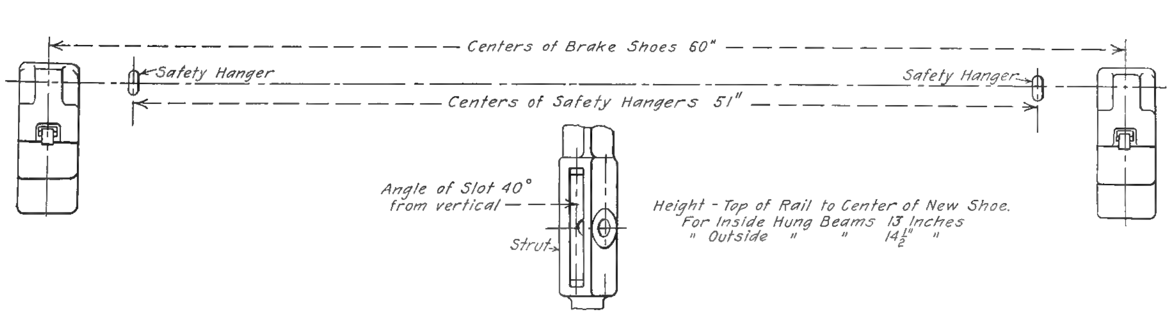
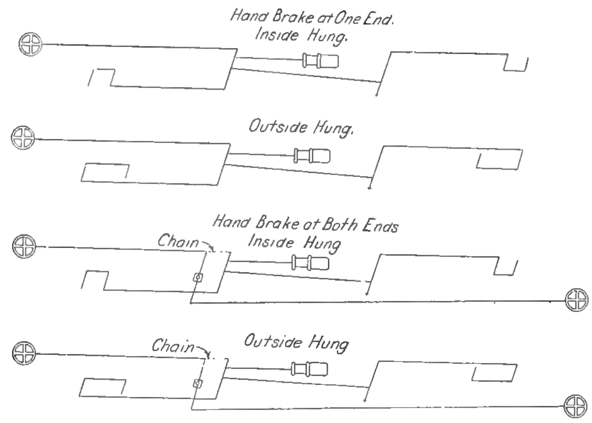


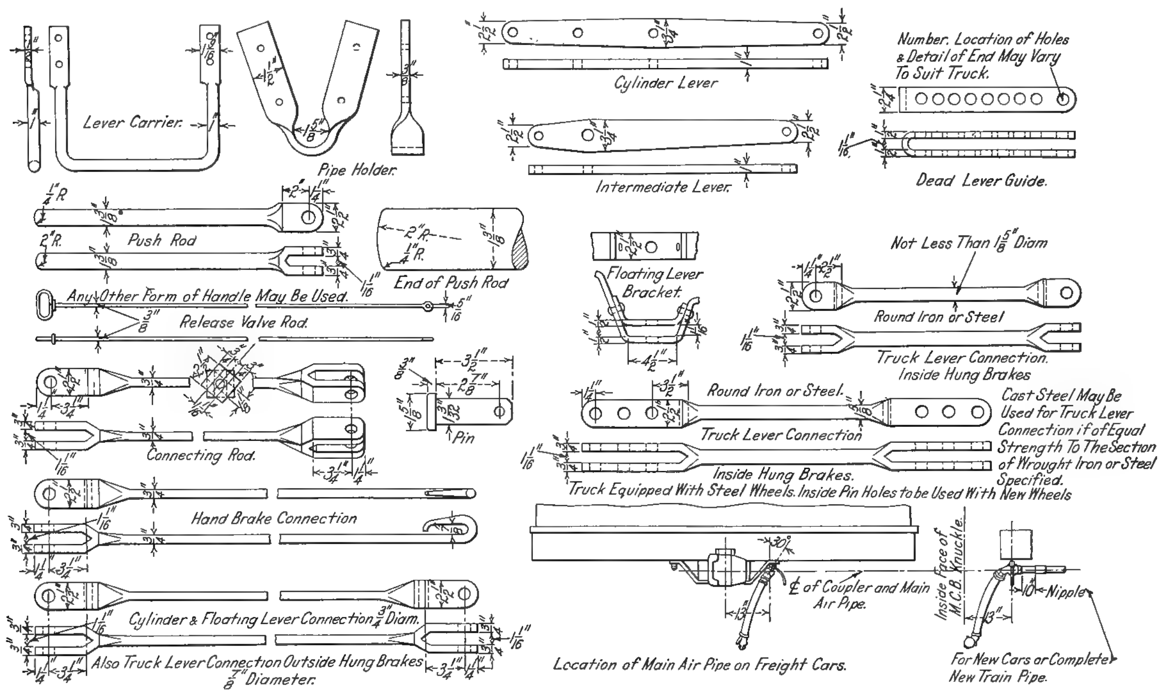
Fig. 2844—Standard Brake Beam. (M. C. B. Sheet 17A.)



For Brake Cylinders Larger Than 8" or for Brake Cylinder Pressures Above 50 Lbs. Per Square Inch, The Size of Brake Rods and Brake Levers Shown Should Be Increased So That The Fibre Stress Shall Not Exceed 15,000 Lbs. Per Square Inch for Rods and 23,000 Lbs. Per Square Inch for Levers

The Form of Jaws May Be Varied Provided The Essential Dimensions Are Adhered To. Jaws May Be Made With Two (or more) Holes if Desired. All Rods Must Be At Least $\frac{3}{4}$" Diam. and Truck Lever Connection For Outside Hung Brakes $\frac{7}{8}$" Diam.

All Holes For Brake Pins Not Less Than $1\frac{3}{32}$" Diam. Nor More Than $1\frac{1}{8}$" Diam. Brake Beams Must Not Be Hung From Any Portion of Body of Cars On Cars Built After Sept. 1st 1909.



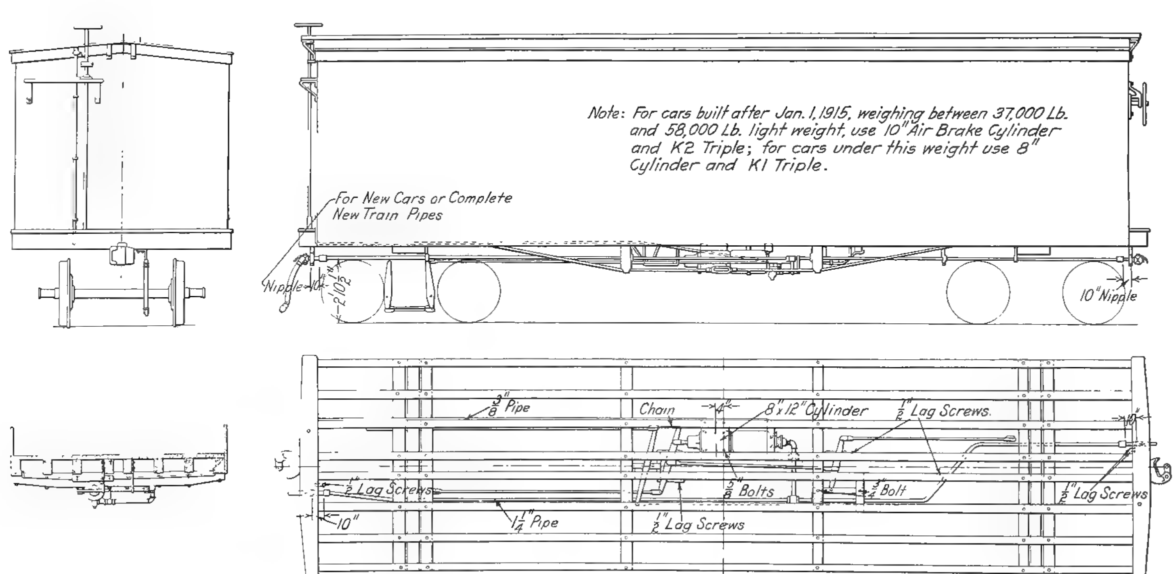
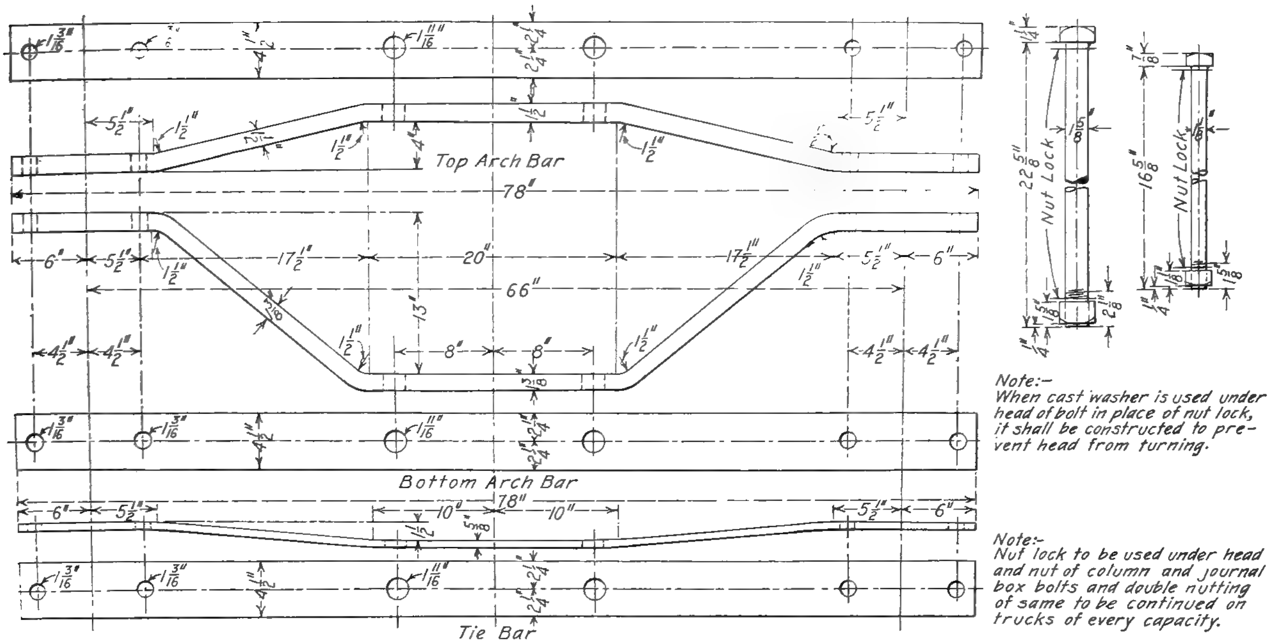
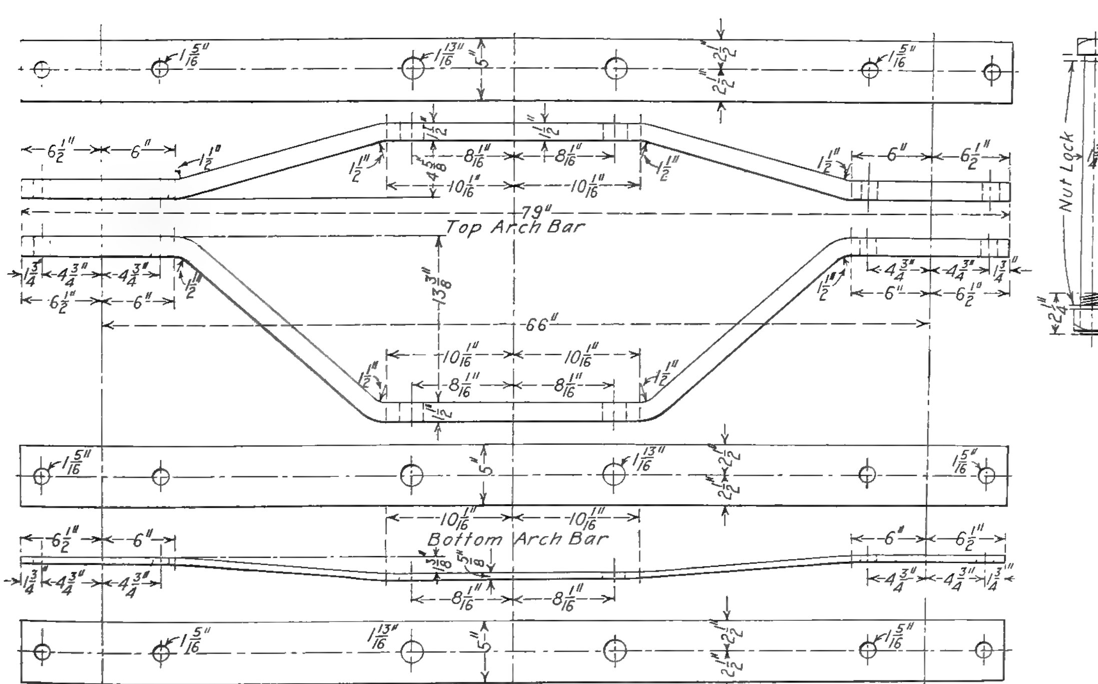


Fig. 2845—M. C. B. Standards for Air Brakes on Freight Cars. (M. C. B. Sheet 18.)



Arch Bars and Column and Journal Box Bolts, for 80,000 lbs, Capacity Cars



Arch Bars and Column and Journal Box bolts, for 100,000 lbs, Capacity Cars.

Fig. 2846—M. C. B. Standard Arch Bars and Column and Journal Box Bolts. (M. C. B. Sheet 20.)

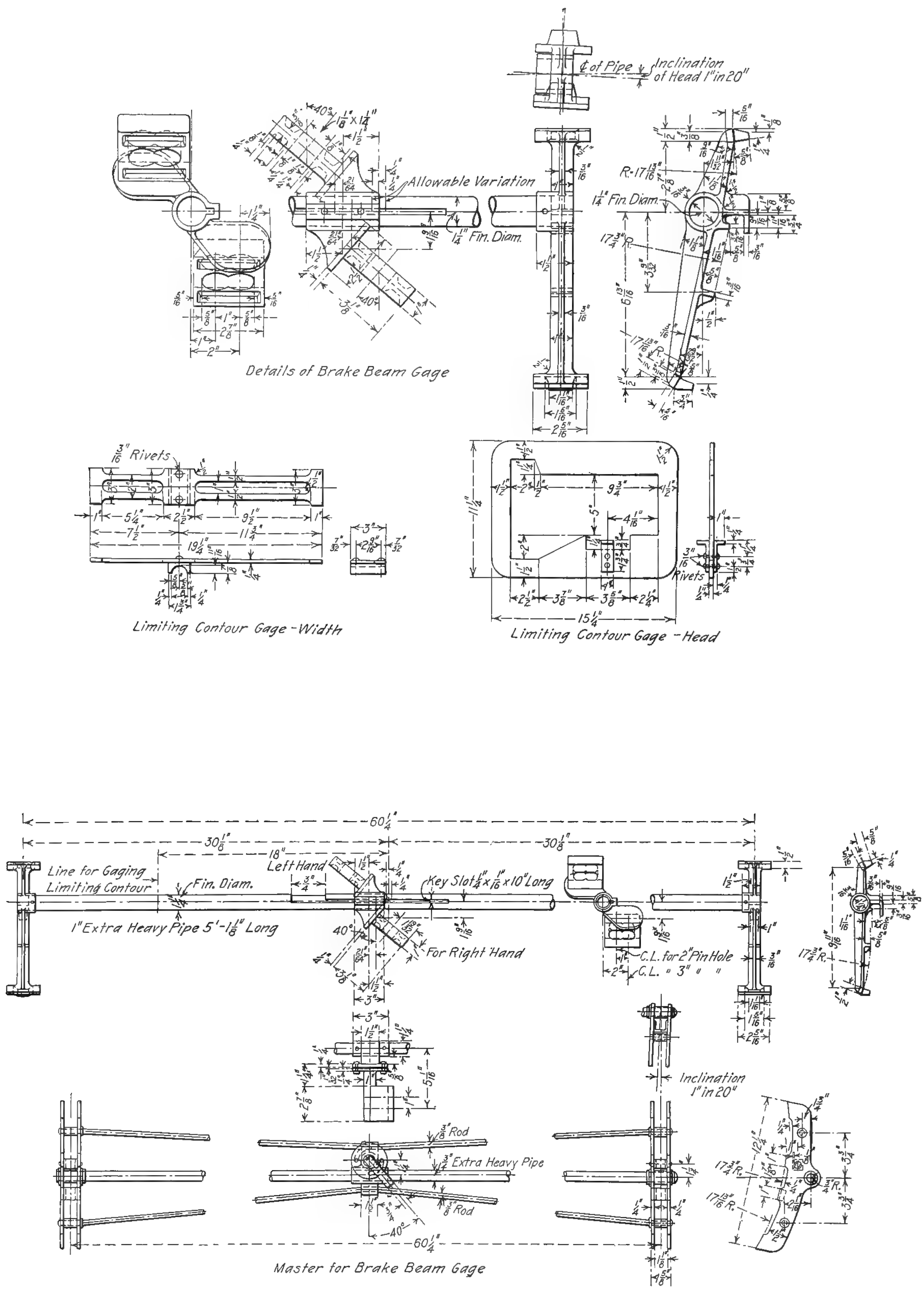


Fig. 2847—M. C. B. Standard Practice for Brake Beam Gages and Details. (M. C. B. Sheet 17A.)

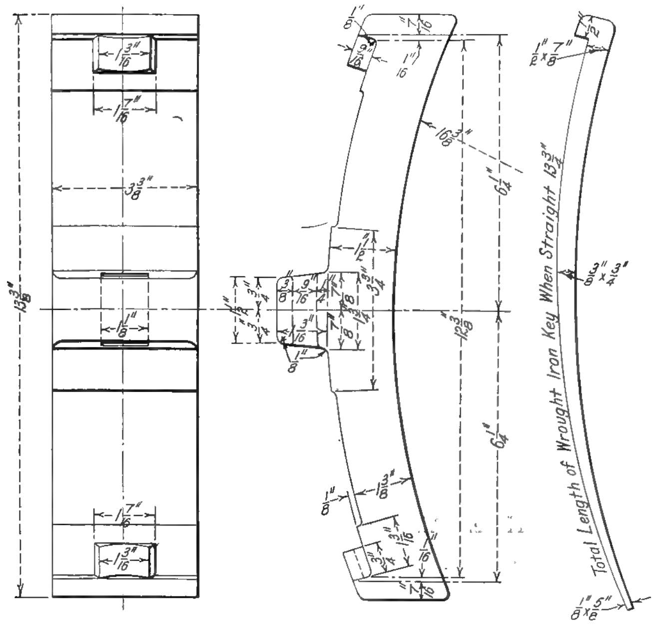


Fig. 2848—M. C. B. Standard Brake Shoe and Key. (M. C. B. Sheet 17.)

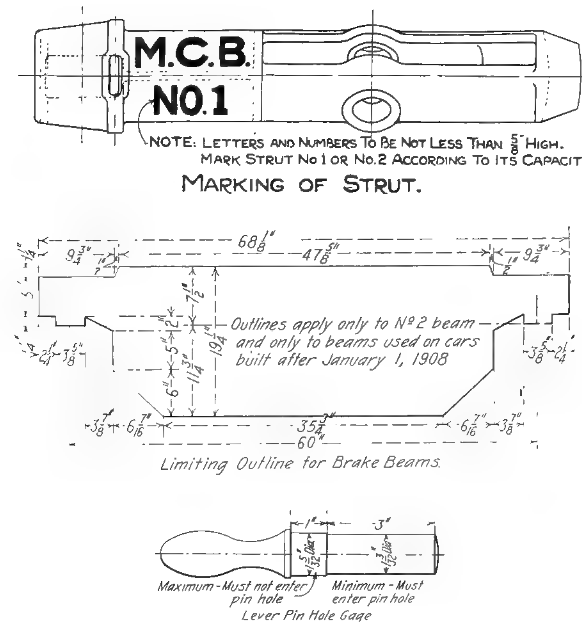


Fig. 2849—M. C. B. Standard Limiting Outline for Brake Beams and Standard Brake Lever Pin Hole Gage. Also Diagram Showing Marking of Strut. (M. C. B. Sheet 17A.)

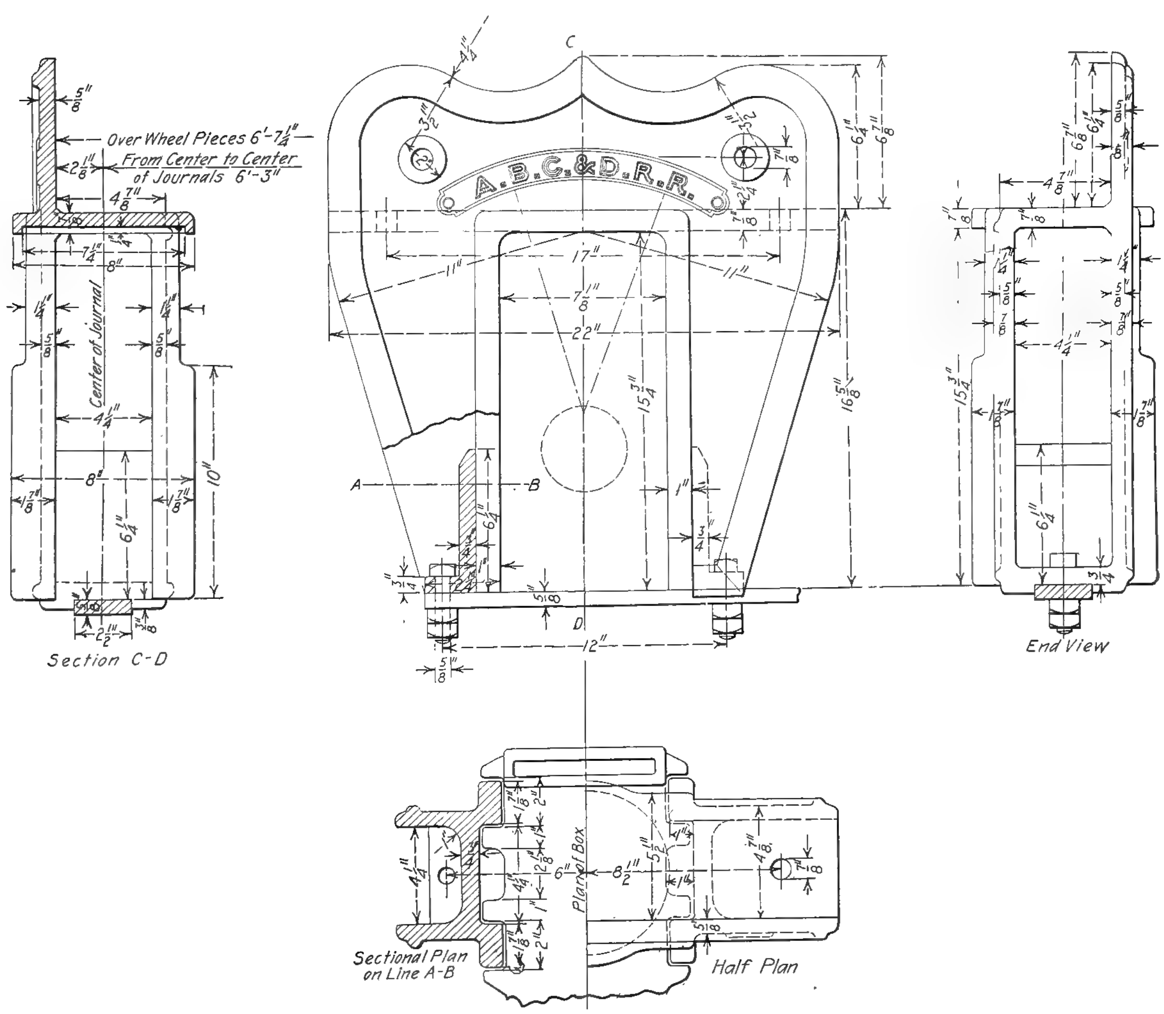


Fig. 2850—M. C. B. Standard Pedestal for 3¾ in. by 7 in. Journal. (M. C. B. Sheet 21.)

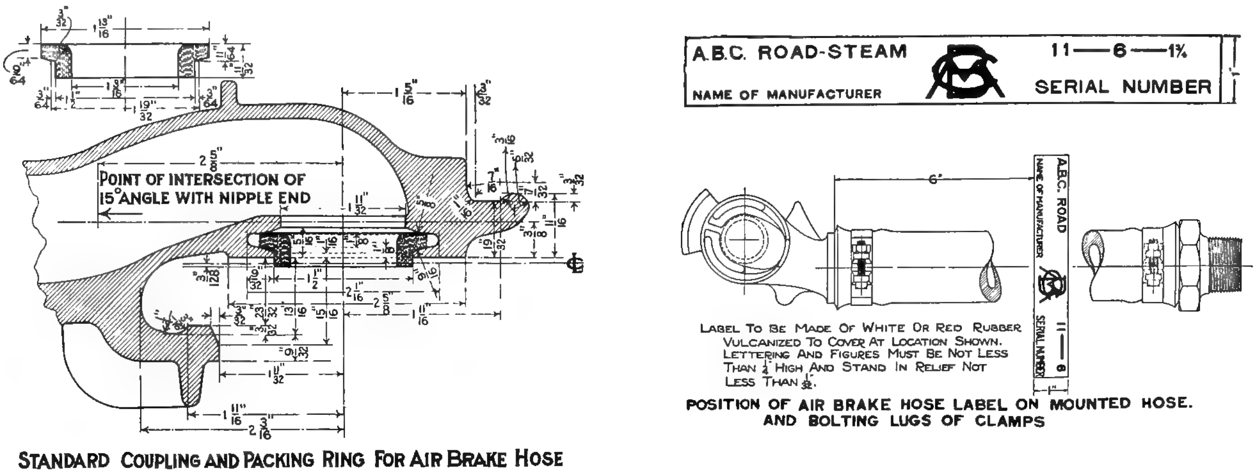


Fig. 2851—Standard Coupling and Packing Ring for Air Brake **Hose.** **Also Label for Air Brake Hose and** Instructions for Its Application. (M. C. B. Sheet 18A.)

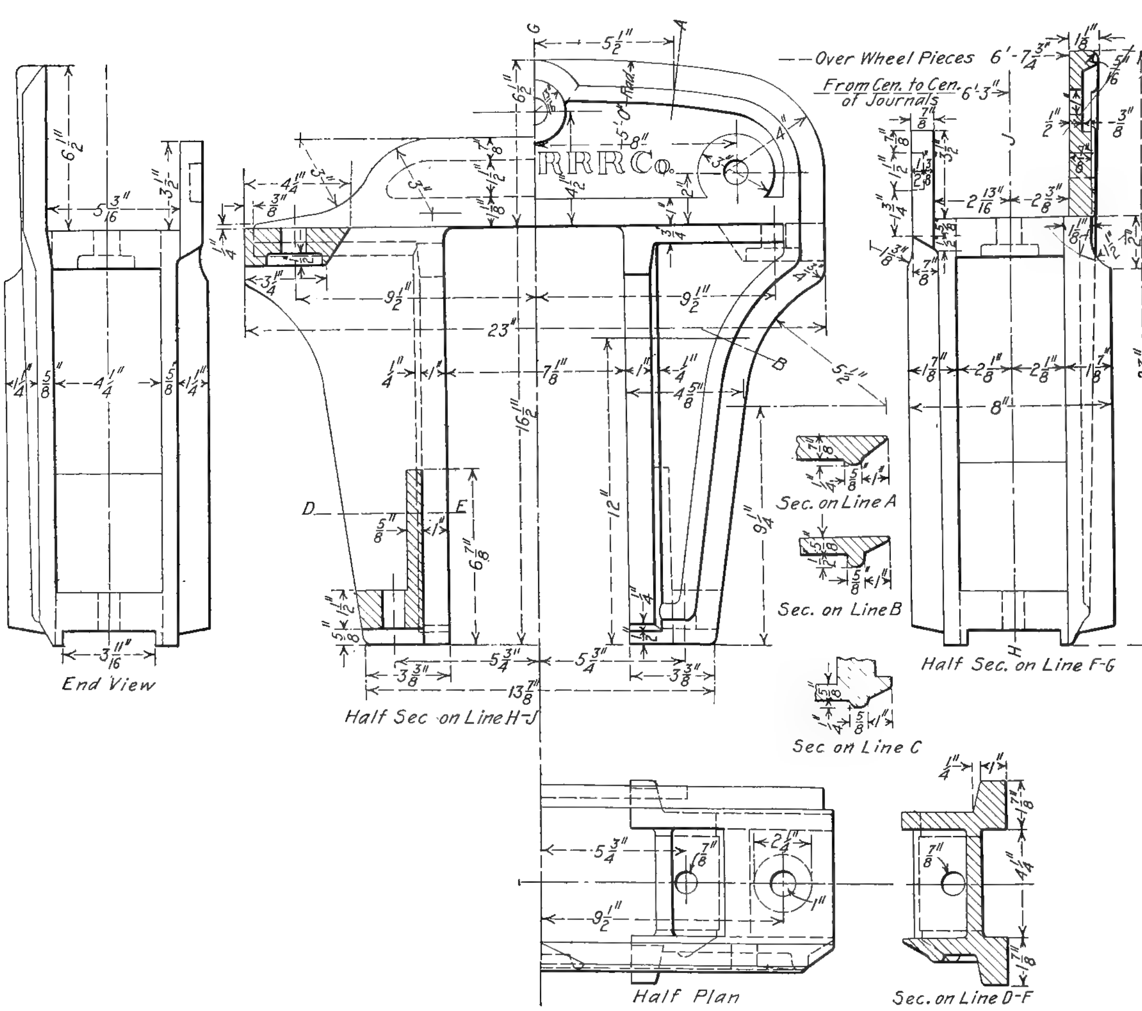


Fig. 2852—M. C. B. Standard Pedestal for 4¼ in. by 8 in. Journal. (M. C. B. Sheet 22.)

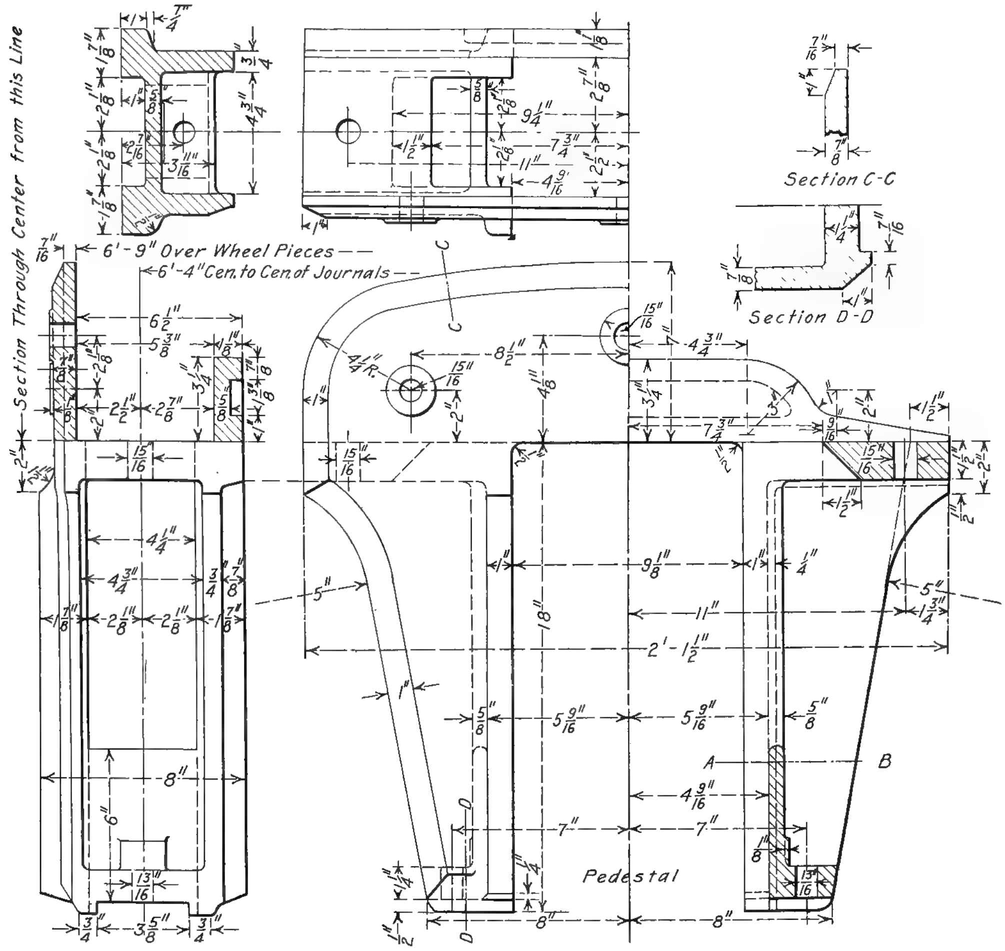


Fig. 2853—M. C. B. Standard Pedestal for 5 in. by 9 in. Journal. (M. C. B. Sheet 22.)

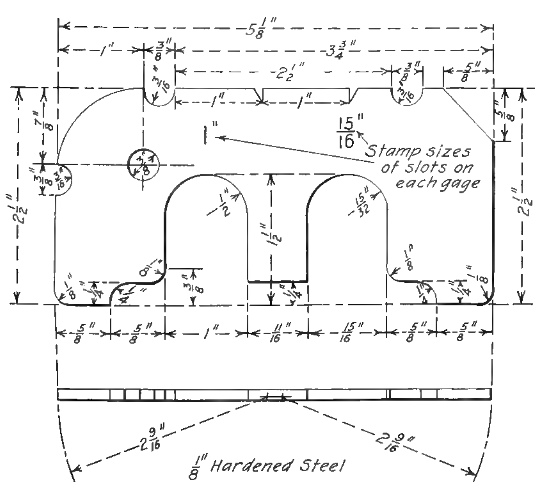


Fig. 2854—Wheel Defect and Worn Coupler Limit Gage. (M. C. B. Sheet 16.)

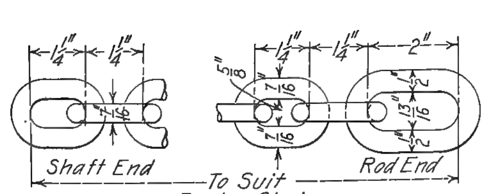


Fig. 2855—M. C. B. Standard Brake Chain. (M. C. B. Sheet. 23A.)

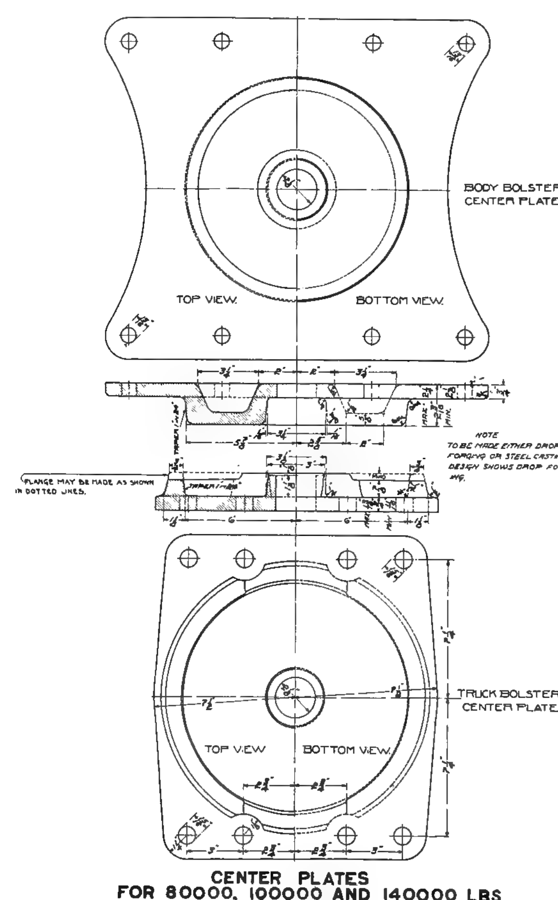


Fig. 2856—Standard Center Plates. (M. C. B. Sheet 20.)

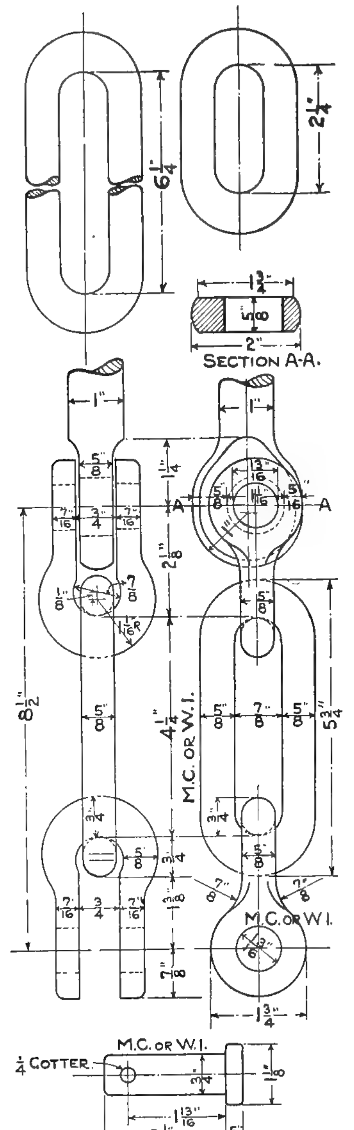


Fig. 2857—M. C. B. Standard Uncoupling Attachments. (M. C. B. Sheet 23A.)

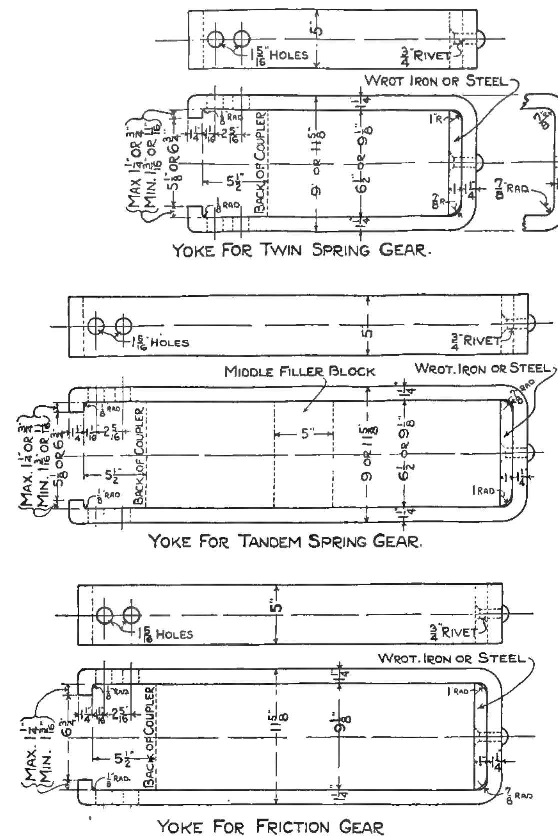


Fig. 2858—Standard Automatic Coupler Yoke. (M. C. B. Sheet 23A.)

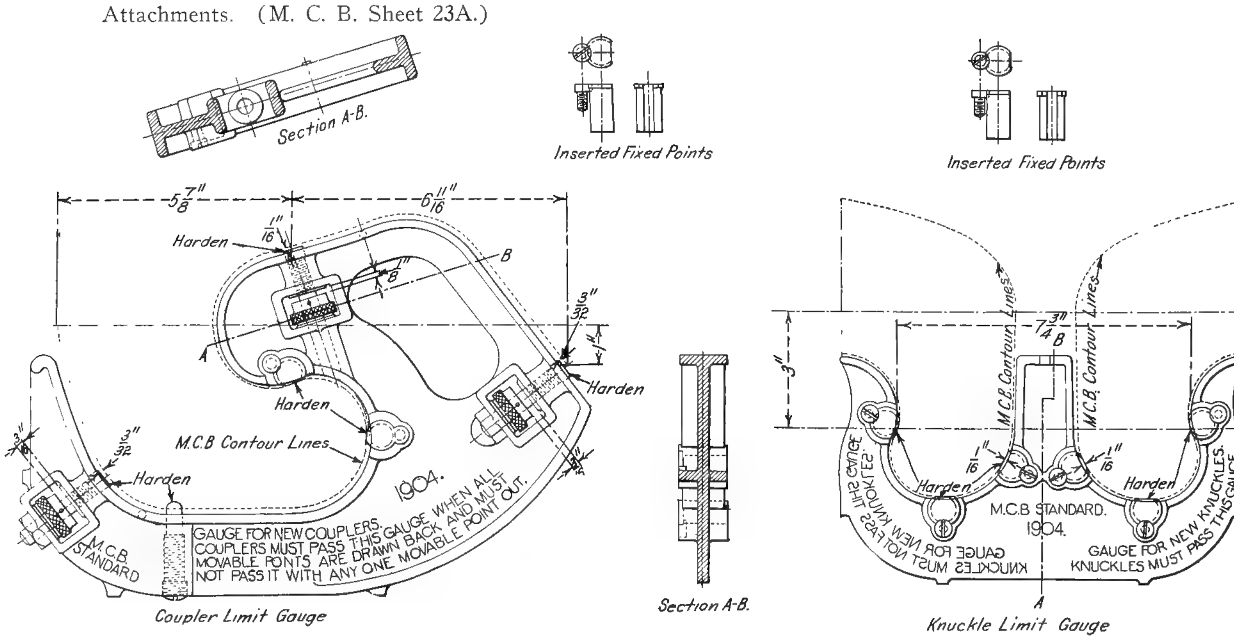


Fig. 2859—M. C. B. Standard Coupler and Knuckle Limit Gages. (M. C. B. Sheet 24.)

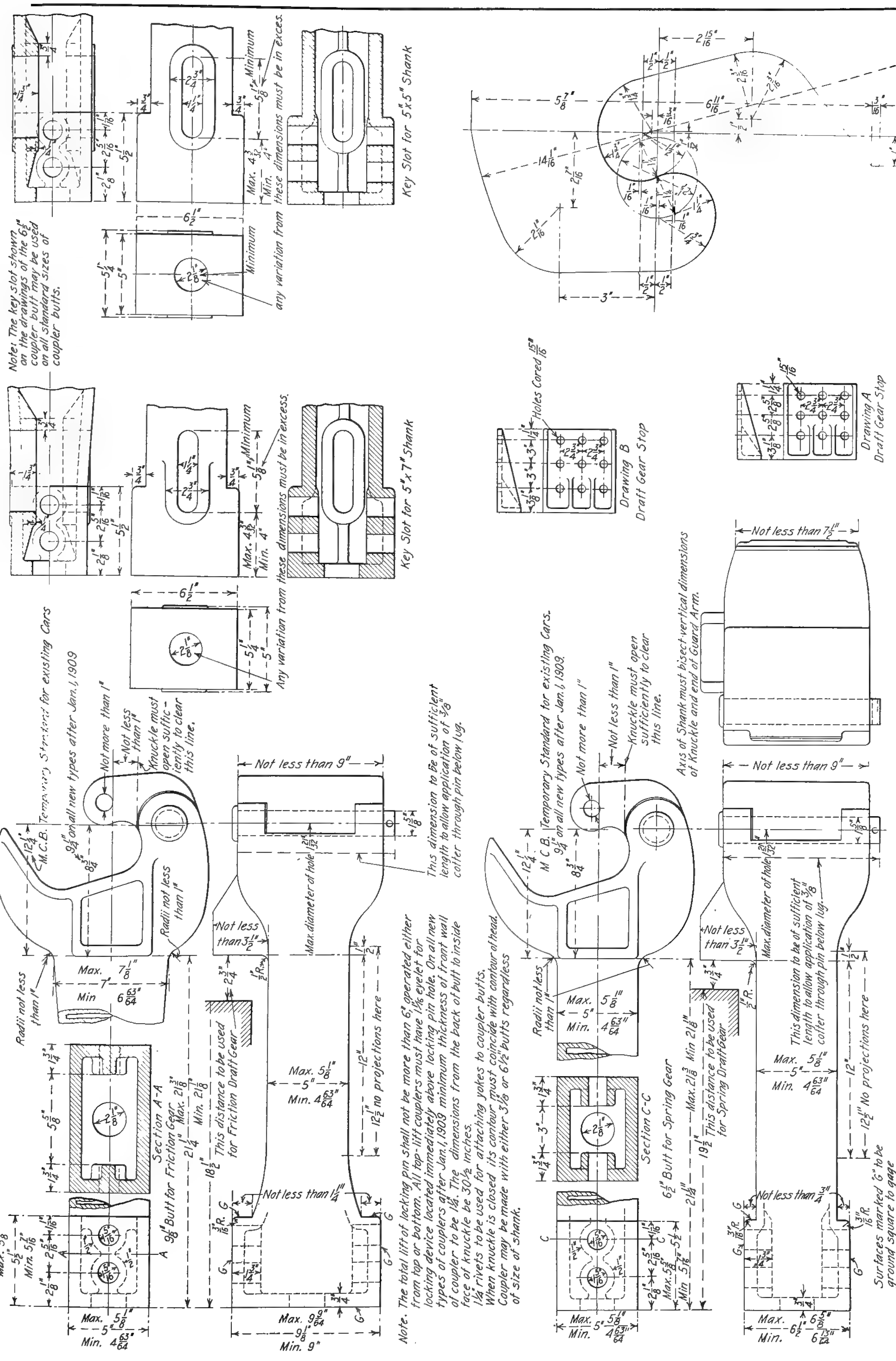


Fig. 2860—M. C. B. Standard Automatic Coupler, Contour Line, Draft Gear Stops and Key Slots for 5 in. by 5 in. and 5 in. by 7 in. Coupler Shanks. (M. C. B. Sheet 23.)

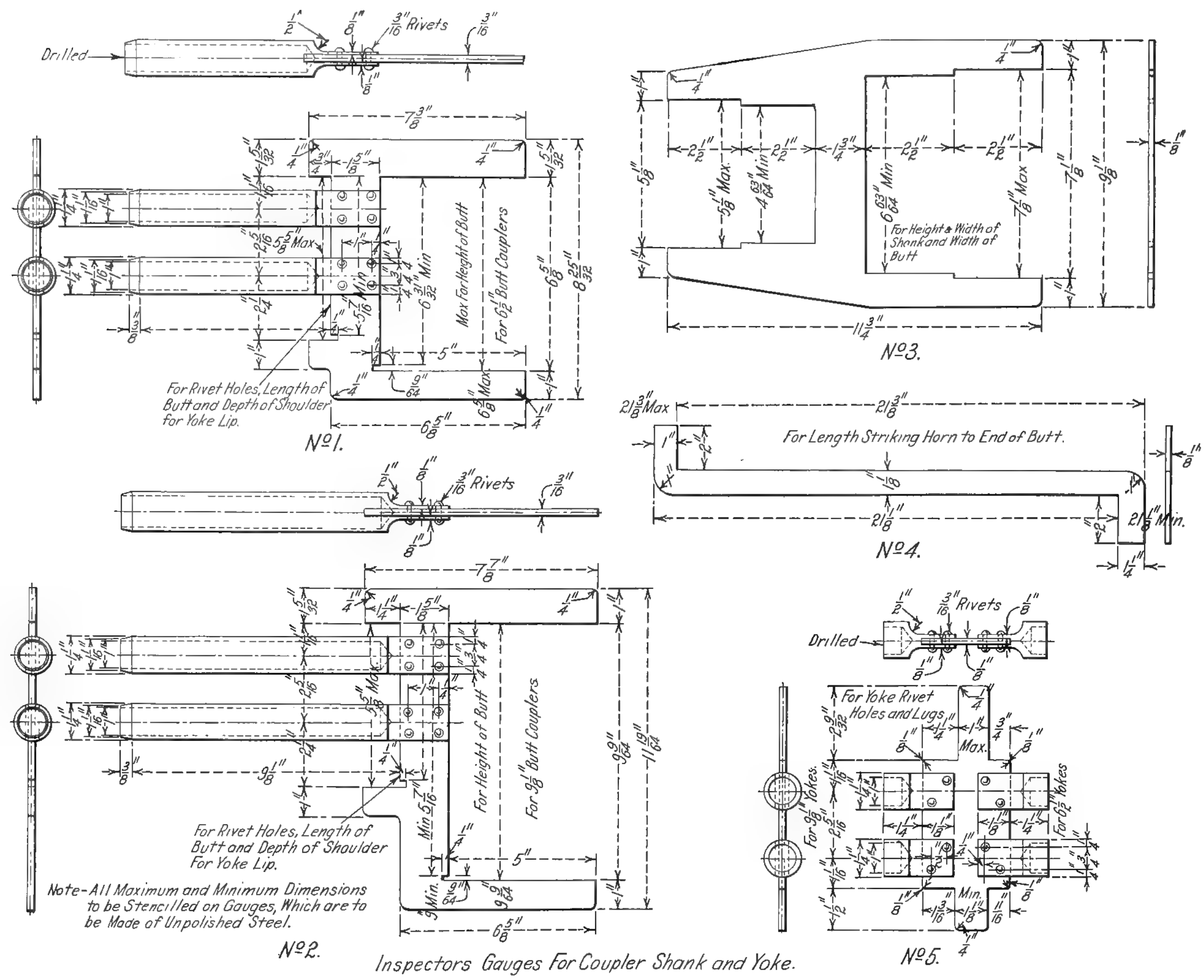


Fig. 2861—M. C. B. Standard Inspector's Gages for Coupler Shank and Yoke. (M. C. B. Sheet 24.)

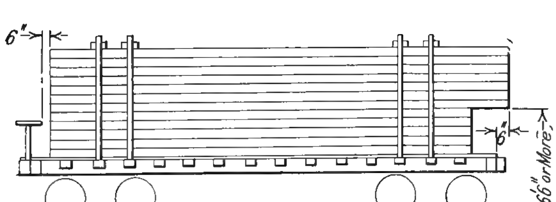


Fig.1-Limits of Projection of Lading on Single Car Which Does Not Require The Use of an Idler. Rules 4 and 9

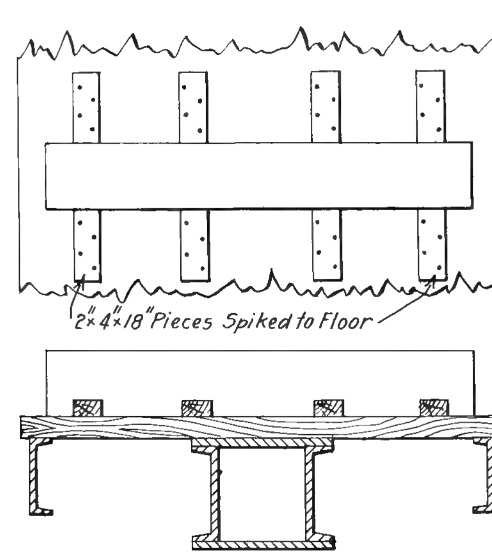


Fig 2. Manner of Blocking Bearing Piece for Lumber, Logs, Telegraph Poles, Piling and Props Rule 22

Fig. 2862—M. C. B. Standards for Loading Long Materials.

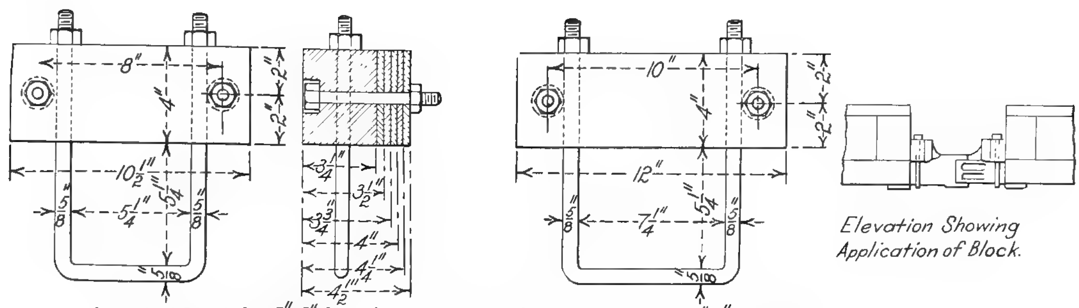


Fig. 3 - Metal Spacing Blocks for Twin and Triple Loads. Rule 26 and 28

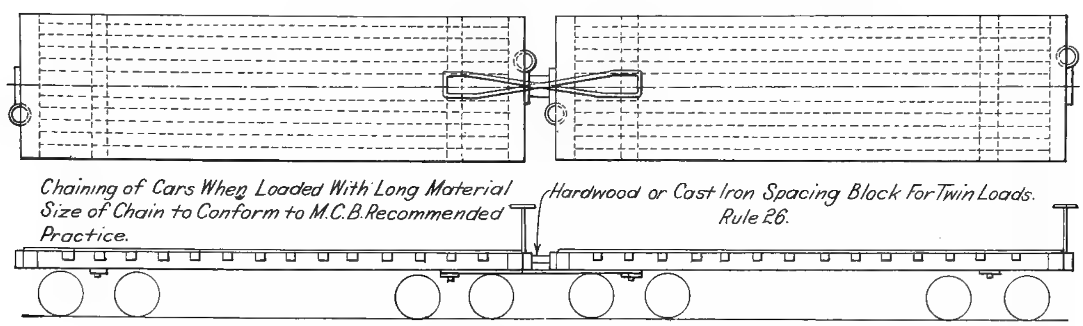


Fig 4.-Rules 26, 27 and 28 Brakes May be Located as the Load Will Permit

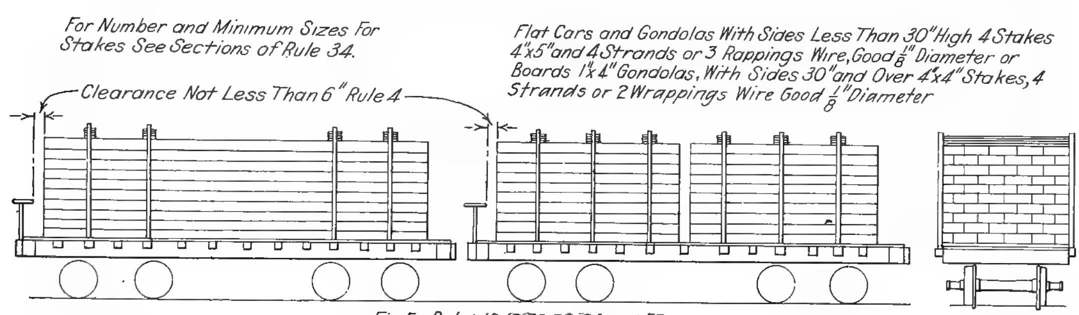


Fig 5. Rules 12, 13, 32, 33, 34 and 53

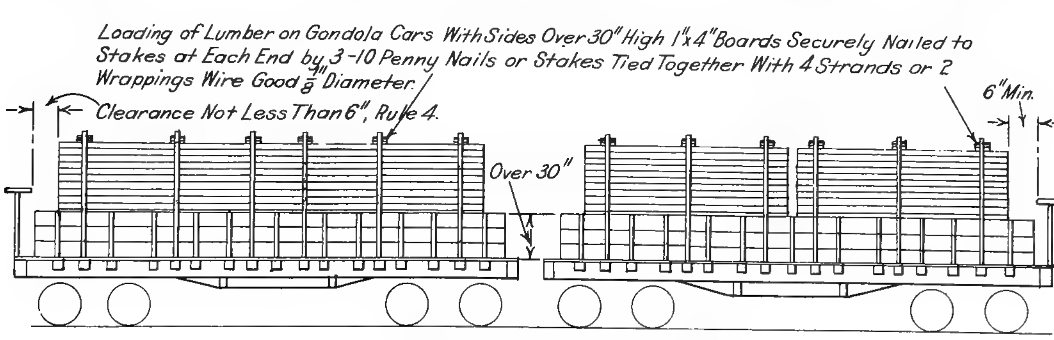


Fig. 6 — Rules 12, 13, 32, 33 and 34

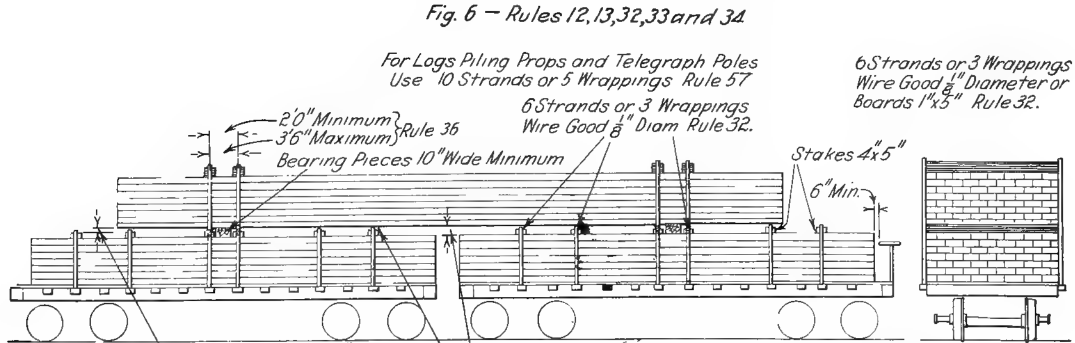


Fig. 7 Manner of Loading Long Lumber on Top of Short Pieces on Single Cars See Rules 34, 35, 36, 37, 53 and 59

Fig. 2863—M. C. B. Standards for Loading Long Materials.

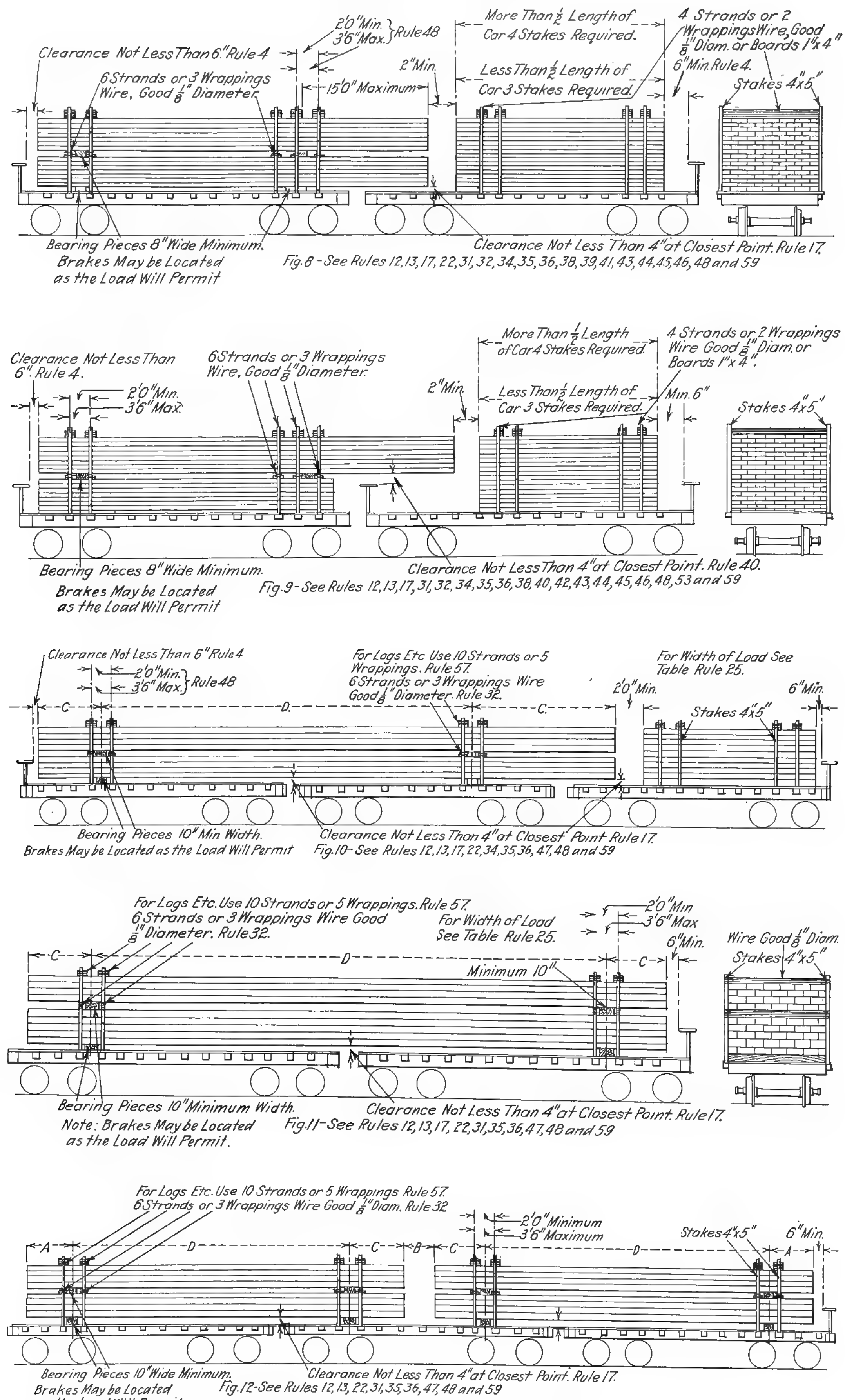


Fig. 2864—M. C. B. Standards for Loading Long Materials.

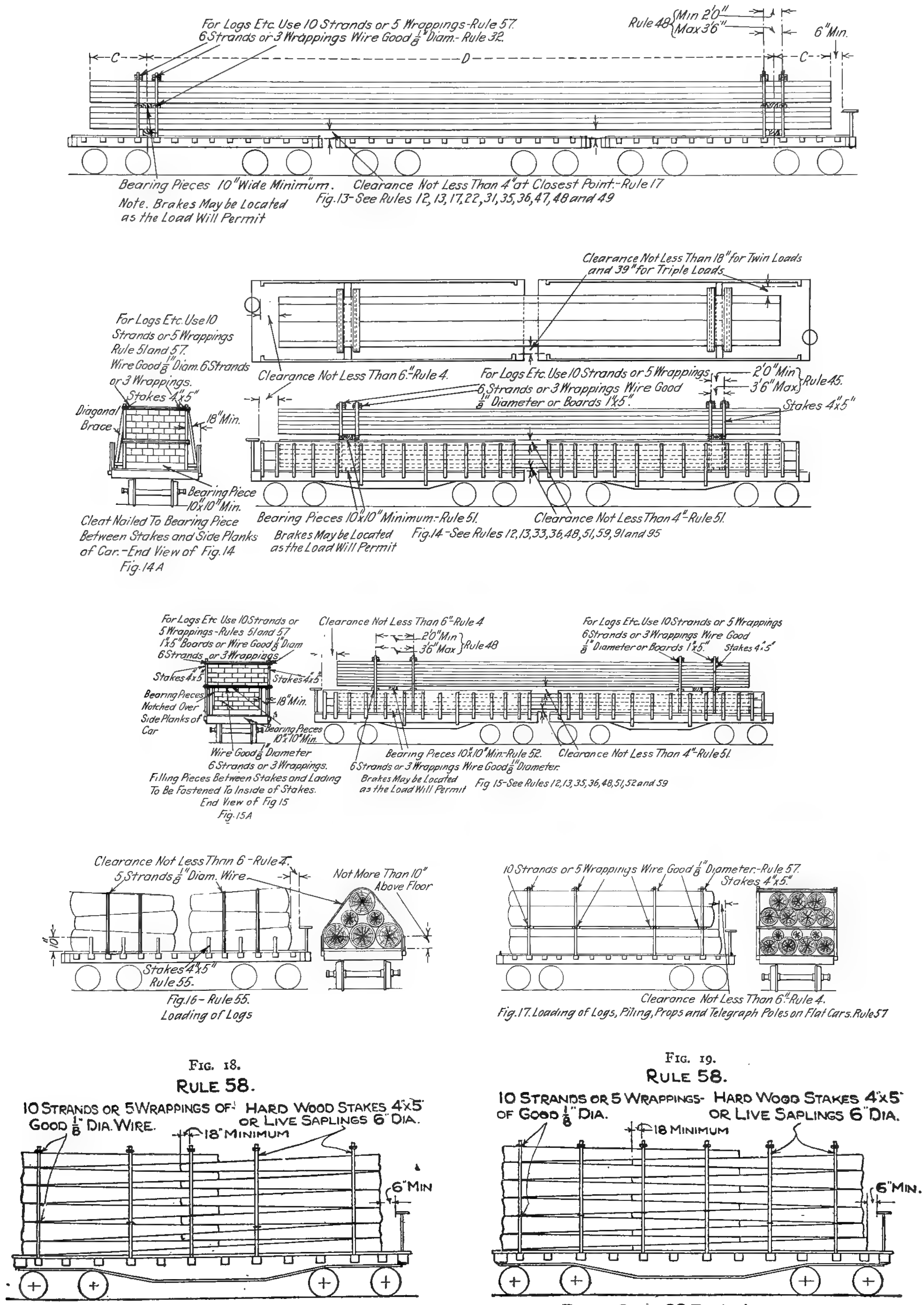
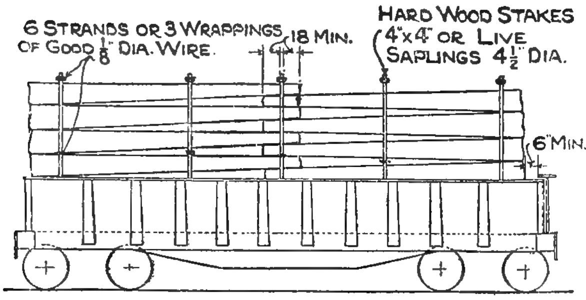


Fig. 2865—M. C. B. Standards for Loading Long Materials.

Fig. 20.

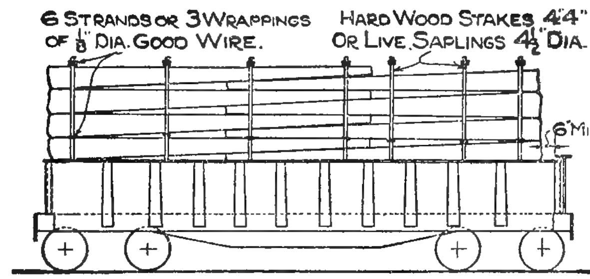
Rule 58.



Poles 20 Ft. or Under in Length.

Fig. 21.

Rule 58.



Poles Over 20 Ft. in Length.

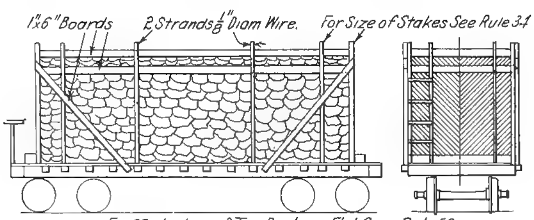


Fig 22- Lading of Tan Bark on Flat Cars Rule 60

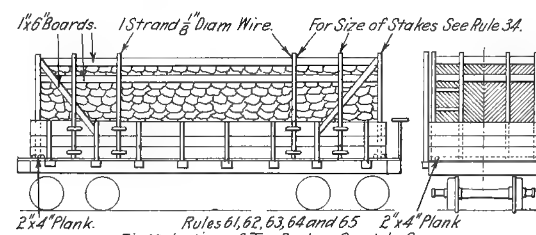


Fig 23-Lading of Tan Bark on Gondola Cars

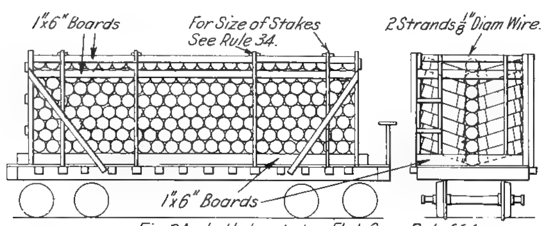


Fig. 24 – Lath Loaded on Flat Cars. Rule 66A

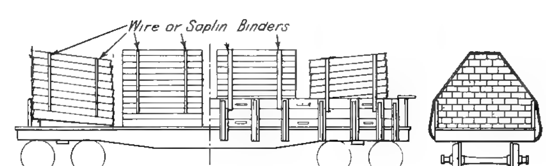


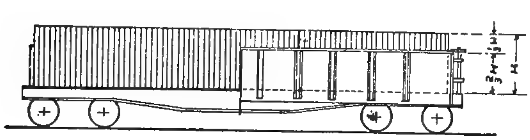
Fig 25- Rules 68, 69, 70 and 71

Loading of Ties, Fence Posts and Similar Material on Gondola Cars

Fig. 26.

Rule 69-A.

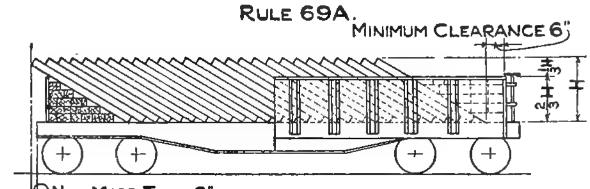
Loading of Short Pieces Not More than 9 ft. 0 in. long, Such as Ties, Fence Posts, Cordwood, etc., in Gondola Cars.



Pieces Loaded Vertically if the Length is Not More than One and One-half Times Inside Height of Car Sides.

Fig. 27.

Rule 69A.

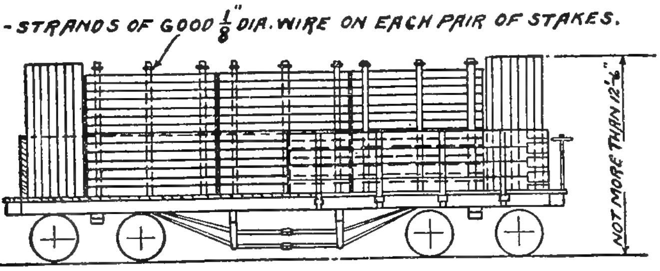


Piles Must Be Inclined If The Length Is More Than One And One Half Times The Inside Height Of Car Sides.

Fig. 28.

Rule 69-A

4-Strands of Good 1/8" Dia. Wire on Each Pair of Stakes.

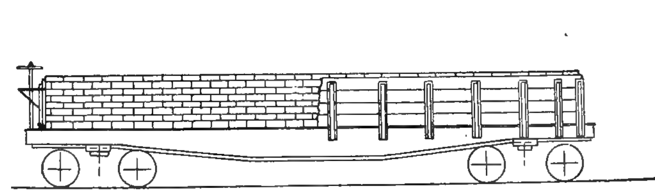


When Inside Width of Car is Less Than Length of Pieces to be Loaded. End Blocking and Stakes May Consist of Pieces Placed Vertically.

Fig. 29.

Loading of Ties, Fenceposts, etc. in Gondola Cars.

Rule 69-A.



When Inside Width of Car is Greater Than Length of Pieces, Lading May Be Placed Transversely.

Fig. 2866—M. C. B. Standards for Loading Long Materials.

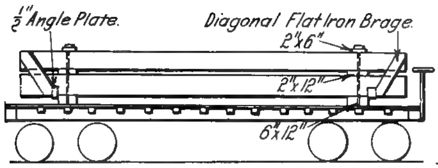
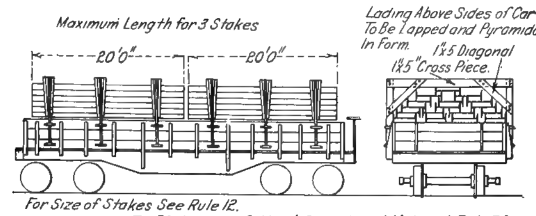
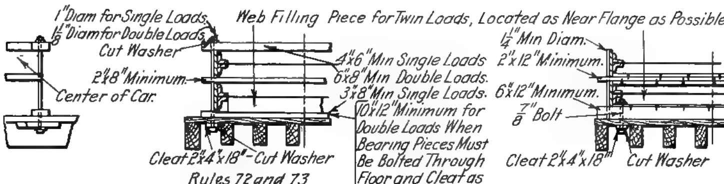


Fig30-Large Girders Loaded Flat-Rule 72



For Size of Stakes See Rule 12.
Fig.36-Lading of Short Structural Material Rule 74



Rules 72 and 73
Fig.31-Large Girders Loaded Flat.
Fig.32
Rule 72

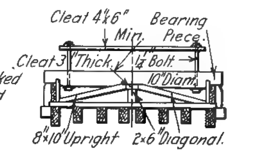
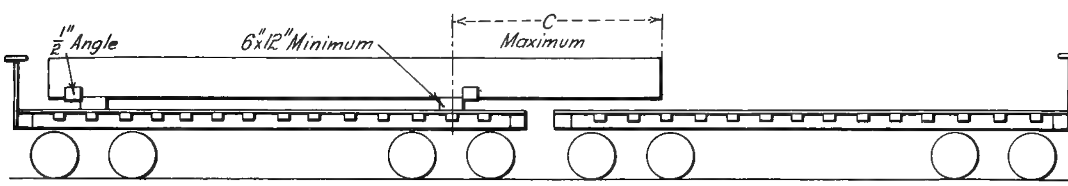
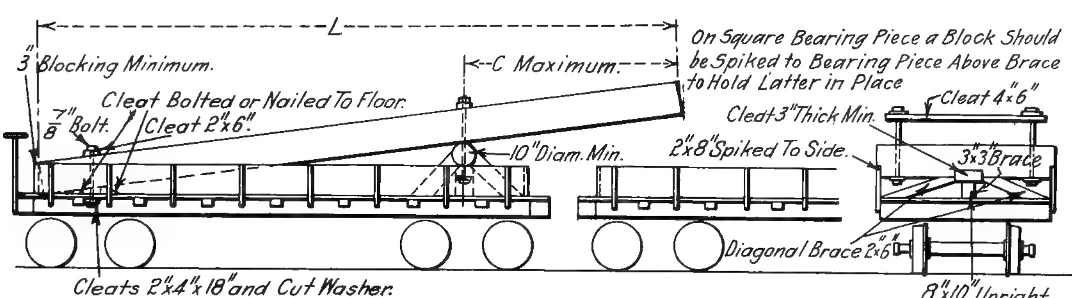


Fig 35-Bracing for Loading of Large Girder.



Brakes May be Located as the Load Will Permit
Fig.33-Lading of Large Girder Overhanging. Rules 11,31,73,77 and 83



Brakes May be Located as the Load Will Permit
Fig.34. Rules 11,31,73,76,77,79,80 and 84

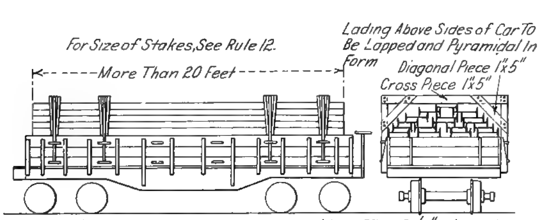
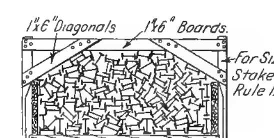


Fig.37-Rule 74-Lading of Structural Material More Than 20'0" in Length



Sufficient Blocking To Allow Removal of Chains Which Were Used in Loading See Rule 74 - Figs 36 and 37
Fig 38-Manner of Loading Light Structural Material On Single Gondola Cars

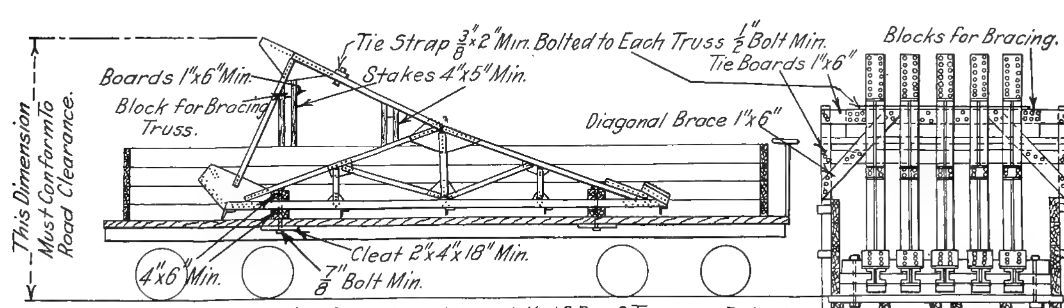


Fig.39-Lading of Steel Half Roof Trusses. Rule 75
End Elevation of Fig.39

Fig. 2867—M. C. B. Standards for Loading Long Materials.

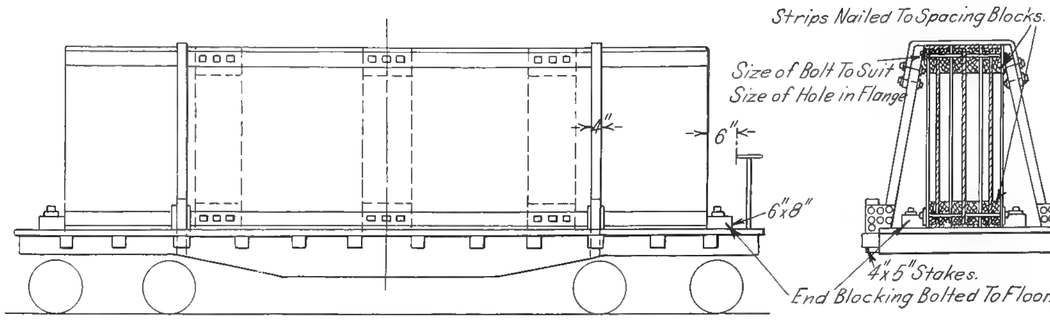
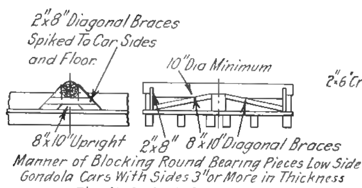
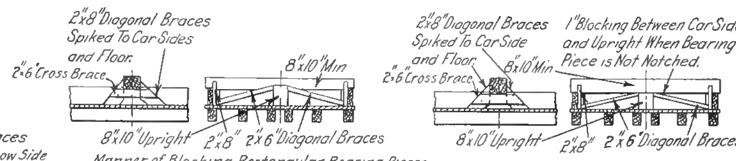


Fig. 40 -Rule 75A.-Manner of Loading Deep Girders on Flat Cars.

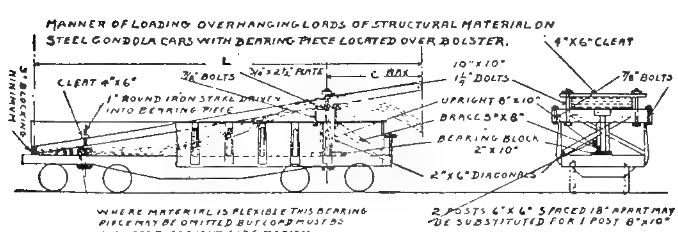


Manner of Blocking Round Bearing Pieces Low Side Gondola Cars With Sides 3" or More in Thickness
Fig 41-Rules 7, 80 and 81



Manner of Blocking Rectangular Bearing Pieces
Fig 42 - Rule 7, 80 and 81

Fig. 43.
Rules 7, 11, 31, 76, 77, 79, 80 and 82.



NOTE.— Brakes may be located as the load will permit.

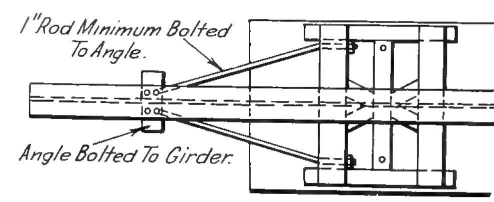
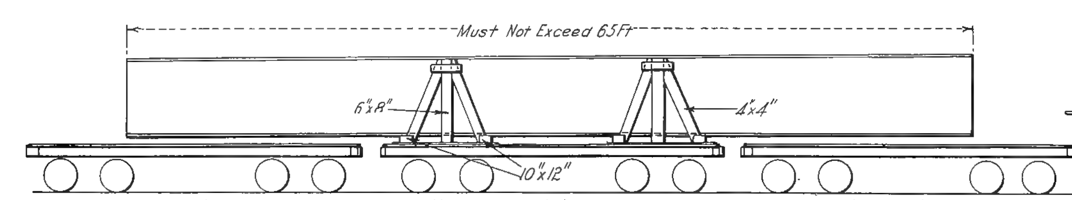


Fig 46-Rules 72, 85, 86, 87 and Figs. 45 and 47

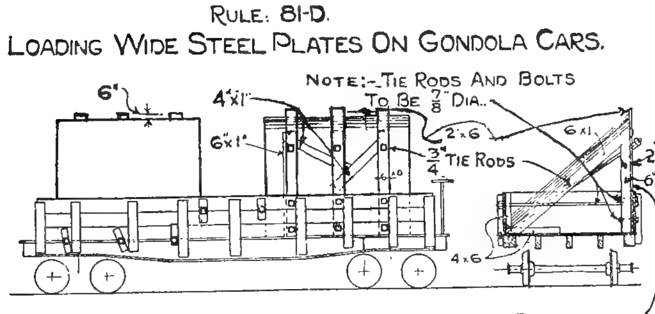


Brakes May be Located as the Load Will Permit
Fig 45 -Manner of Loading Lattice Girders Rules 72, 85, 86, 87 and Figs 46 and 47.-Box Girders, Columns, ½ Roof Trusses and Similar Material Rule 85 to be Used Only When Absolutely Necessary

Fig 44

RULE: 81-D.

LOADING WIDE STEEL PLATES ON GONDOLA CARS.



2" x 6" BOLTED BETWEEN UPRIGHT POST AND SIDE OF CAR EXTENDING 6" ABOVE LADING.

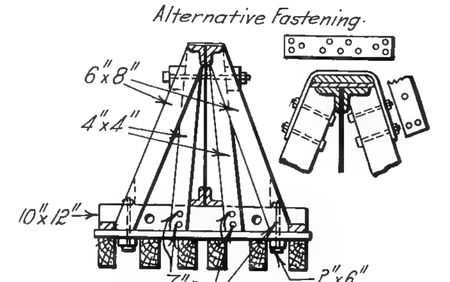


Fig. 47 - Rules 72, 85, 86, 87 and Figs 45 and 46

Fig. 2868—M. C. B. Standards for Loading Long Materials.

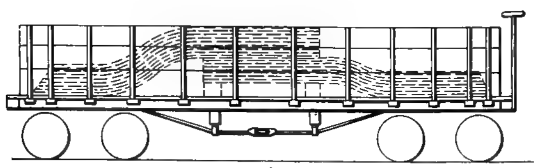
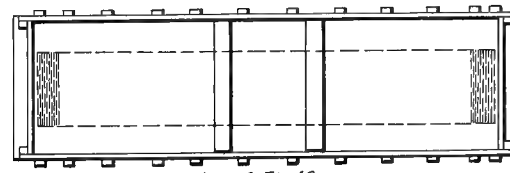


Fig.48 - Rule 89



Plan View of Fig.48
Fig. 49

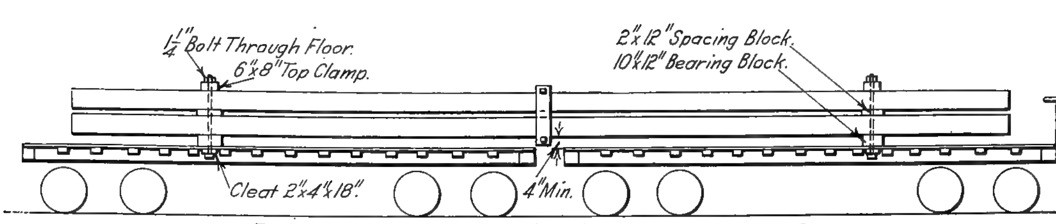
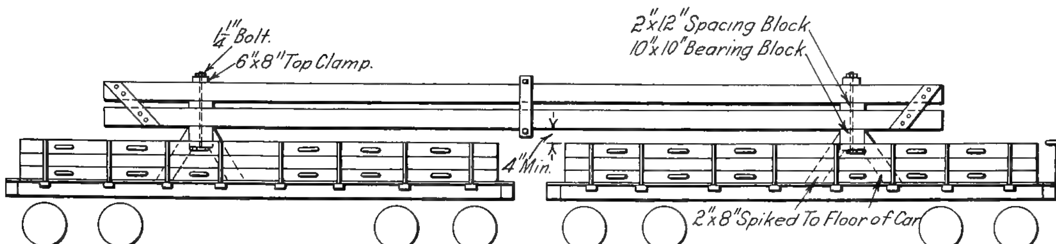


Fig.50 - Lading of Long Material on Flat or Drop End Gondola Cars. - Rules 15, 29, 72 and 90
Brakes May be Located as the Load Will Permit



Brakes May be Located as the Load Will Permit

Fig.51 - Lading of Long Material on Gondola Cars. Rules 15, 81, 92 and 97

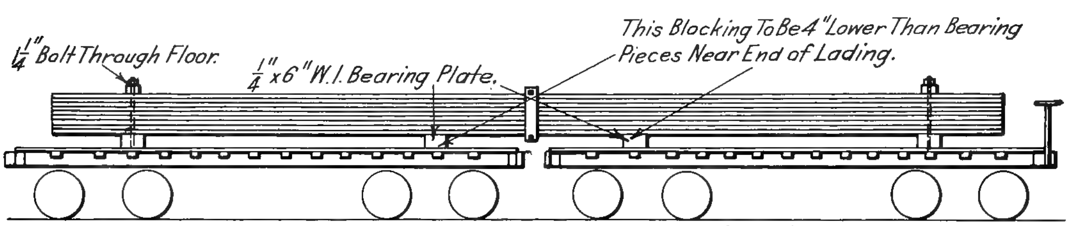


Fig. 52 - Lading of Long Flexible Material on Flat or Drop End Gondola Cars. Rules - 15, 29, 72, 90 and 93
Brakes May be Located as the Load Will Permit

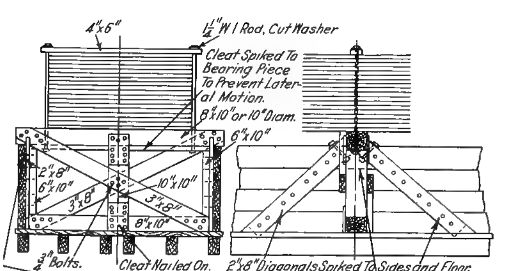


Fig.53 - Twin Shipments on Gondola Cars Not Equipped With Drop End and Having Sides Less Than Three Inches Thick. Rules 7 and 92

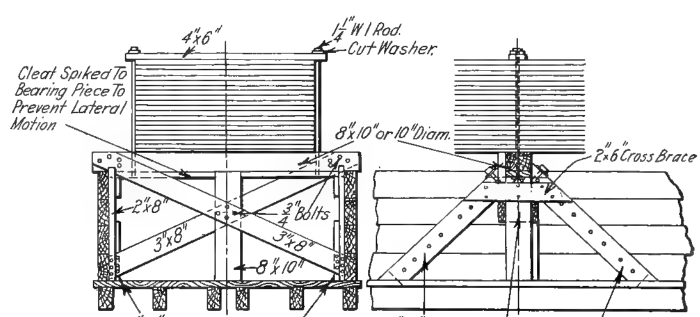


Fig 54 - Rules 7 and 92 - Twin Shipments on Gondola Cars Not Equipped With Drop Ends and Having Sides Three or More Inches Thick.

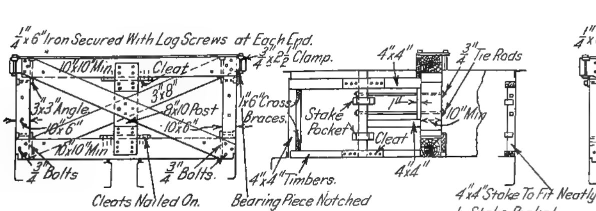


Fig. 55 - Manner of Blocking and Bracing Bearing Piece on Steel Gondola Cars With Inside Stake Pocket. Rules 7 and 92

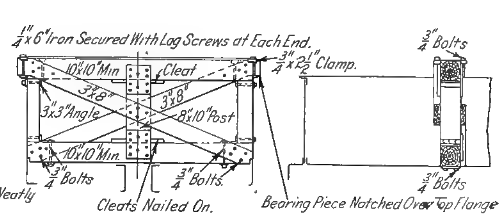


Fig 56 - Manner of Blocking and Bracing Bearing Piece on Steel Gondola Cars Without Inside Stake Pockets. Rules 7 and 92

Fig. 2869—M. C. B. Standards for Loading Long Materials.

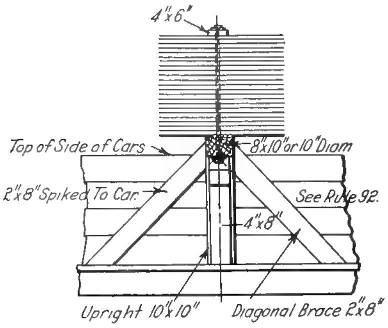
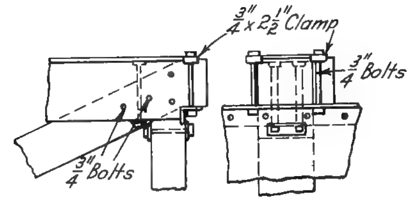


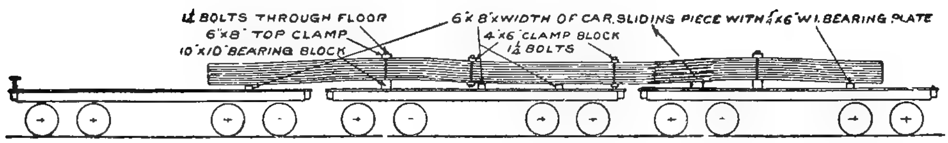
Fig. 57 – Twin Shipments on Gondola Cars Not Equipped With Drop. Ends. Rule 92



Manner of Blocking Bearing Piece on Steel Gondola Cars. Fig. 56-Rules 7 and 92

Fig. 58.
Rules 15 and 93.

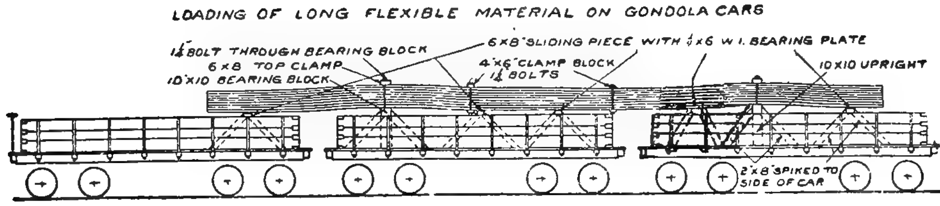
LOADING OF LONG FLEXIBLE MATERIAL ON FLAT CARS.



Note.— Brakes may be located as the load will permit.

Fig. 59.
Rules 15 and 93.

LOADING OF LONG FLEXIBLE MATERIAL ON GONDOLA CARS



Note.— Brakes may be located as the load will permit.

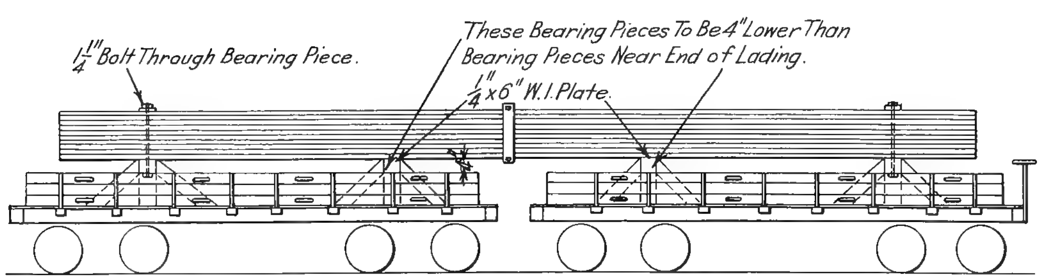


Fig. 60 - Lading of Long Flexible Material on Gondola Cars Not Having Drop Ends. Rules 15, 81, 92, 93, 94 and 97
Brakes May be Located as the Load Will Permit

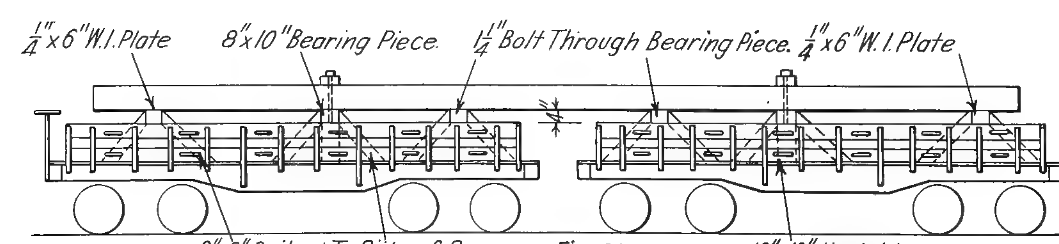
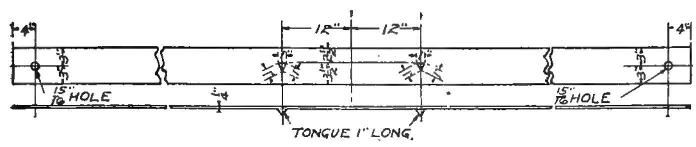


Fig. 61
Rules 15, 81, 92, 93, 96 and 97 - Lading of Long Material on Gondola Cars Not Having Drop Ends.

Fig. 2870—M. C. B. Standards for Loading Long Materials.

SKETCH-A.
RULE 93.
MANNER OF PREPARING 1/4"X6"
SLIDING IRONS FOR LOADS OVER
40000 LBS. PER BEARING PIECE.



STEEL PLATE

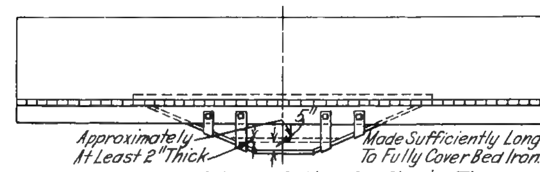


Fig.-62 —Diagram of Hopper Bottom Car, Showing The Application of False Bottom for The Loading of Pig Iron Billets, Small Castings Etc. Rule 98A

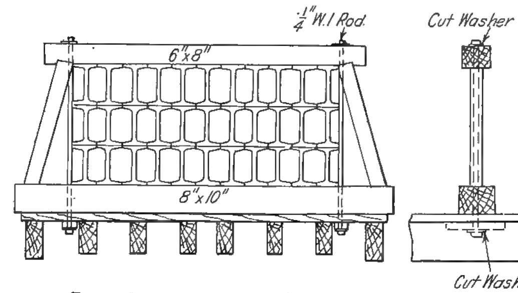
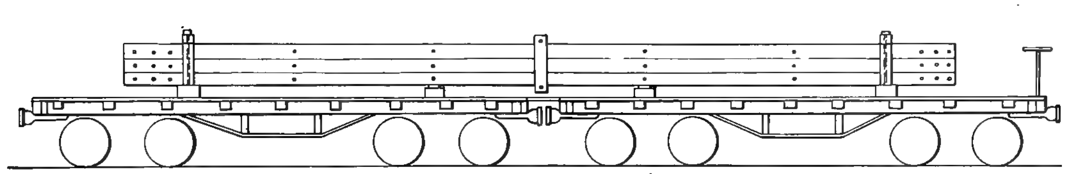


Fig.63-Structural Material Loaded On Flat Cars or on Tops of Sides of Gondola Cars. Rules 72, 78, 78, 94 and 100



Brakes May be Located as the Load Will Permit Fig.64-Rules 100 and 102

Plan View of Fig 64

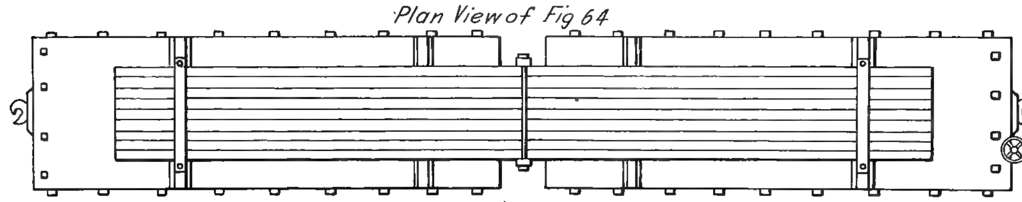
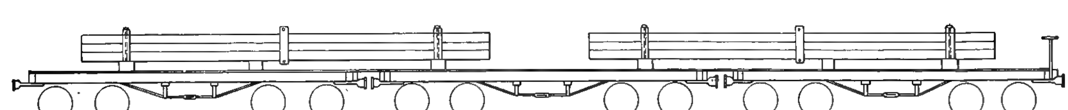


Fig. 65



Brakes May be Located as the Load Will Permit Fig.66-Rules 100 and 102

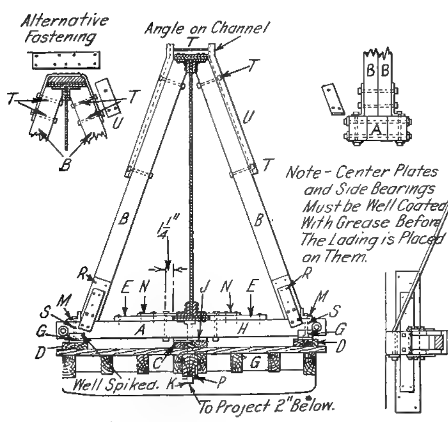


Fig.67-See Rules 103 and 104 and Figs.68-69-For Dimensions See Table Rule 104.

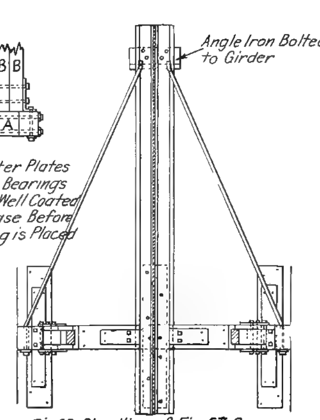


Fig.68-Plan View of Fig.67-See Rules 103 and 104

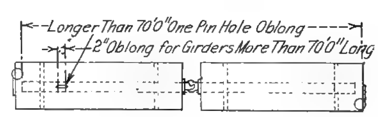


Fig.67A-See Rule 104B, Letter F and Figures 67, 68 and 69A

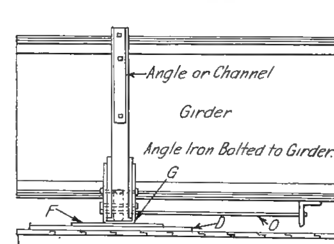


Fig.69-Side View of Fig.68-See Rules 103 and 104 and Figs.67-68.

Fig. 2871—M. C. B. Standards for Loading Long Materials.

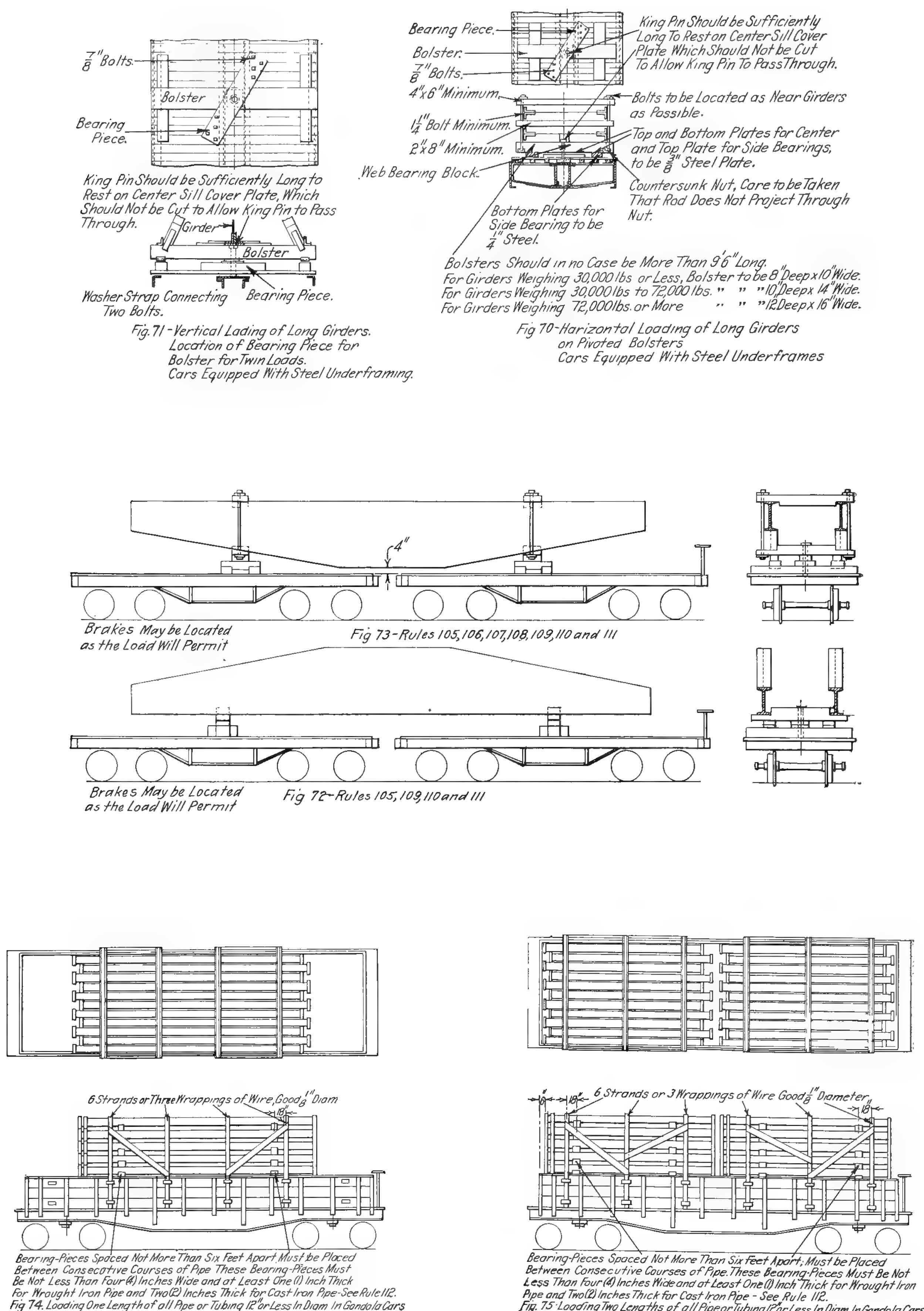
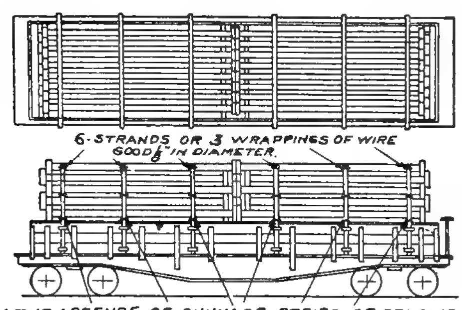


Fig. 2872 —M. C. B. Standards for Loading Long Materials.

Fig. 76.
Rules 112 and 112-A.

LOADING TWO LENGTHS OF ALL PIPE OR TUBING 20" OR LESS IN DIAMETER AND 23'-0" OR LESS IN LENGTH IN GONDOLA CARS.



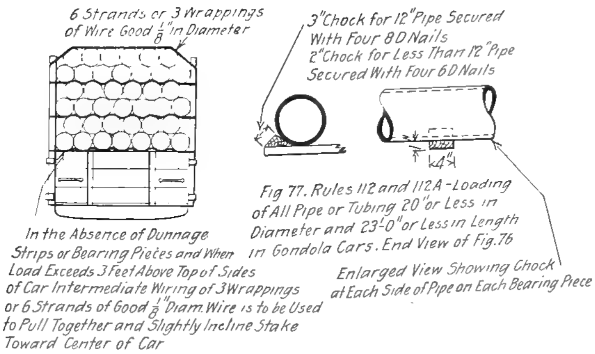


Fig 77. Rules 112 and 112A - Loading of All Pipe or Tubing 20" or Less in Diameter and 23'-0" or Less in Length in Gondola Cars. End View of Fig. 76

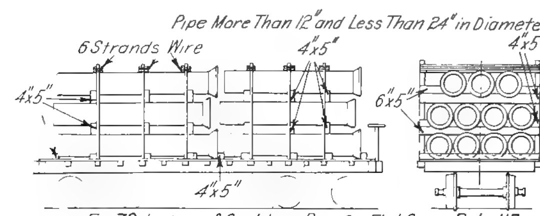


Fig 78 Lading of Cast Iron Pipe On Flat Cars. Rule 113

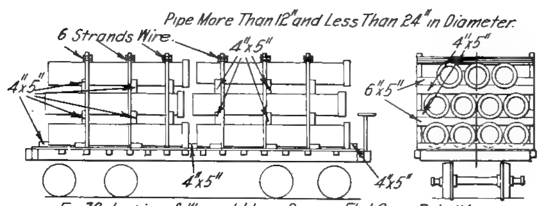


Fig. 79 - Lading of Wrought Iron Pipe on Flat Cars. Rule 114

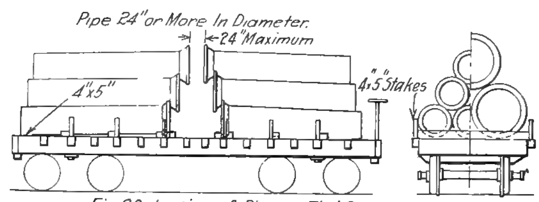


Fig. 80 - Lading of Pipe on Flat Cars. Rules 115A, 116 and 117.

Fig. 81.

MANNER OF LOADING MINING CARS AND SIMILAR VEHICLES IN GONDOLA CARS.

RULE 117-C

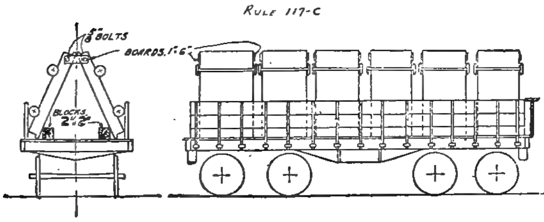


Fig. 82.

RULE 117-C
MANNER OF LOADING MINING CARS AND SIMILAR VEHICLES IN GONDOLA CARS

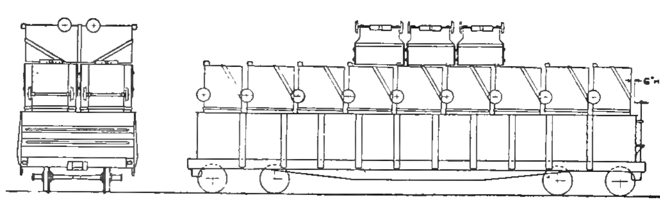
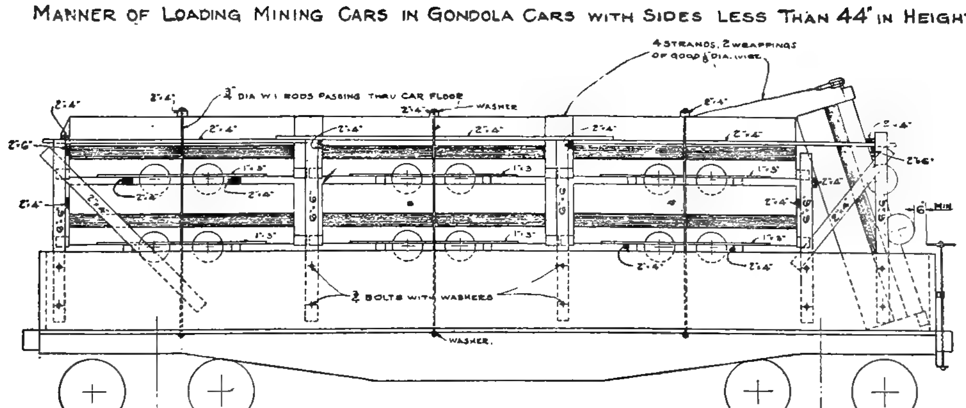


Fig. 83.
RULE 117-C
MANNER OF LOADING MINING CARS IN GONDOLA CARS WITH SIDES LESS THAN 44" IN HEIGHT.



NOTE:-
ALL TIMBERS USED TO SUPPORT LOAD MUST BE HARDWOOD.
SIZES GIVEN ARE MINIMUM.

Fig. 2873—M. C. B. Standards for Loading Long Materials.

Fig. 84.

RULE 117-C.

MANNER OF LOADING MINING CARS IN GONDOLA CARS WITH SIDES LESS THAN 44" IN HEIGHT.

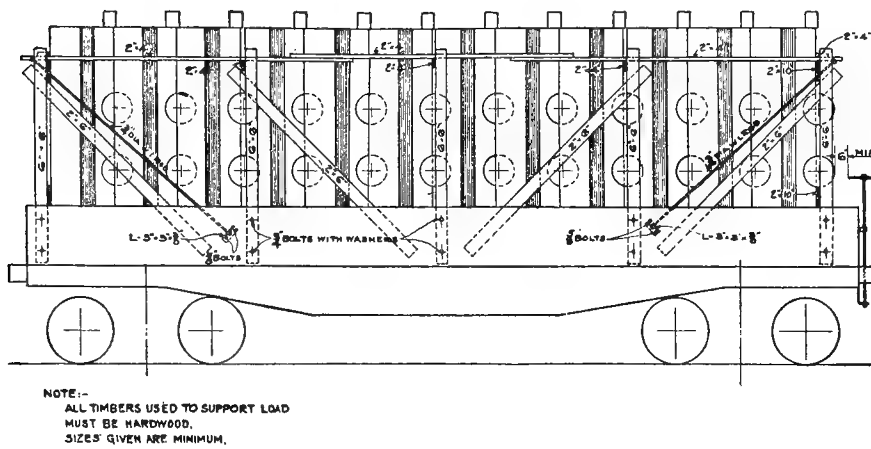


Fig. 85.

FIG. 61-E.

RULE 117-C

MANNER OF LOADING MINING CARS IN GONDOLA CARS.

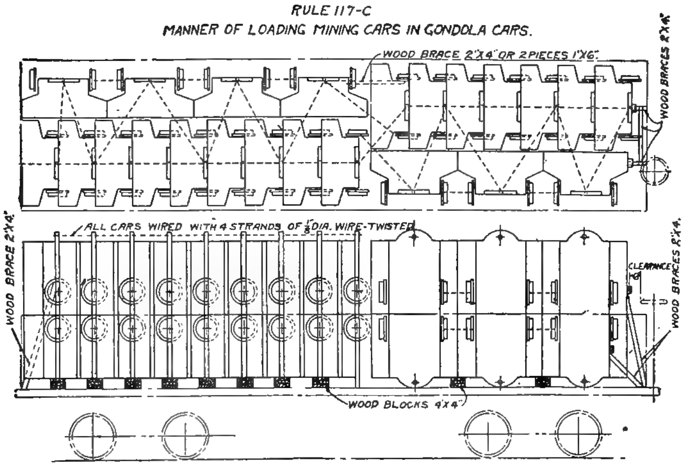


Fig. 86.

RULE 120-B

MANNER OF LOADING GRINDSTONES IN GONDOLA CARS.

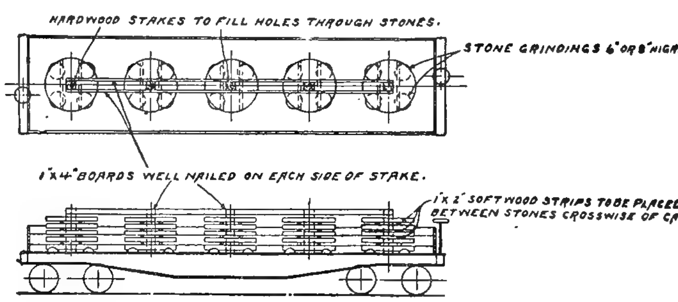


Fig. 87.

RULE 120-B

MANNER OF LOADING GRINDSTONES ON FLAT CARS.

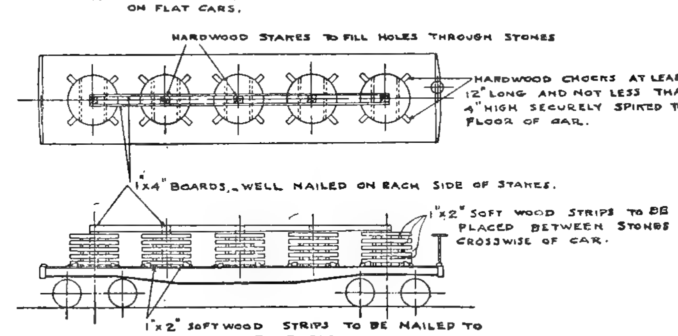


Fig. 88.

RULE 121

BOILER SHELLS & TANKS 8 FT OR LESS IN DIAMETER

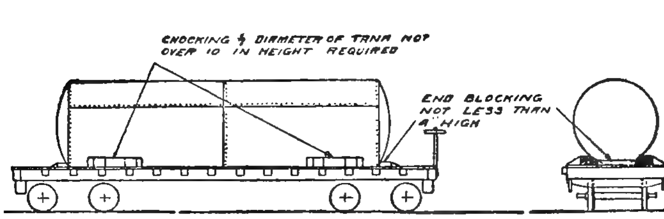


Fig. 89.

RULE 121

BOILER SHELLS & TANKS OVER 8 FT. IN DIAMETER.

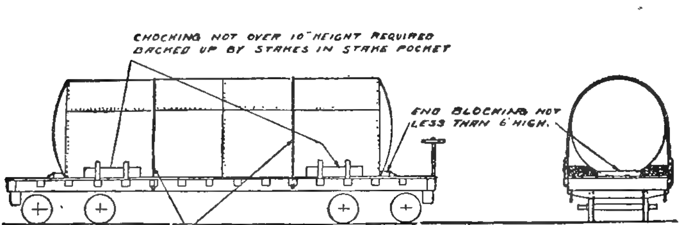


Fig. 90.

RULE 121.

SECTIONS OF BOILERS, TANKS OR SHELLS OVER 8 FEET IN DIAMETER WEIGHING LESS THAN 2500 LBS. PER SECTION.

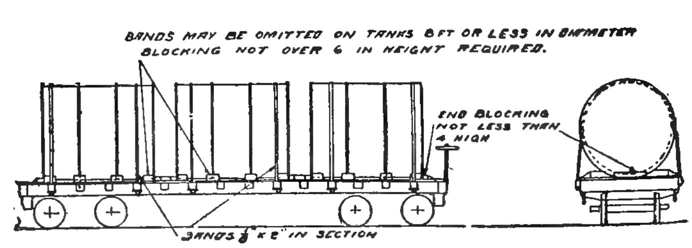


Fig. 2874—M. C. B. Standards for Loading Long Materials.

Fig. 91.
Rule 121-B.
Loading of Engines and Similar Machinery.

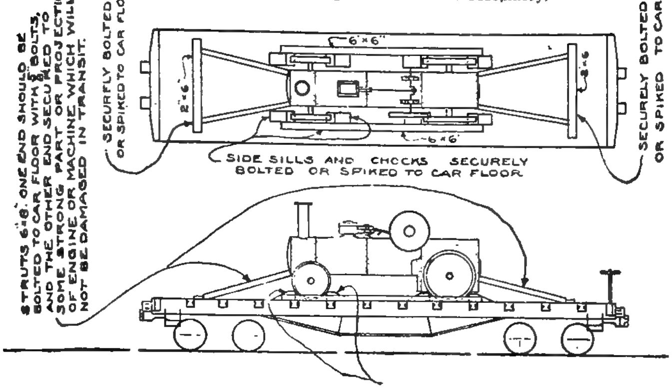


Fig. 92.
Rule-121-B
Manner of Loading Engines and Similar Machinery

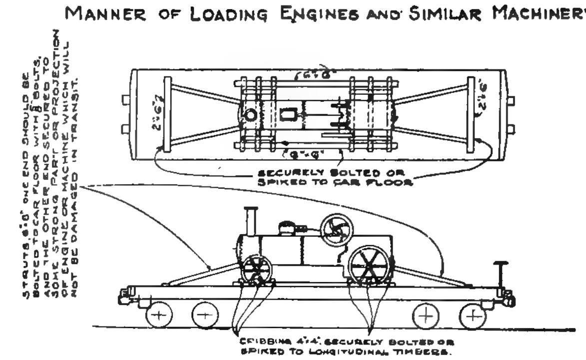


Fig. 93.
Rule 121-B.
Manner of Loading Gasoline Tractor Engines on Flat Cars

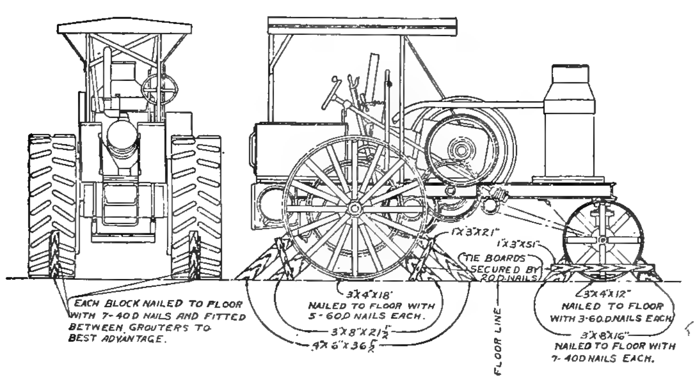


Fig. 94.
Rule 121-B
Manner of Loading Gasoline Tractor Engines on Flat Cars

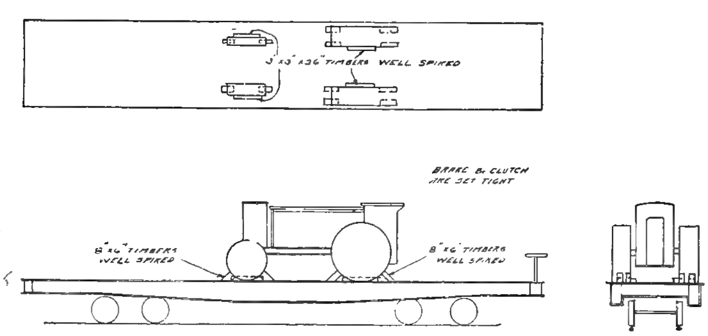


Fig. 95.
Rule 122

Lading of Plate Glass on Flat Cars.

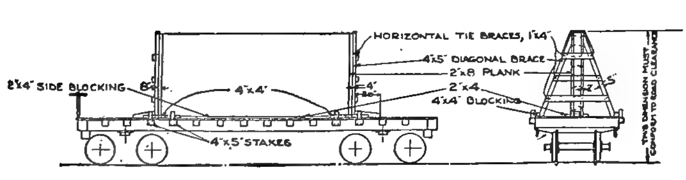


Fig. 96.
Rule 122
Manner of Loading Plate Glass on Flat or Gondola Cars.

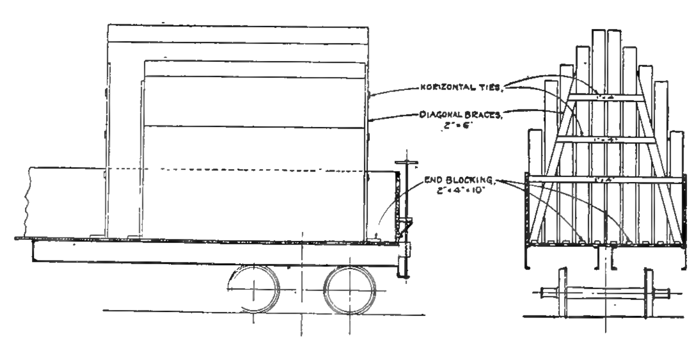


Fig. 97.
Rule 122-A.

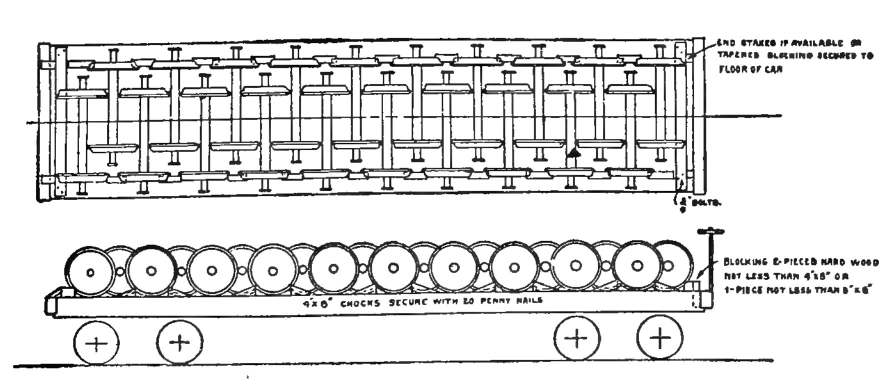


Fig. 2875—M. C. B. Standards for Loading Long Materials.

Fig. 98

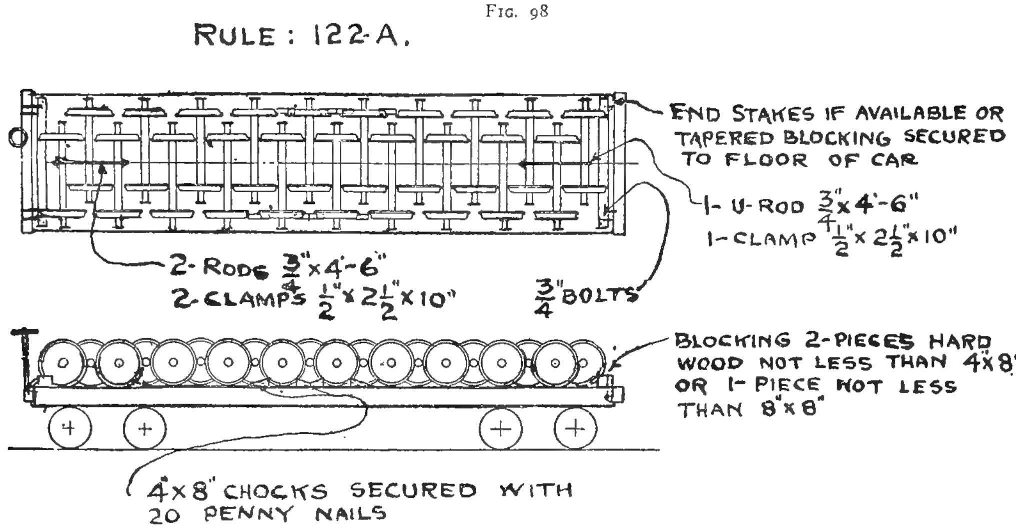
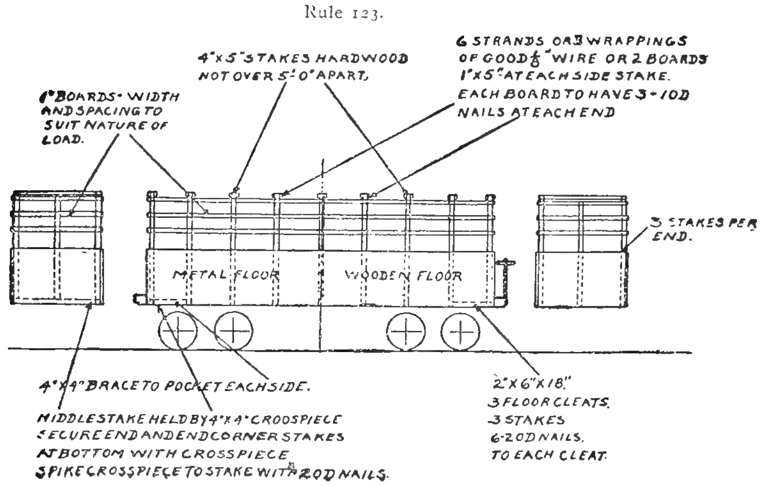


Fig. 99.
Rule 123.



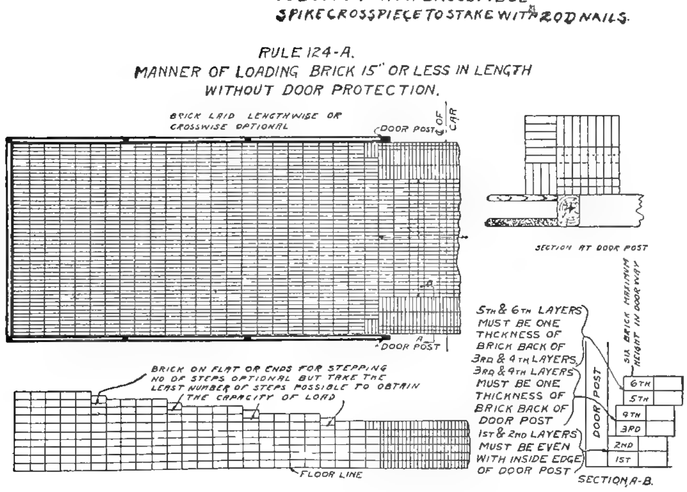


Fig. 102.

Rule 124-A.

Manner of Loading Brick when Door Protection is Required.

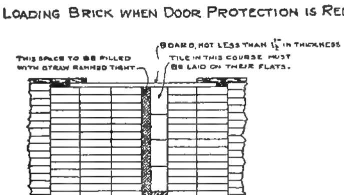
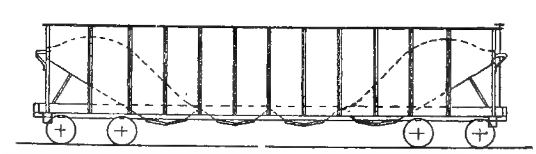


Fig. 100.

Rule 123-A.

MANNER OF LOADING IRON ORE AND SIMILAR MATERIAL.



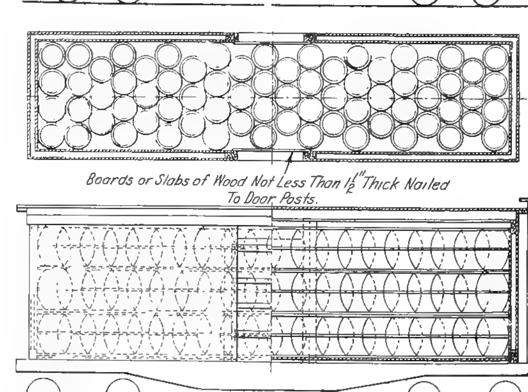


Fig 103-Manner of Loading Barrels In Box or Stock Cars. Rule 125

Fig. 2876 –M. C. B. Standards for Loading Long Materials.

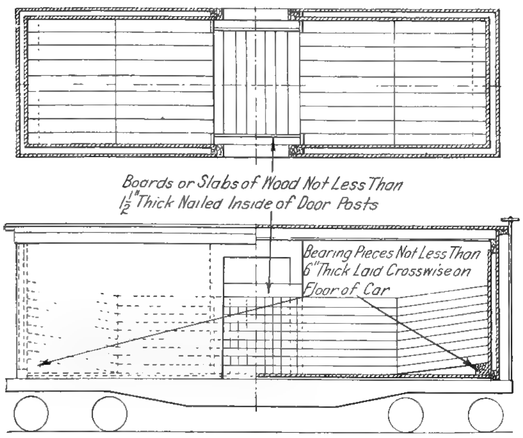
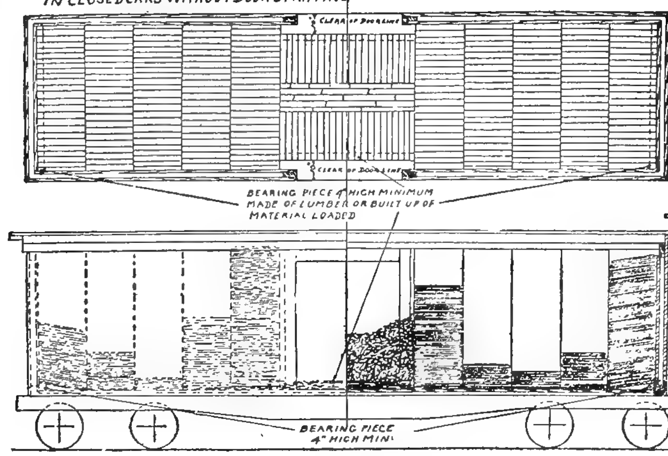
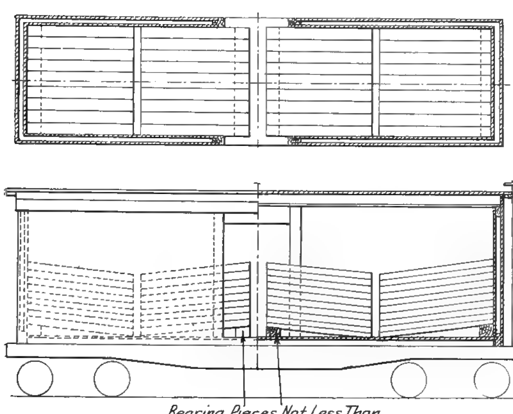


Fig. 104-Manner of Loading Ties, Fence Posts, Wooden Billets, Barrel Staves and Similar Short Wood In Closed Cars. Rule 126

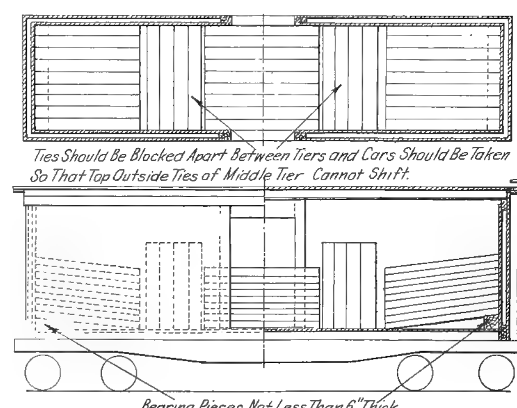
FIG. 105.
"RULE 126"
MANNER OF LOADING STAVES-FENCE POSTS-LATH-TAN BARK AND SIMILAR MATERIAL IN CLOSED CARS WITHOUT DOOR STRIPPING





Rule-126

Fig. 106-Manner of Loading Four Piles of Ties in Closed Cars.



Rule-126

Fig. 107-Manner of Loading Three Piles of Ties in Closed Cars

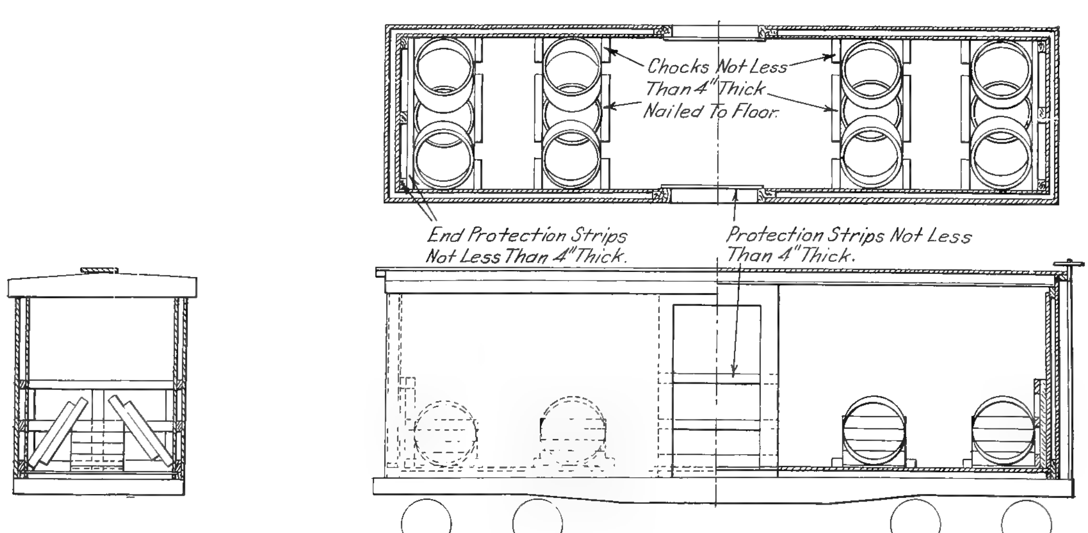


Fig. 108- Manner of Loading Tires In Box or Stock Cars. Rule 128

Fig. 2877—M. C. B. Standards for Loading Long Materials.

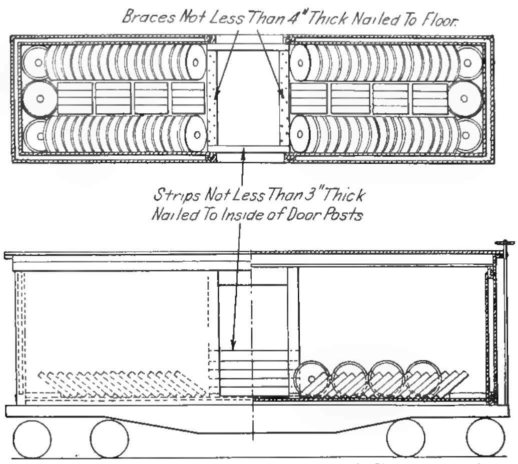


Fig.109-Manner of Loading Wheels In Closed Cars. Rule 129

FIG. 111.
RULE 132-A
MANNER OF LOADING
DRAIN TILE, 8" IN DIAMETER AND UNDER.

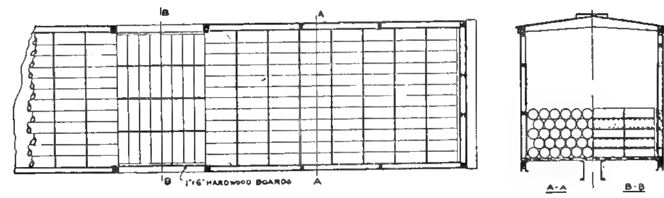


FIG. 113.
RULE 132-A.
MANNER OF LOADING DRAIN TILE 30" IN DIA. AND OVER.

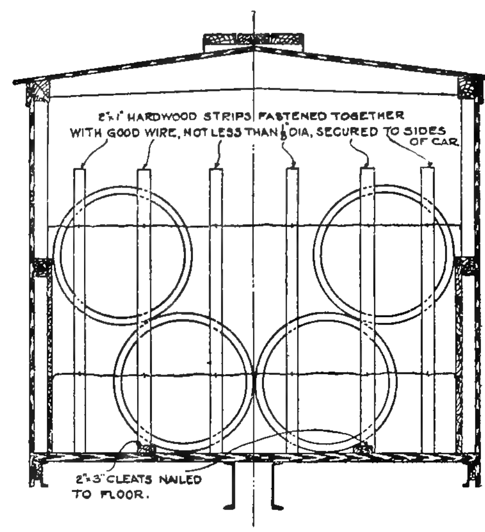
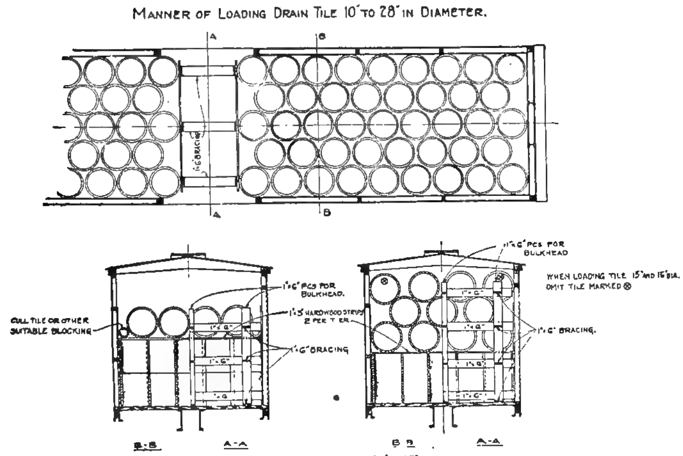


FIG. 112.
RULE 132-A.
MANNER OF LOADING DRAIN TILE 10" TO 28" IN DIAMETER.



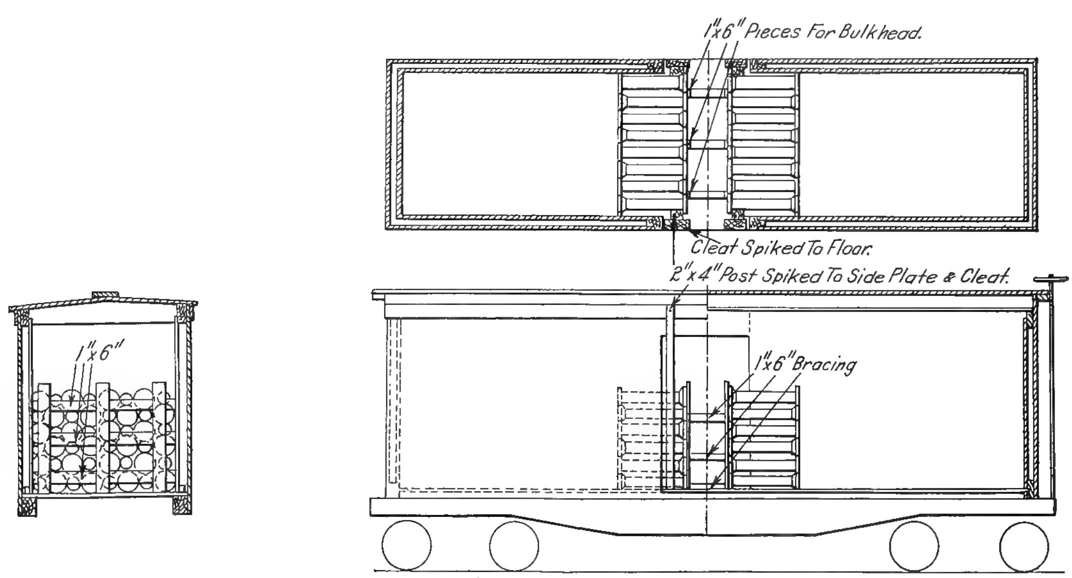


Fig.110-Manner of Loading Sewer Pipe In Closed Cars. Rule 132

Fig. 2878—M. C. B. Standards for Loading Long Materials.

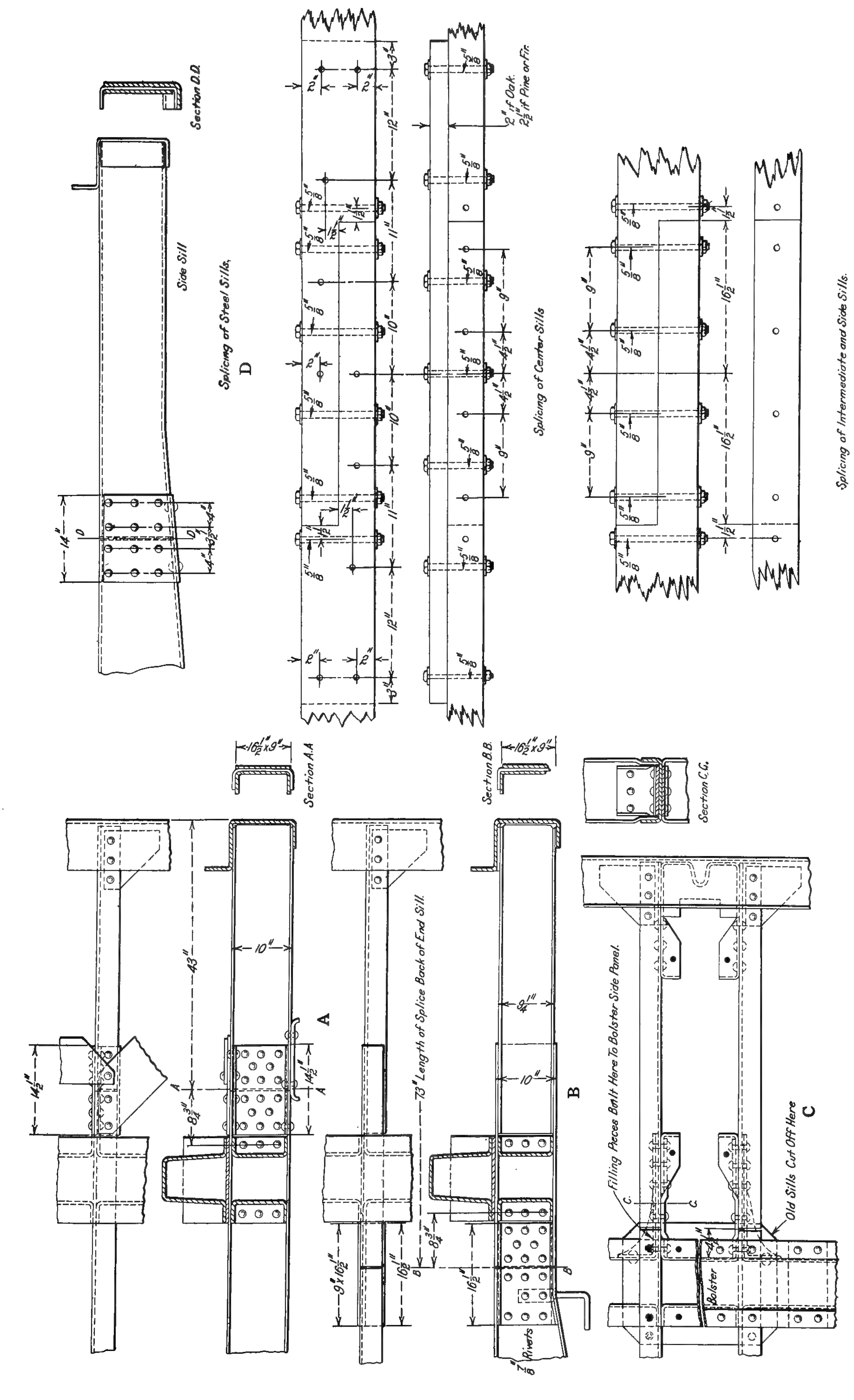
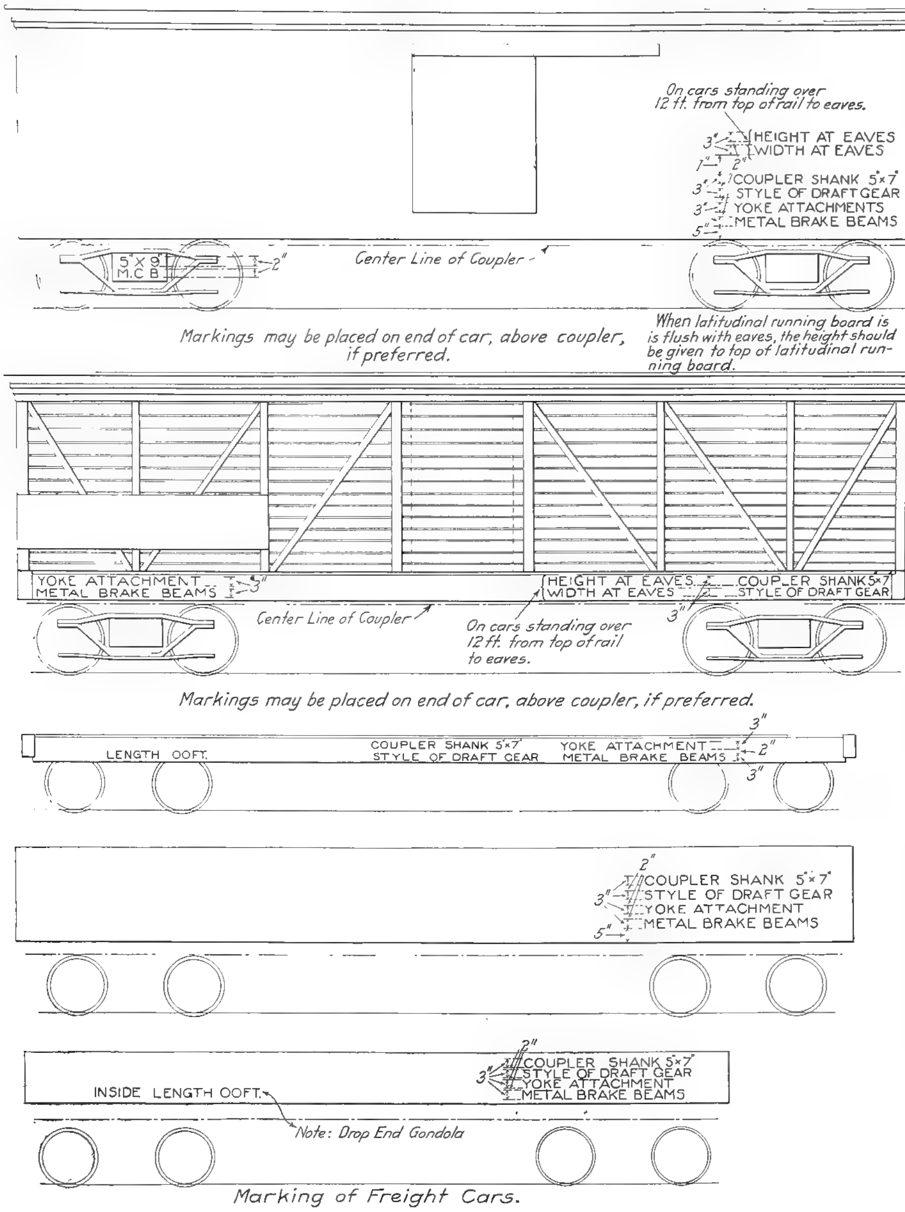


Fig. 2879—M. C. B. Standard Splicing for Steel and Wooden Sills. (M. C. B. Sheet 28.)



Box cars more than 12 feet from top of rail to eaves to show height and width of eaves near bottom of side of car.

Size of coupler, style of rear attachments, kind of draft gear and style of brake beams (wood or metal) to be shown on side of car at end, or on end of car above coupler.

Truck bolsters to show size of journal and letters "M.C.B." If M.C.B. axles are used, or distance c. to c. of journal, if axles are not M.C.B.

Initials of road on one side of truck bolster on truck transom.

Stock cars more than 12 ft. from top of rail to eaves, to show height and width at eaves on outside of side sills.

Style of coupler, style of draft gear, style of rear attachments, kind of brake beam (wood or metal) to be stenciled on outside of side sills, or on end of car above coupler.

Truck bolsters to show size of journal and letters "M.C.B." if M.C.B. axles are used, or distance c. to c of journals if axles are not M.C.B.

Initials of road on one side of truck bolster or truck transom.

When latitudinal running board is flush with eaves, the height should be given to top of latitudinal running board.

Size of coupler, style of rear attachments, kind of draft gear and style of brake beams (wood or metal) to be shown on side of car at end or on end of car above coupler.

Truck bolsters to show size of journal and letters "M.C.B." if M.C.B. axles are used, or the distance c. to c. of journals if axles are not M.C.B.

Initials of road on one side of truck bolster or truck transom.

Fig. 2880—M. C. B. Standard Marking for Freight Cars. (M. C. B. Sheet 26.)

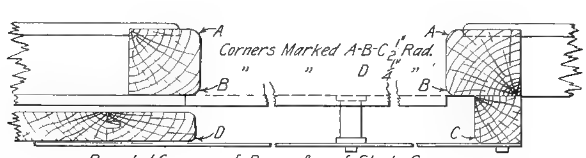
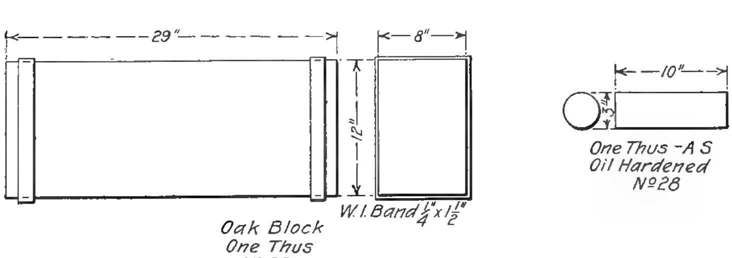


Fig. 2880A—M. C. B. Recommended Practice for Rounded Corners of Doors, etc., of Stock Cars. (M. C. B. Sheet F.)



List of Bolts for Jerk Test

No. of Bolt	No. Used	Diam.	Length	Remarks
28	1	1 1/2"	22 1/4"	Sq. Hd 2 7/16 Across Flats
29	2	7/8"	3 1/8"	
30	4	7/8"	3"	Turn Tapered
31	2	15/16	9 1/2"	
32	2	7/8"	3 1/2"	Tap Bolts

Fig. 2881—Details for Standard Jerk Test for M. C. B. Couplers. (M. C. B. Sheet 29A.)
See Figs. 2882-2884.

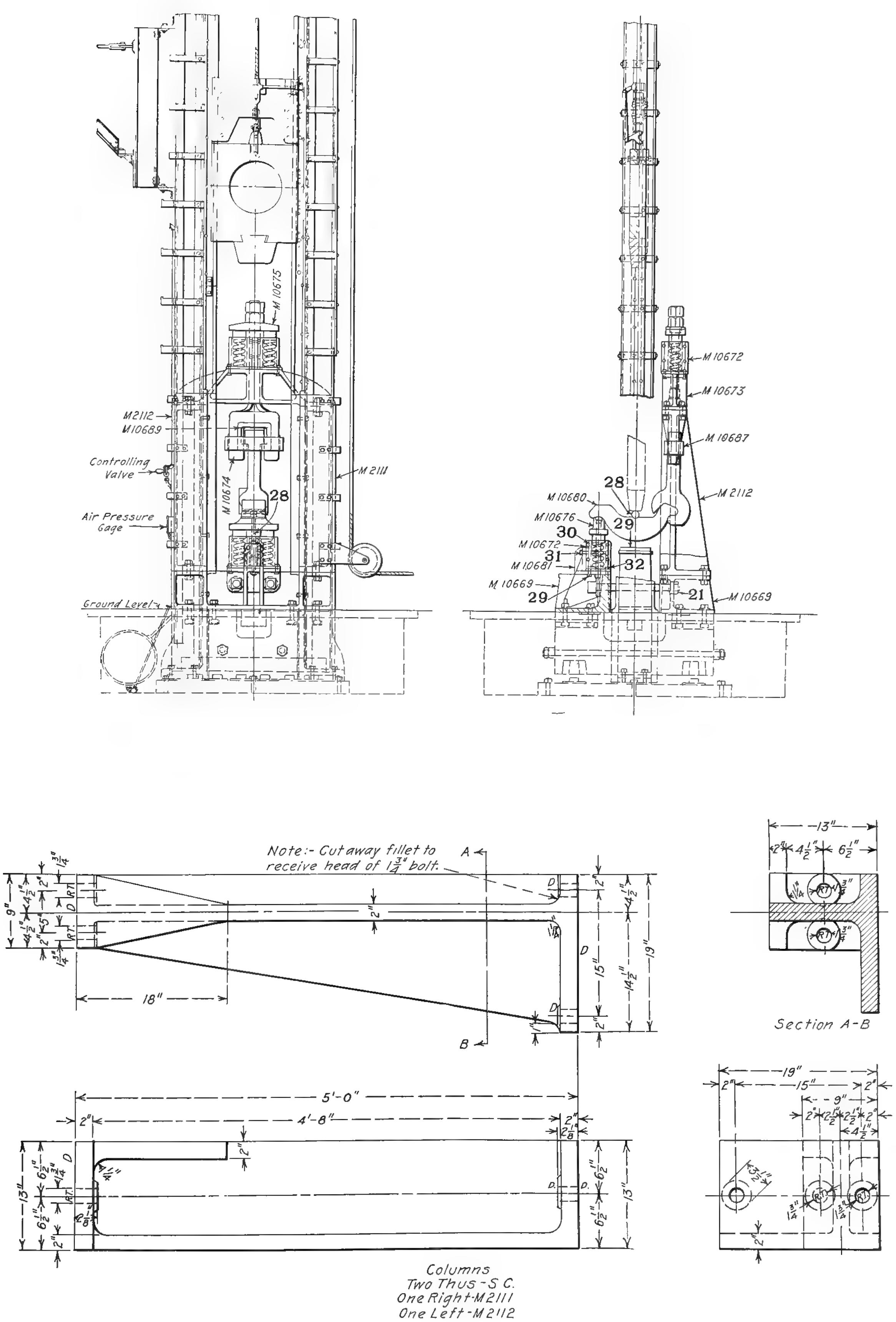


Fig. 2882—Details for Standard Jerk Test for M. C. B. Couplers. (M. C. B. Sheet 29A.)
See Figs. 2881-2884.

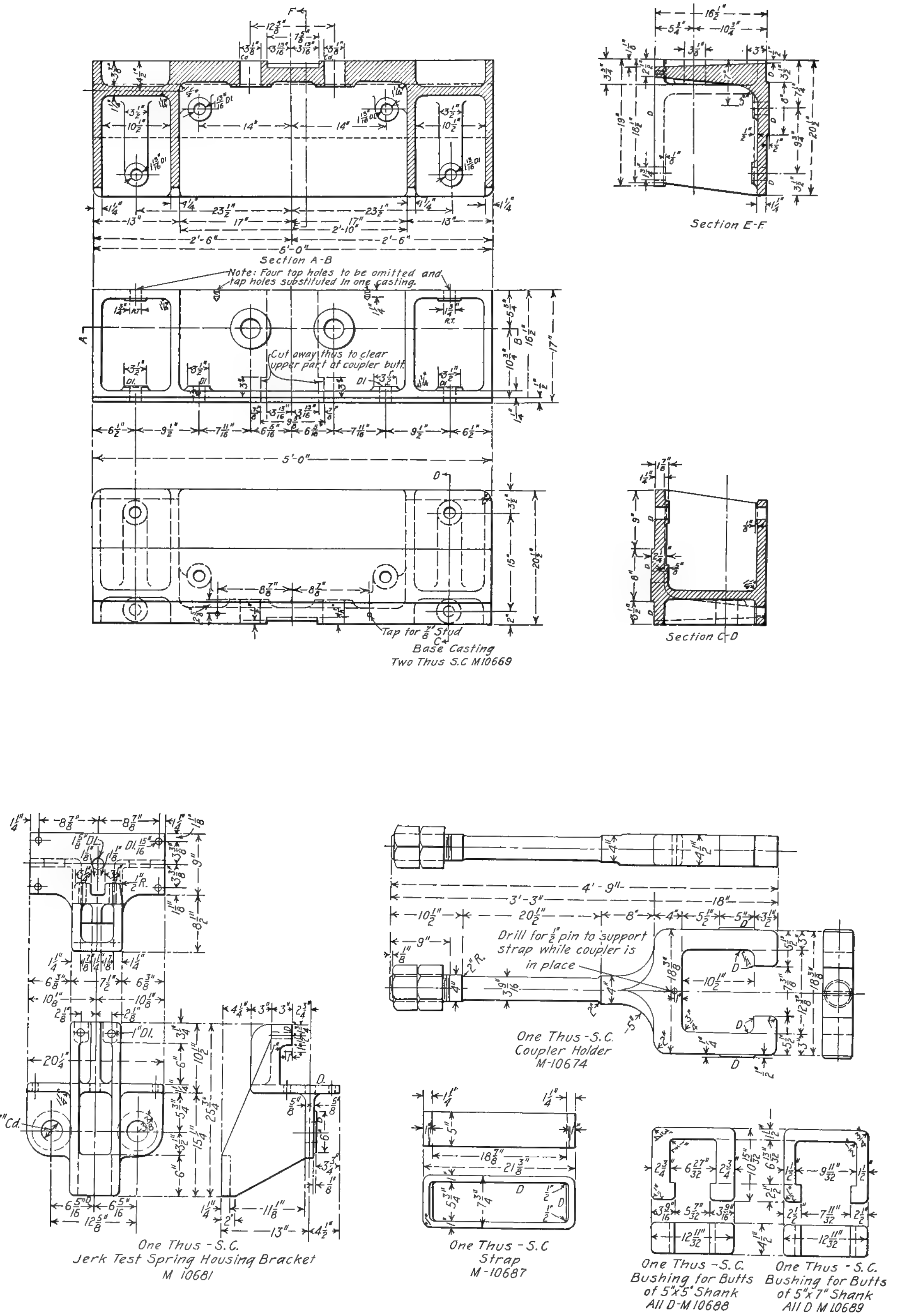


Fig. 2883—Details for Standard Jerk Test for M. C. B. Couplers. (M. C. B. Sheets 29A and 29B.) See Figs. 2881-2884.

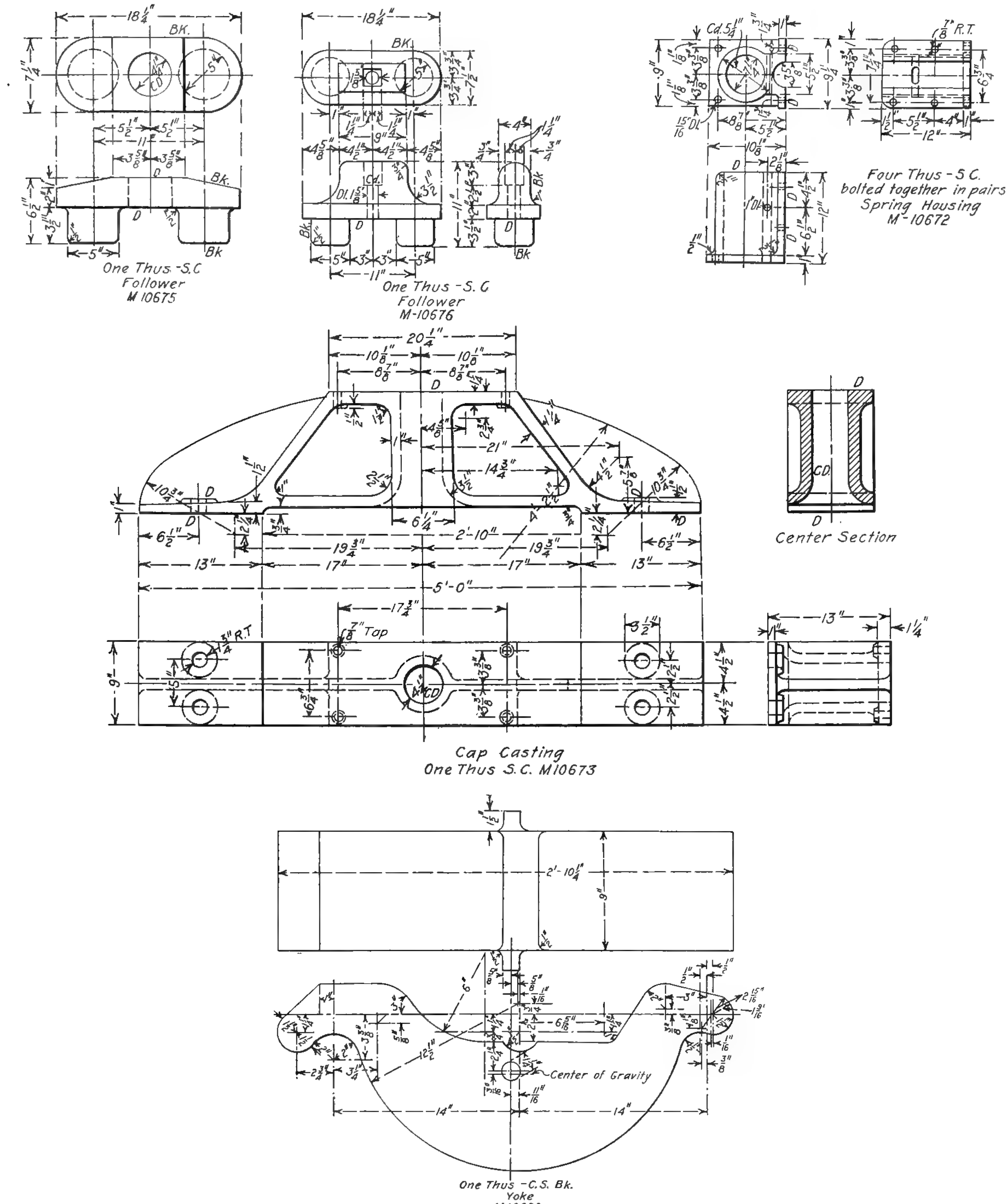


Fig. 2884—Details for Standard Jerk Test for M. C. B. Couplers. (M. C. B. Sheets 29A and 29B.) See Figs. 2881-2884.

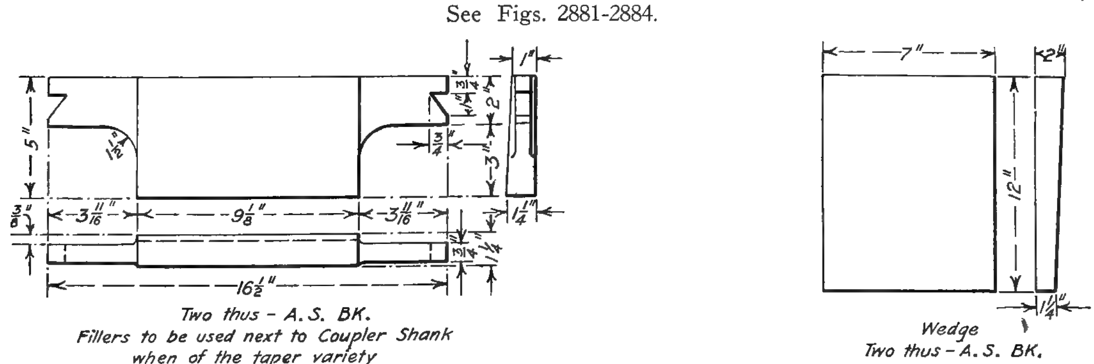
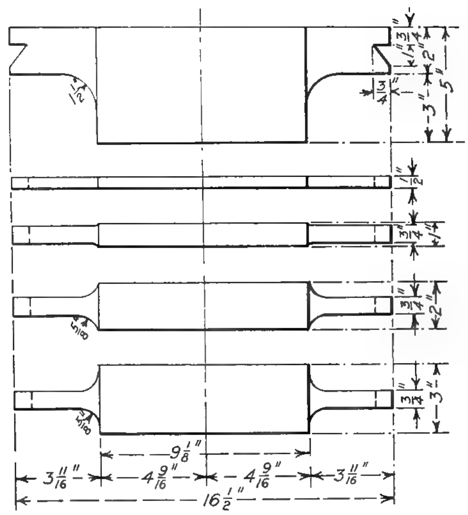
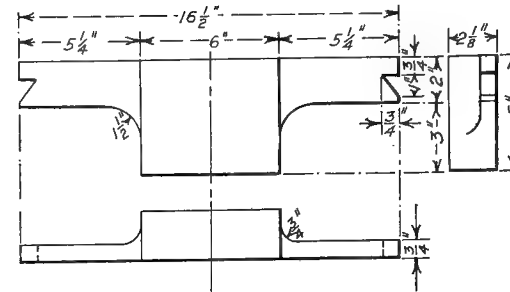


Fig. 2885—Details for Standard Striking Test for M. C. B. Couplers. (M. C. B. Sheet 29B.) See also Fig. 2886.

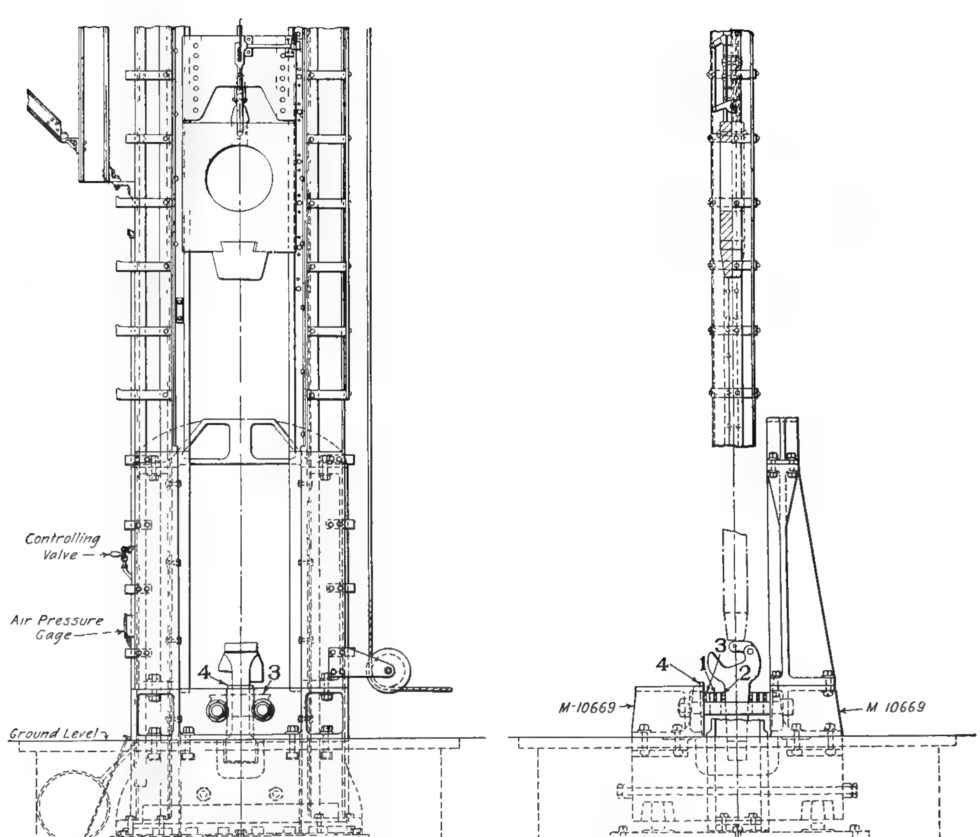


Coupler Wedging Blocks-A. S. BK.
Three of each
No. 1



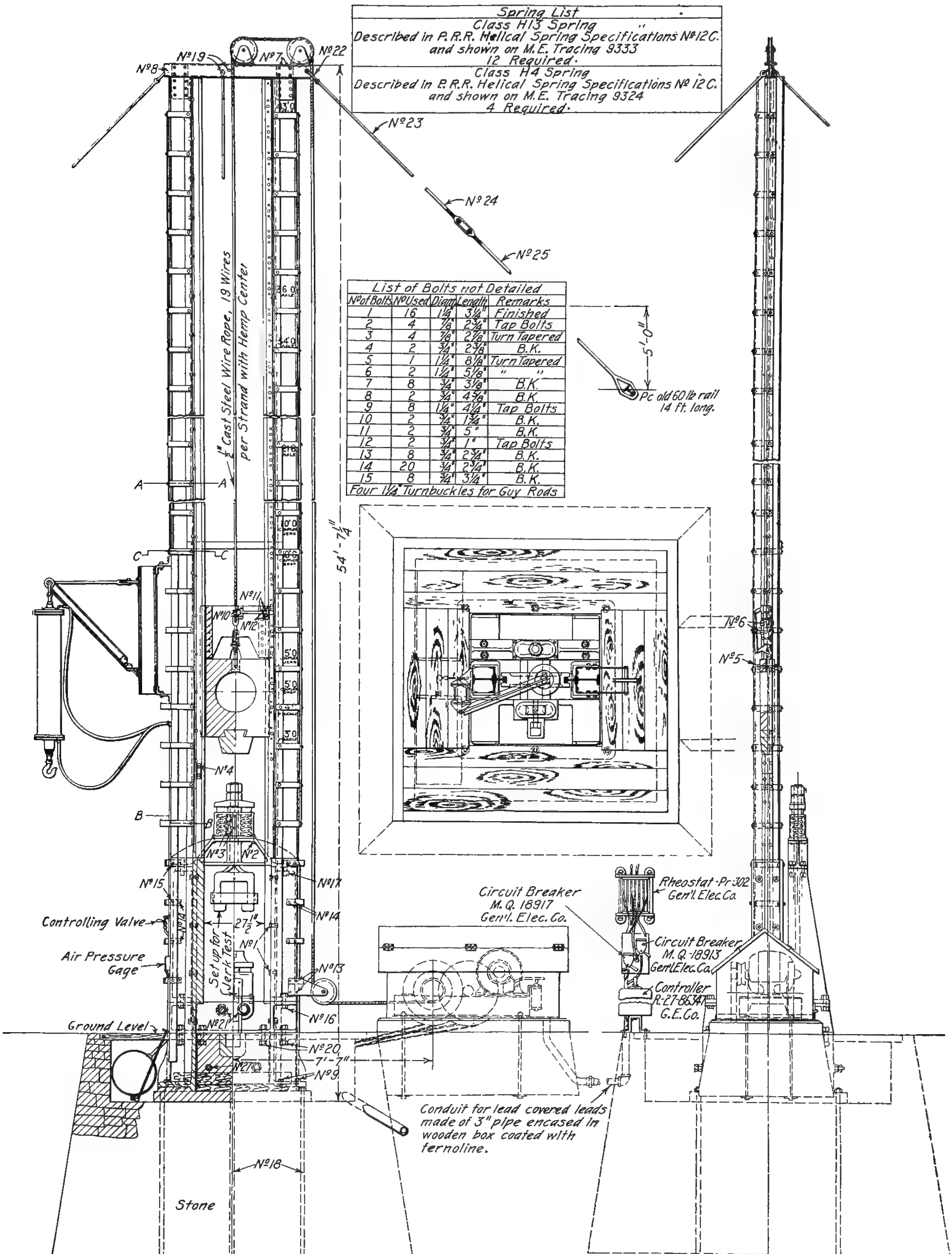
One thus - A. S. BK.
Filler to be used next to Wedge
No. 3

Note. For detail of Casting
M. 10669 see



Striking Test

Fig. 2886—Details for Standard Striking Test for M. C. B. Couplers. (M. C. B. Sheet 29B.) See also Fig. 2885.



Spring List
Class H13 Spring Described in P. R.R. Helical Spring Specifications Nº 12 C. and shown on M.E. Tracing 9333 12 Required.
Class H4 Spring Described in P. R.R. Helical Spring Specifications Nº 12 C. and shown on M.E. Tracing 9324 4 Required.

List of Bolts not Detailed

Nº of Bolts	Nº Used	Diam.	Length	Remarks
1	16	1¼"	3¼"	Finished
2	4	⅞"	2¾"	Tap Bolts
3	4	⅞"	2⅞"	Turn Tapered
4	2	¾"	2⅜"	B.K.
5	1	1¼"	8⅛"	Turn Tapered
6	2	1¼"	5⅛"	" "
7	8	¾"	3⅛"	B.K.
8	2	¾"	4⅝"	B.K.
9	8	1¼"	4¼"	Tap Bolts
10	2	¾"	1¾"	B.K.
11	2	¾"	5"	B.K.
12	2	¾"	1"	Tap Bolts
13	8	¾"	2¾"	B.K.
14	20	¾"	2¾"	B.K.
15	8	¾"	3¼"	B.K.
Four 1¼" Turnbuckles for Guy Rods				

Fig. 2887—General Arrangement for M. C. B. Standard Drop Test Machine for M. C. B. Couplers and Axles. (M. C. B. Sheet 29.)

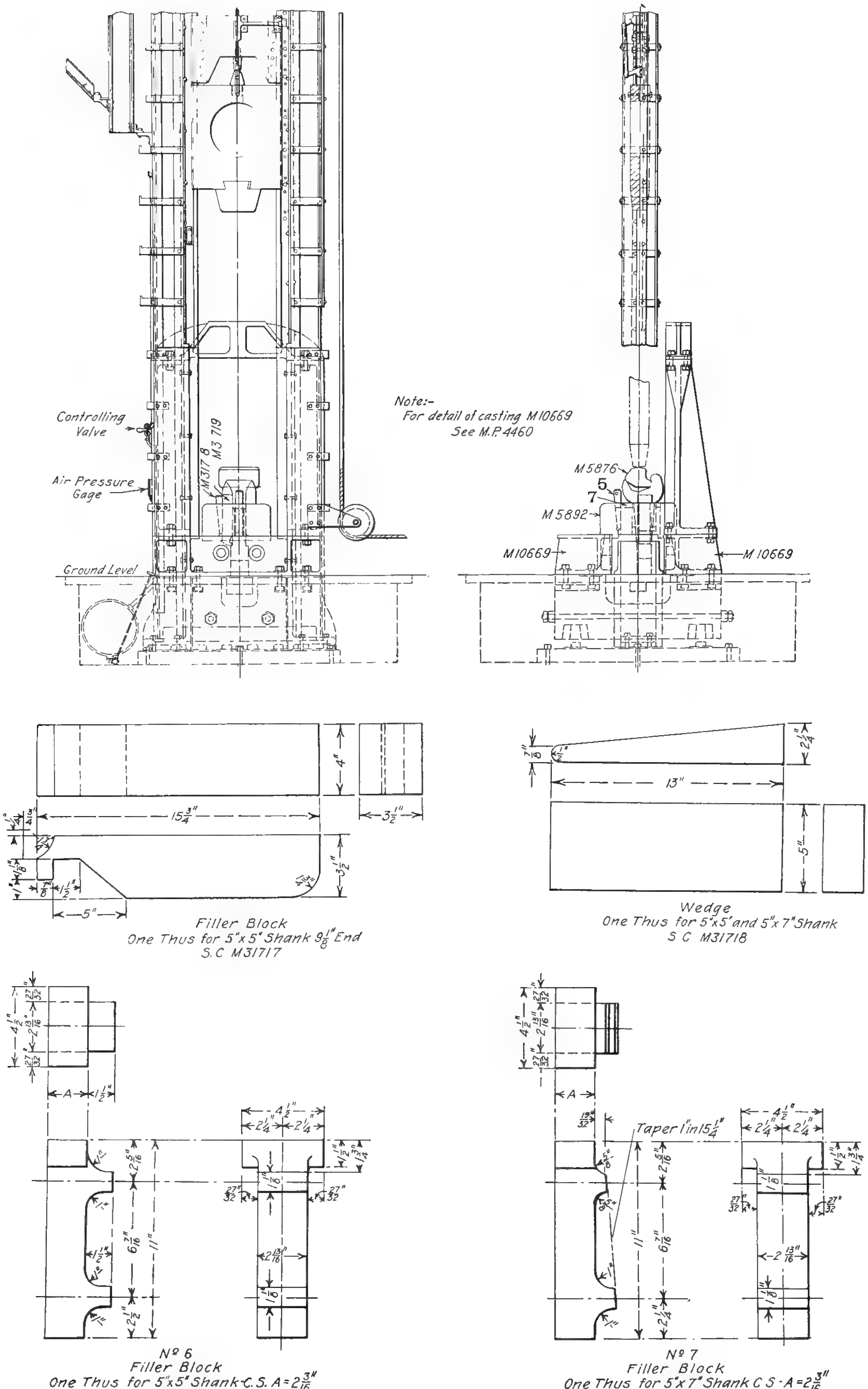


Fig. 2888—Details for Standard Face Test for M. C. B. Couplers. (M. C. B. Sheet 29C.) See also Fig. 2889.

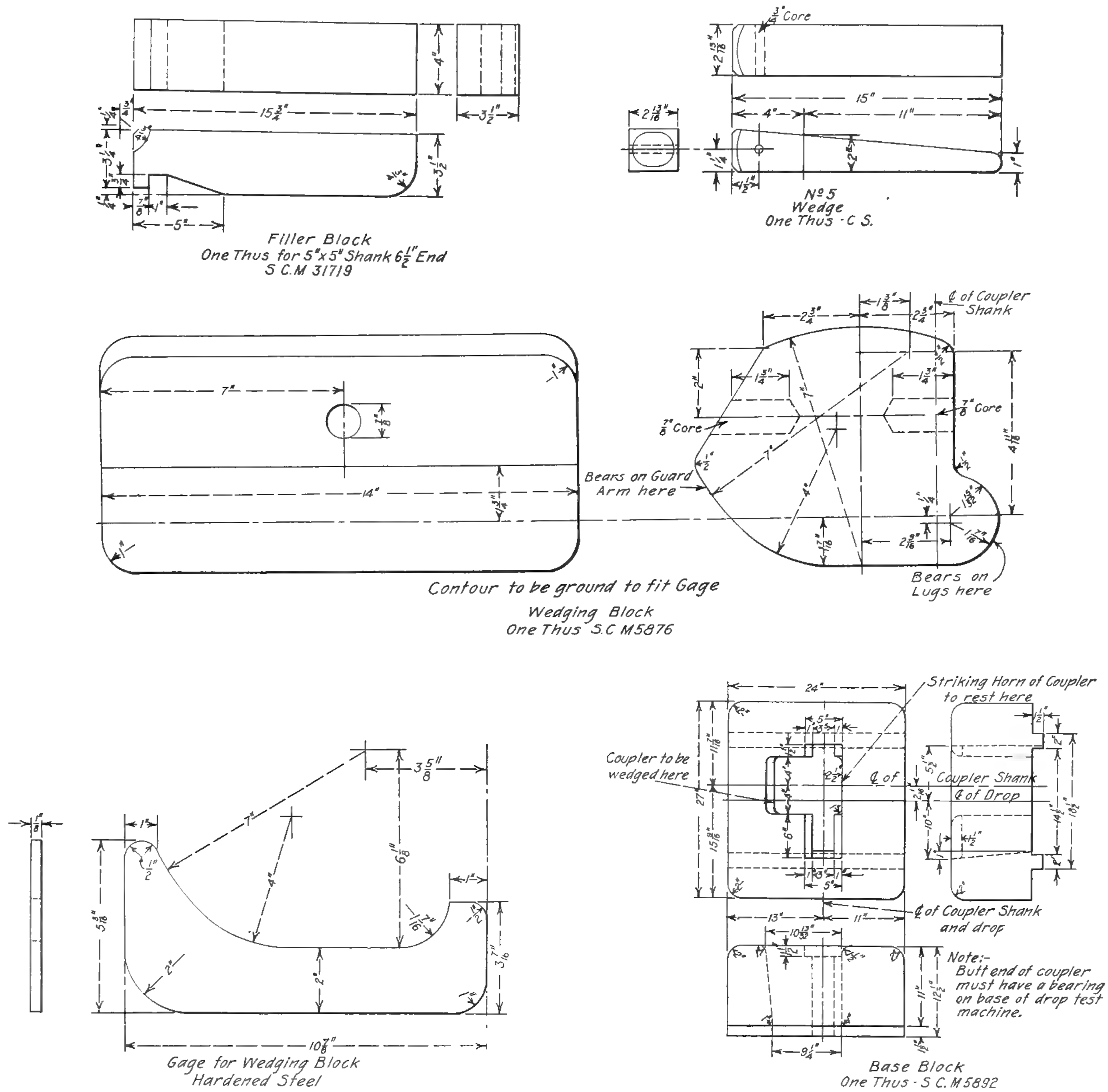


Fig. 2889—Details for Standard Face Test for M. C. B. Couplers. (M. C. B. Sheet 29C.) See also Fig. 2888.

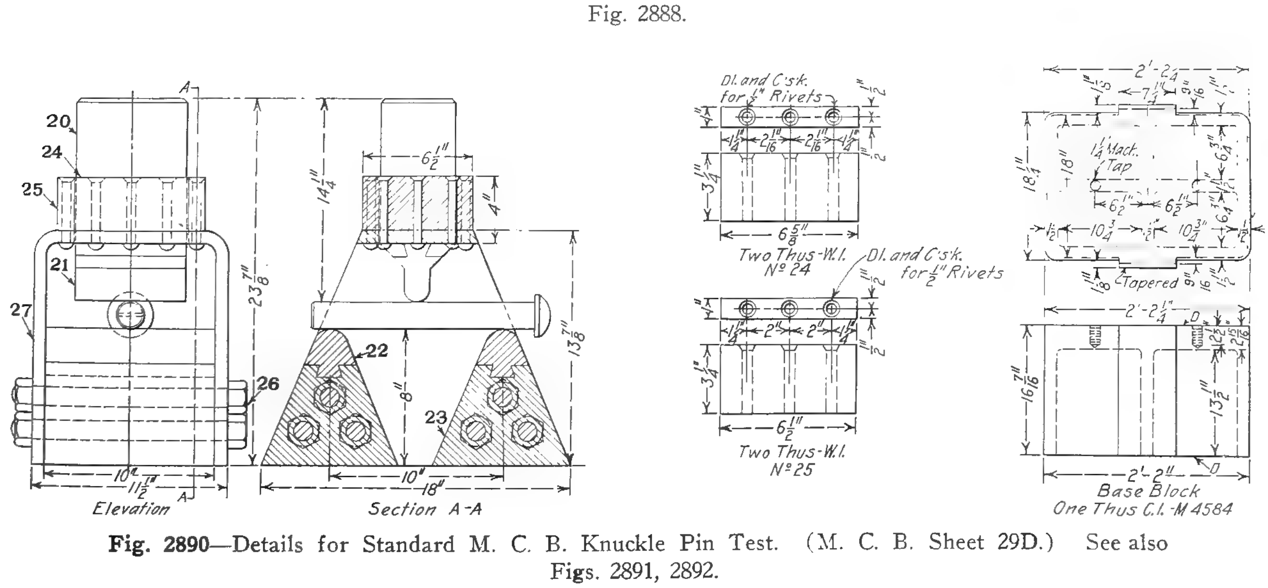
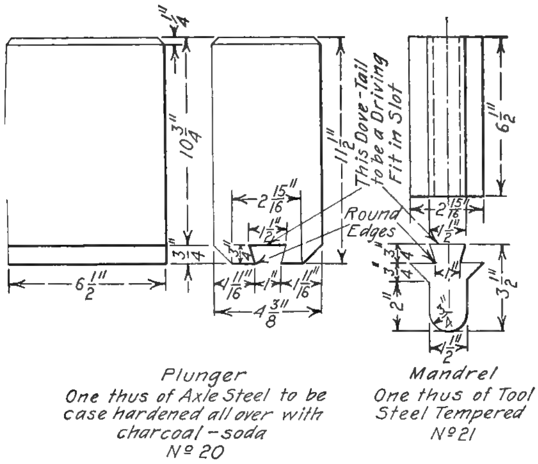
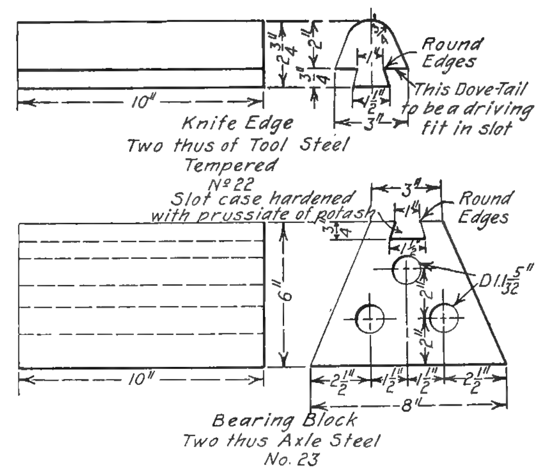
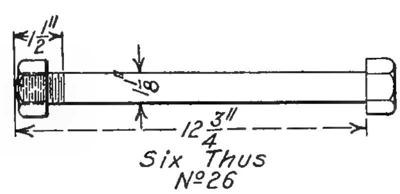


Fig. 2890—Details for Standard M. C. B. Knuckle Pin Test. (M. C. B. Sheet 29D.) See also Figs. 2891, 2892.







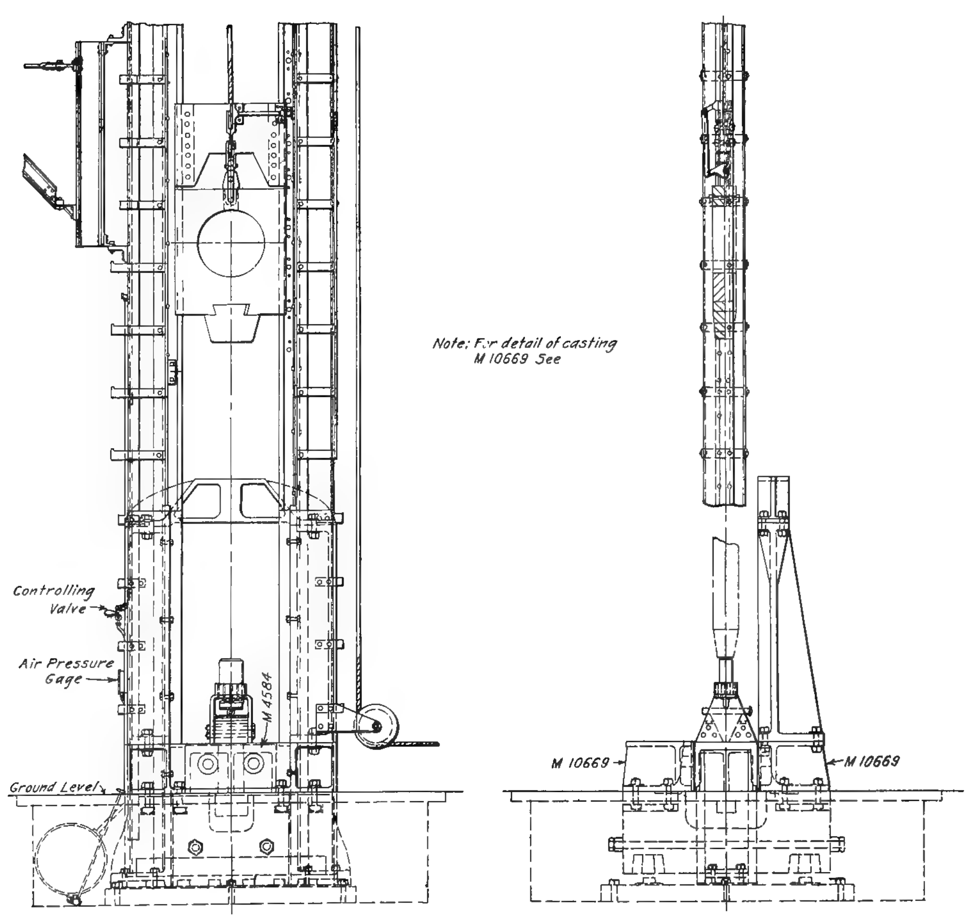


Fig. 2891—Details for Standard M. C. B. Knuckle Pin Test. (M. C. B. Sheet 29D.) See also Figs. 2890, 2892.

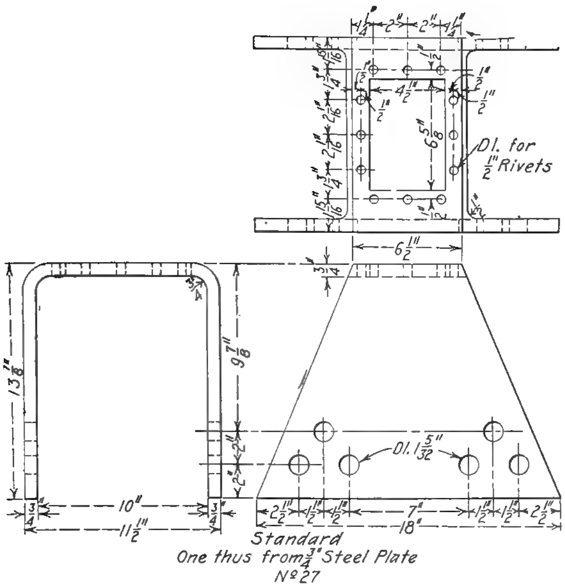


Fig. 2892—Details for Standard M. C. B. Knuckle Pin Test. (M. C. B. Sheet 29D.) See also Figs. 2890, 2891.

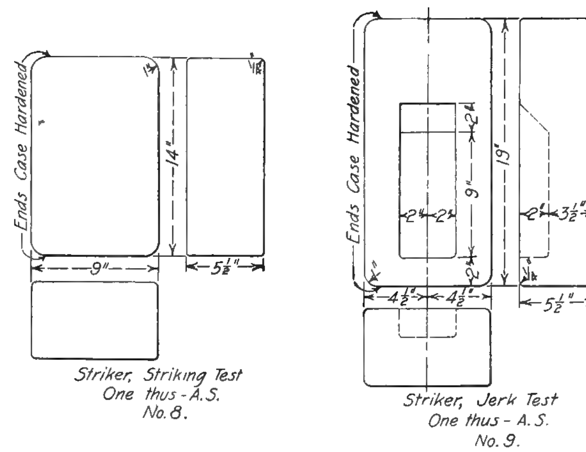


Fig. 2893—Details for M. C. B. Standard Separate Knuckle Test. (M. C. B. Sheet 29E.) See also Figs. 2894, 2895.

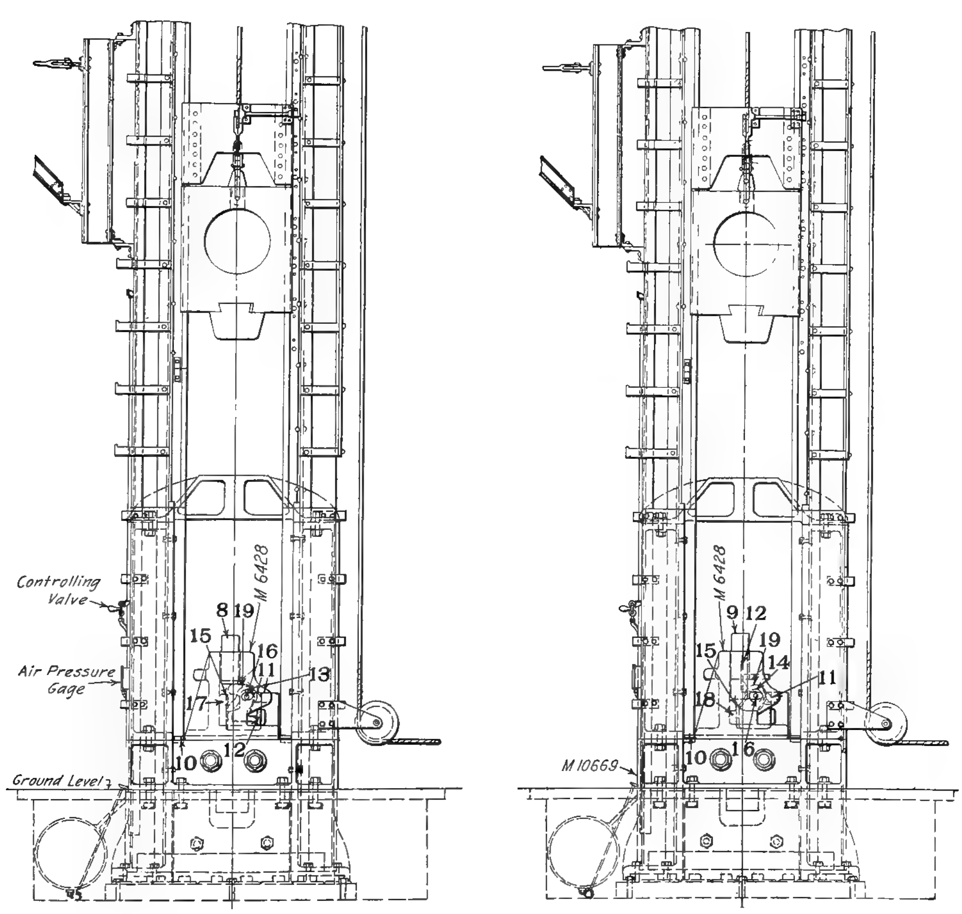


Fig. 2894—Details for M. C. B. Standard Separate Knuckle Test. (M. C. B. Sheet 29E.) See also Figs. 2893, 2894.

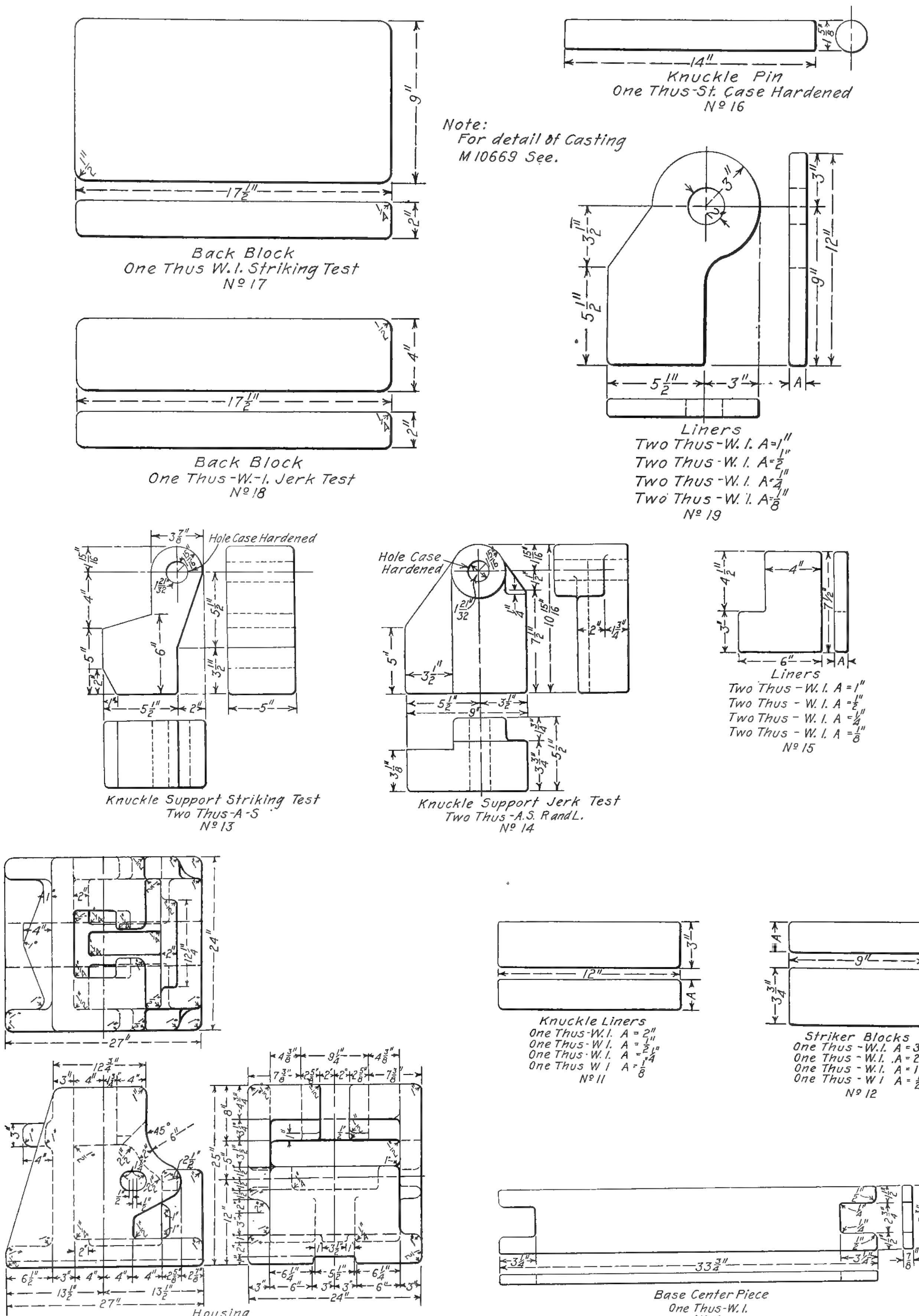


Fig. 2895—Details for M. C. B. Standard Separate Knuckle Test. (M. C. B. Sheet 29E.) See also Figs. 2893, 2894.

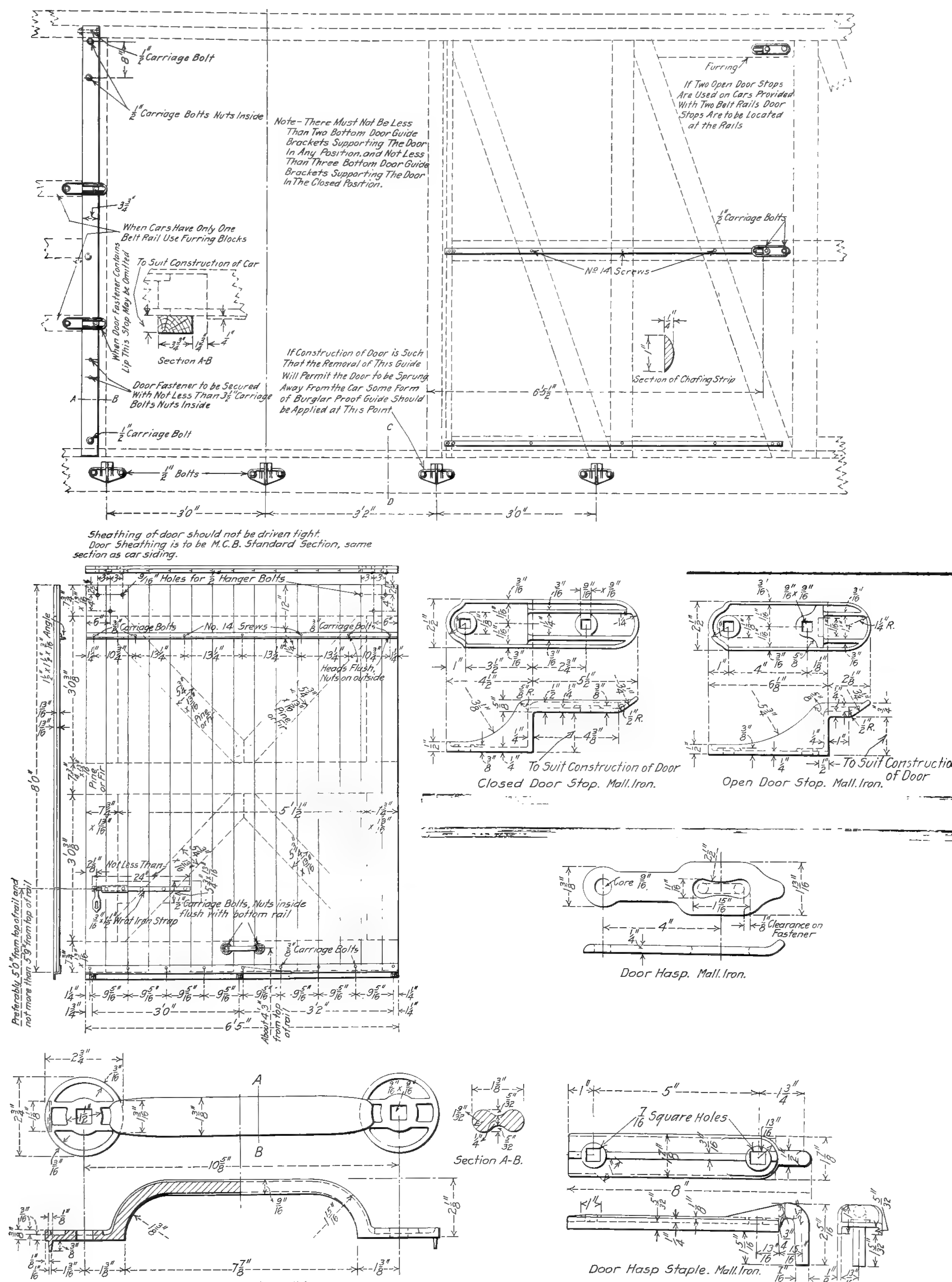


Fig. 2896—M. C. B. Standard Outside Hung Box Car Side Door and Details. (M. C. B. Sheet 30.) See also Fig. 2897.

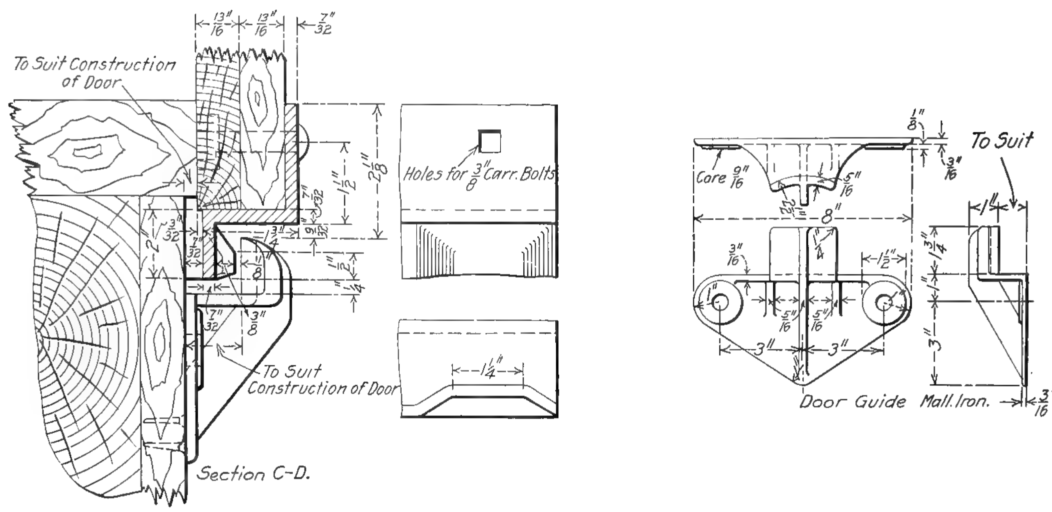


Fig. 2897—Details for M. C. B. Standard Outside Hung Box Car Side Door. (M. C. B. Sheet 30.) See also Fig. 2896.

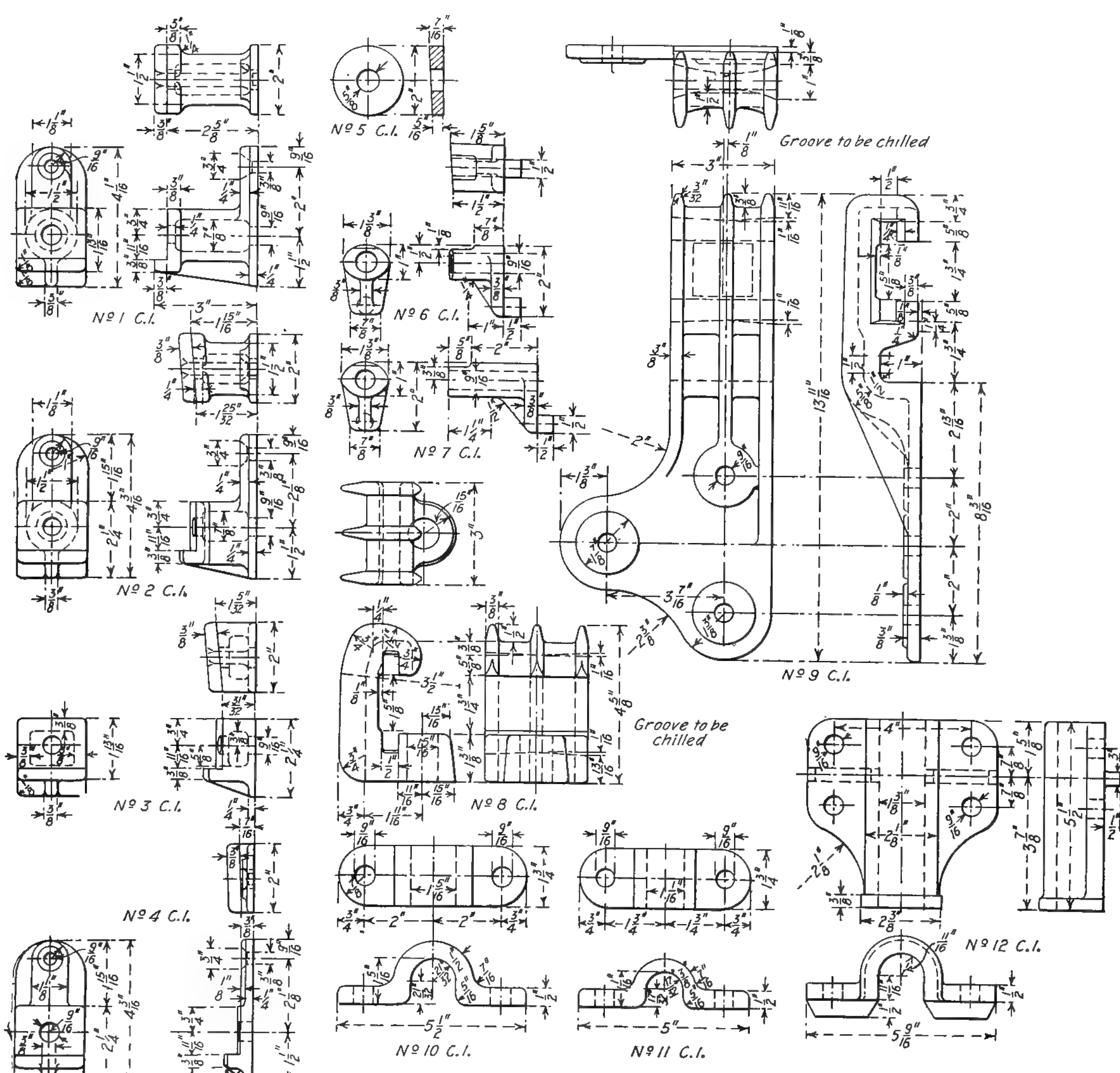


Fig. 2898—Details for M. C. B. Standard Flush Side Door for Box Cars. (M. C. B. Sheet 30A.) See also Figs. 2899, 2900.

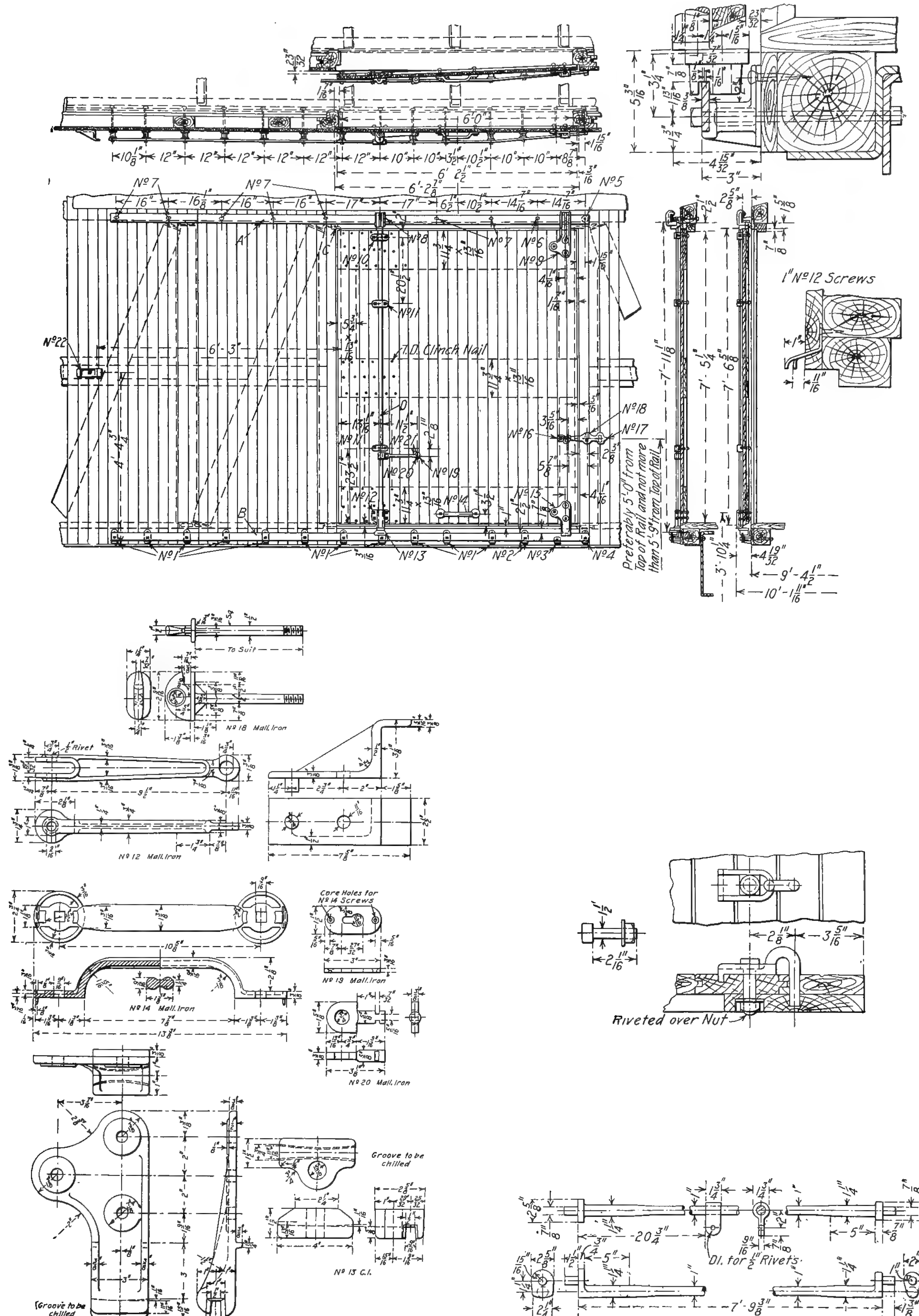


Fig. 2899—M. C. B. Standard Flush Side Door and Details for Box Cars. (M. C. B. Sheet 30A.) See also Figs. 2898, 2900.

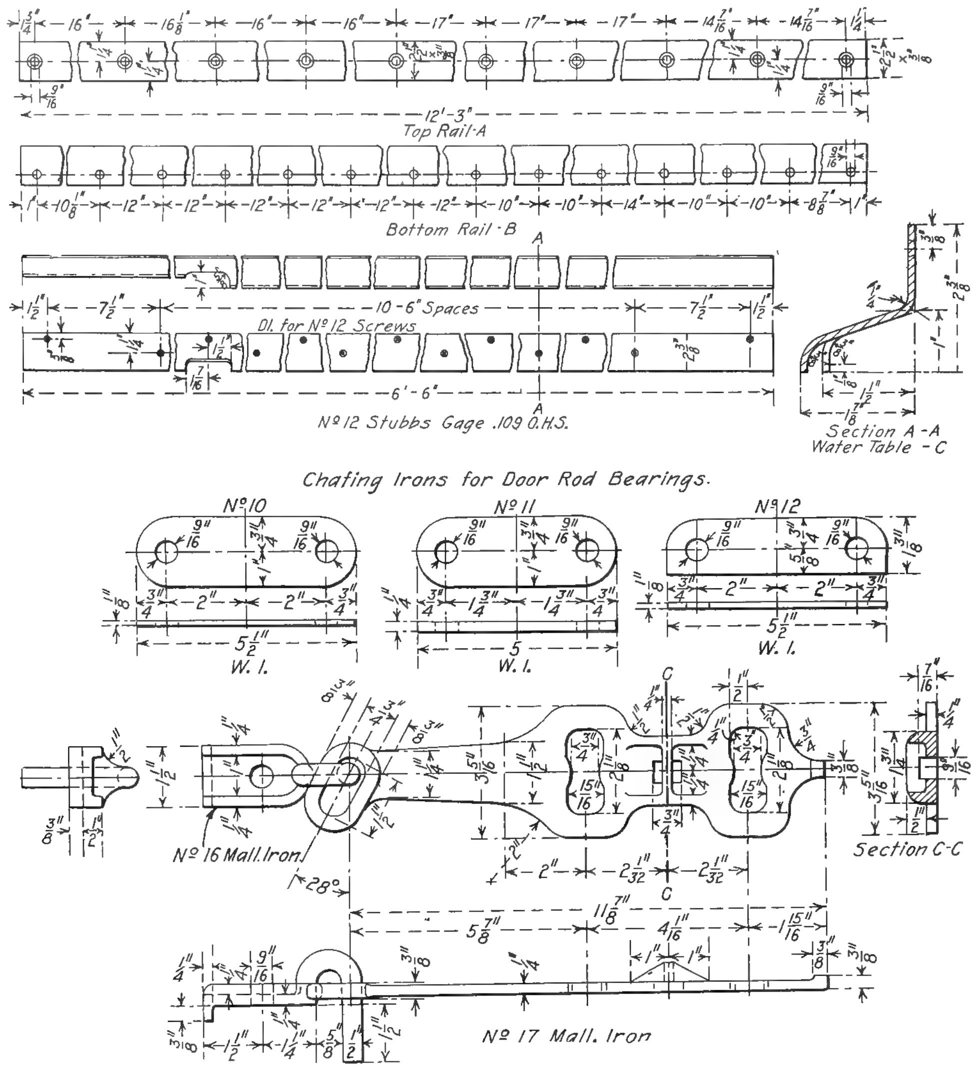


Fig. 2900—Details for M. C. B. Standard Flush Side Door for Box Cars. (M. C. B. Sheet 30A.) See also Figs. 2898, 2899.

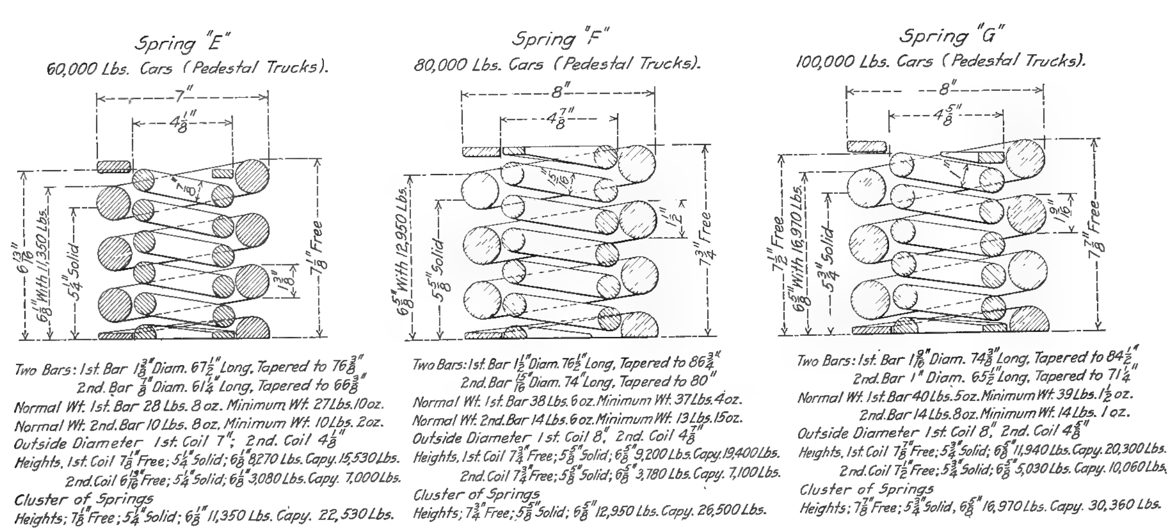
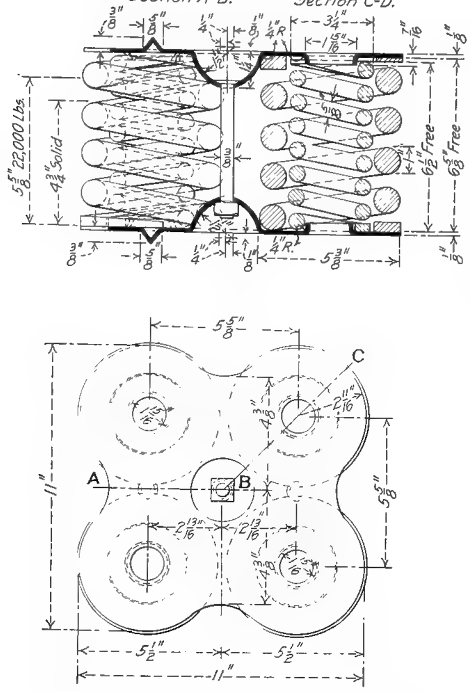


Fig. 2901—M. C. B. Standard Springs and Spring Caps for Freight Car Trucks. (M. C. B. Sheet H.) See also Fig. 2902.

Spring A

60,000 Lbs. Cars. (Arch Bar Trucks)

Section A-B. Section C-D.

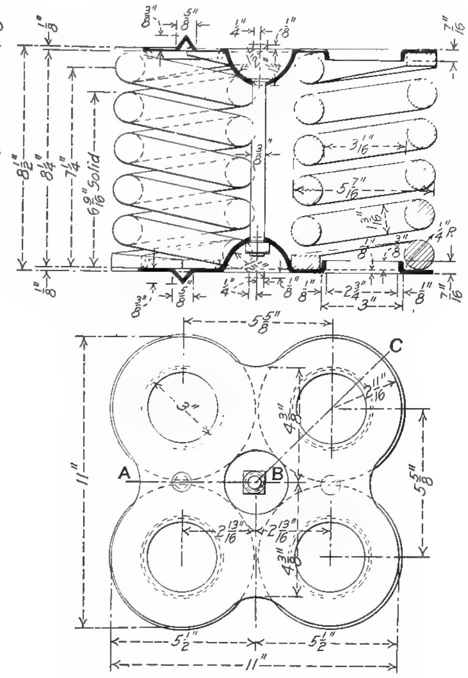


Eight Bars. Four Bars $1''$ Diam $65\frac{1}{4}''$ Long, Tapered to $72\frac{1}{4}''$
Four Bars $\frac{5}{8}''$ Diam $62\frac{1}{2}''$ Long, Tapered to $66\frac{3}{4}''$
Normal Wt. of each 1st Four Bars 14 Lbs. 12 oz. Minimum Wt. 14 Lbs 5 oz.
Normal Wt. of each 2nd. Four Bars 5 Lbs 6 oz. Minimum Wt. 5 Lbs. 3 oz.
Outside Diam 1st. Four Coils $5\frac{3}{8}''$, 2nd Four Coils $3\frac{1}{4}''$
Heights, 1st Four Coils $5\frac{5}{8}''$ Free, $4\frac{3}{4}''$ Solid, $5\frac{5}{8}''$ 3,970 Lbs. Capy. 7,440 Lbs.
2nd. Four Coils $6\frac{1}{2}''$ Free. $4\frac{3}{4}''$ Solid, $5\frac{5}{8}''$ 1,530 Lbs. Capy. 3,060 Lbs.
Cluster of Springs
Heights Exclusive of Caps $6\frac{5}{8}''$ Free, $4\frac{3}{4}''$ Solid, $5\frac{5}{8}''$ 22,000 Lbs. Capy. 42,000 Lbs.

Spring B

70,000 Lbs. Cars. (Arch Bar Trucks)

Section A-B. Section C-D.

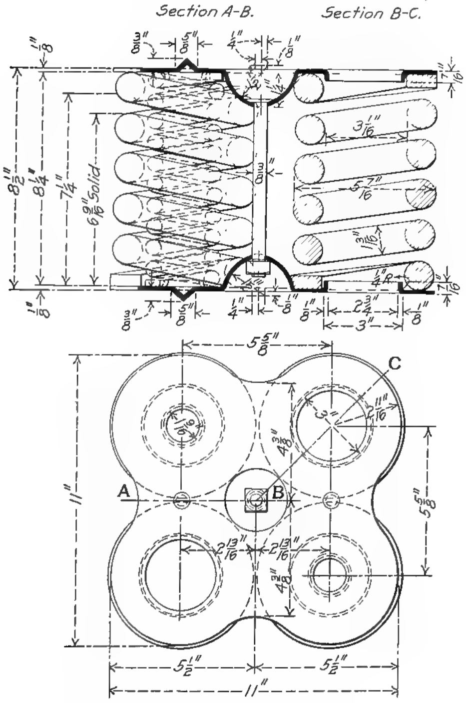


4 Bars $1\frac{3}{16}''$ Diam. $73\frac{3}{4}''$ Long, Tapered to $80\frac{3}{8}''$
Normal Wt of each Bar 23 Lbs Minimum Wt. 22 Lbs 5 oz
Outside Diam $5\frac{7}{16}''$
Heights, $8\frac{1}{4}''$ Free. $6\frac{9}{16}''$ Solid, $7\frac{1}{4}''$ 7,400 Lbs. Capy. 12,500 Lbs
Cluster of Springs
Heights $8\frac{1}{4}''$ Free. $6\frac{9}{16}''$ Solid. $7\frac{1}{4}''$ 29,000 Lbs. Capy 50,000 Lbs.

Spring "C"

80,000 Lbs. Cars. (Arch Bar Trucks)

Section A-B. Section B-C.

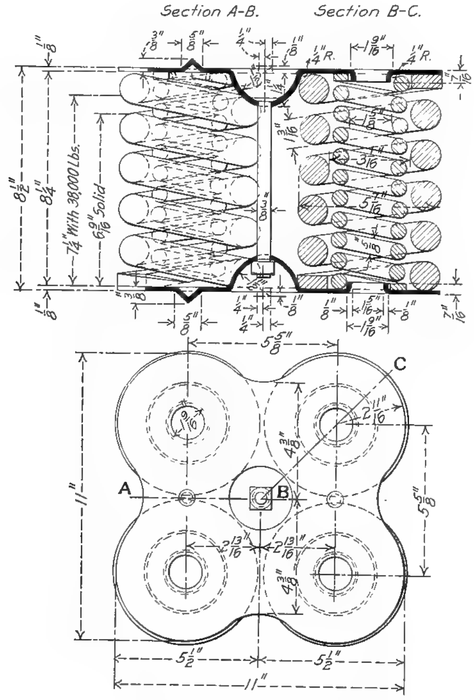


6 Bars:
4 Bars, $1\frac{3}{16}''$ Diam. $73\frac{3}{4}''$ Long, Tapered to $80\frac{3}{8}''$
2 Bars, $\frac{5}{8}''$ Diam. $74\frac{1}{4}''$ Long, Tapered to $77\frac{3}{4}''$
Normal Wt. of each 1st. four bars 23 Lbs. Minimum Wt. 22 Lbs. 5 oz
Normal Wt. of each 2nd. two bars 6 Lbs. 7 oz " " 6 Lbs. 4 oz.
Outside Diam. of 1st. four Coils $5\frac{7}{16}''$, 2nd. two Coils $2\frac{7}{8}''$
Heights 1st. four Coils $8\frac{1}{4}''$ Free; $6\frac{9}{16}''$ Solid; $7\frac{1}{4}''$ 7,400 Lbs. Capy. 12,500 Lbs
Heights 2nd. two Coils $8\frac{1}{4}''$ Free, $6\frac{9}{16}''$ Solid, $7\frac{1}{4}''$ 2,100 Lbs. Capy. 3,500 Lbs.
Cluster of Springs
Heights without Caps: $8\frac{1}{4}''$ Free, $6\frac{9}{16}''$ Solid, $7\frac{1}{4}''$ 33,800 Lbs. Capy 57,000 Lbs.

Spring "D"

100,000 Lbs Cars. (Arch Bar Trucks)

Section A-B. Section B-C.



Eight Bars: 4 Bars $1\frac{3}{16}''$ Diam. $73\frac{3}{4}''$ Long, Tapered to $80\frac{3}{8}''$
4 Bars $\frac{5}{8}''$ Diam. $74\frac{1}{4}''$ Long, Tapered to $77\frac{3}{4}''$
Normal Wt of each 1st Four Bars 23 Lbs. Minimum Wt 22 Lbs 5 oz.
Normal Wt of each 2nd Four Bars 6 Lbs. 7 oz. " Wt 6 Lbs. 4 oz
Outside Diam. of 1st. Four Coils $5\frac{7}{16}''$, 2nd Four $2\frac{7}{8}''$
Heights, 1st Four Coils $8\frac{1}{4}''$ Free, $6\frac{9}{16}''$ Solid, $7\frac{1}{4}''$ 7,400 Lbs. Capy 12,500 Lbs.
Heights, 2nd. Four Coils $8\frac{1}{4}''$ Free, $6\frac{9}{16}''$ Solid. $7\frac{1}{4}''$ 2,100 Lbs. Capy 3,500 Lbs.
Cluster of Springs
Heights Without Caps $8\frac{1}{4}''$ Free, $6\frac{9}{16}''$ Solid, $7\frac{1}{4}''$ 38,000 Lbs Capy 64,000 Lbs.

Fig. 2902—M. C. B. Standard Springs and Spring Caps for Freight Car Trucks. (M. C. B. Sheet H.)

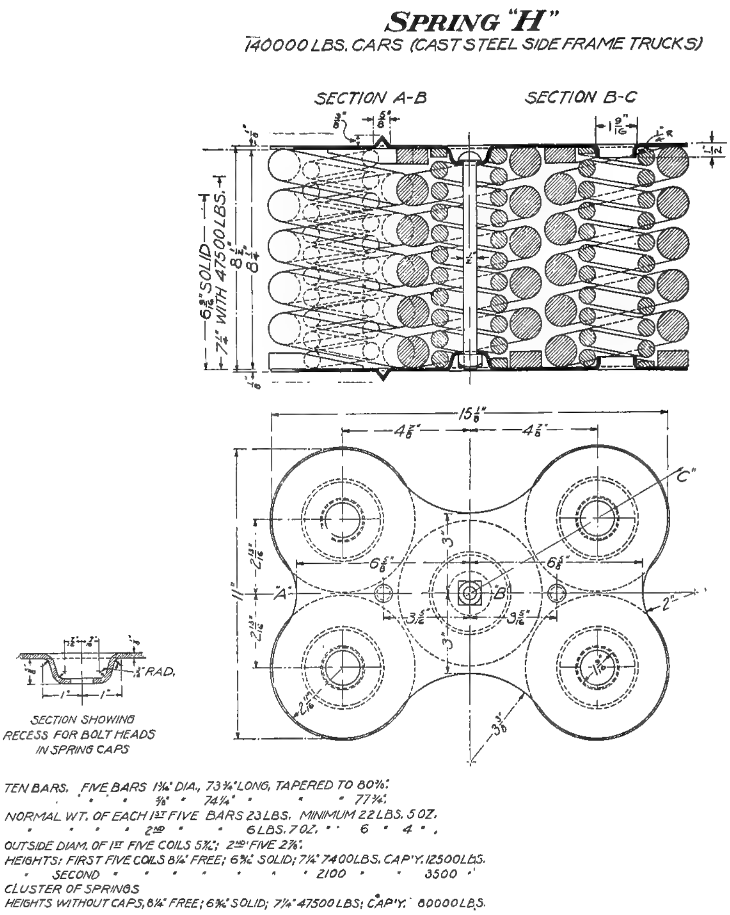


Fig 2903—Spring for 140,000 lb. Cars with Cast Steel Side Frame Trucks. (M. C. B. Sheet H1.)

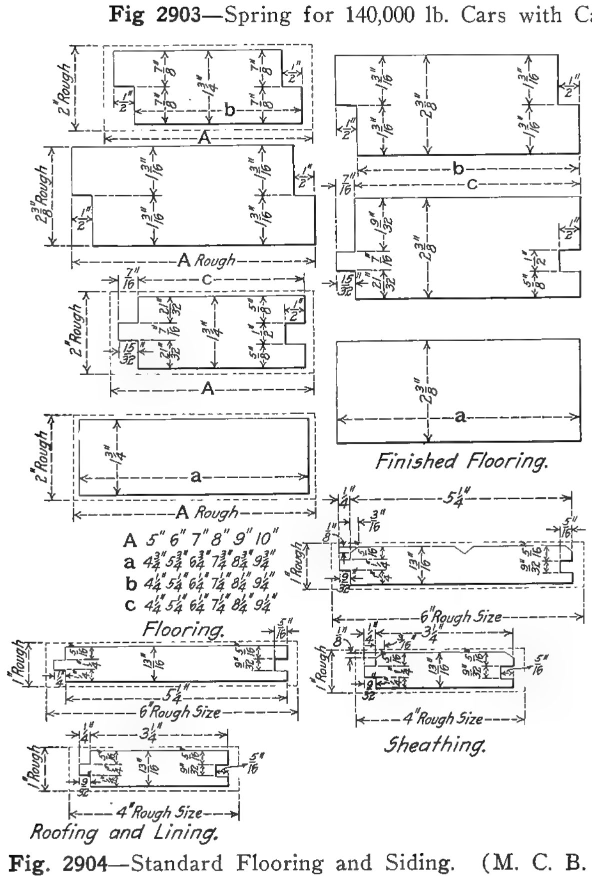


Fig. 2904—Standard Flooring and Siding. (M. C. B. Sheet 26.)

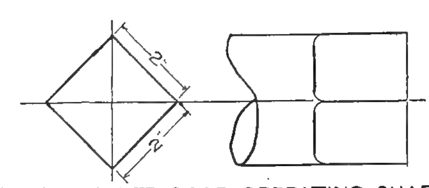


Fig. 2905—Standard End for Hopper Door Operating Shaft. (M. C. B. Sheet 28).

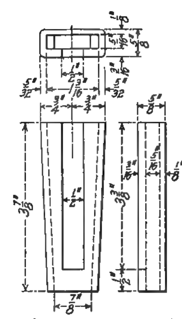


Fig. 2906—M. C. B. Standard Signal Lamp Socket. (M. C. B. Sheet 26.)

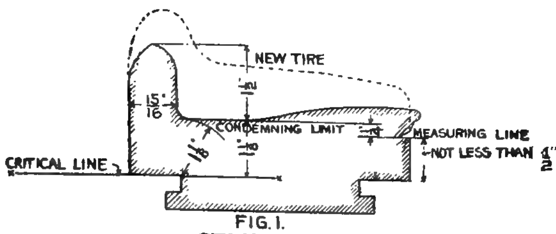


FIG. 1.
STEEL TIRE
RETAINING RING FASTENING.

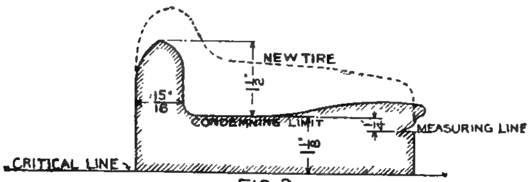


FIG. 2.
STEEL TIRE.
SHRINKAGE FASTENING ONLY.

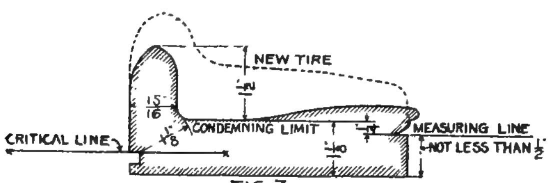


FIG. 3.
STEEL TIRE.
RETAINING RING FASTENING

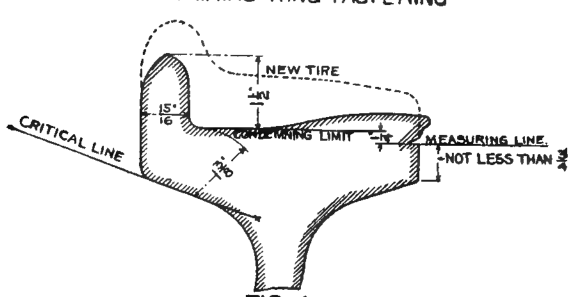
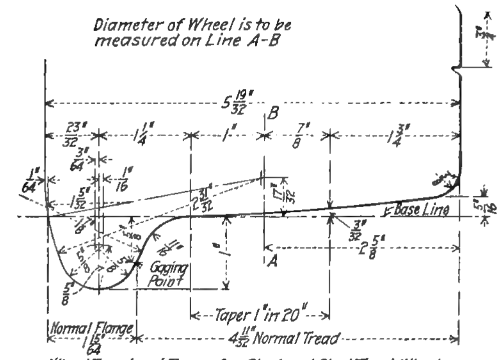
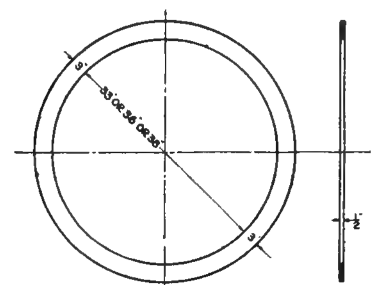


FIG. 4.
STEEL WHEEL.

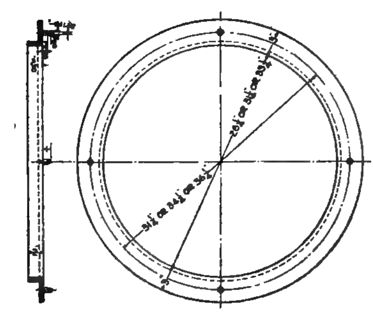
MINIMUM THICKNESS FOR STEEL TIRES.



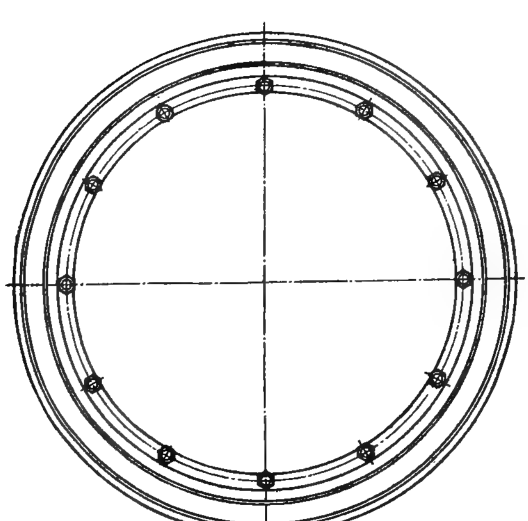
Wheel Tread and Flange for Steel and Steel Tired Wheels.

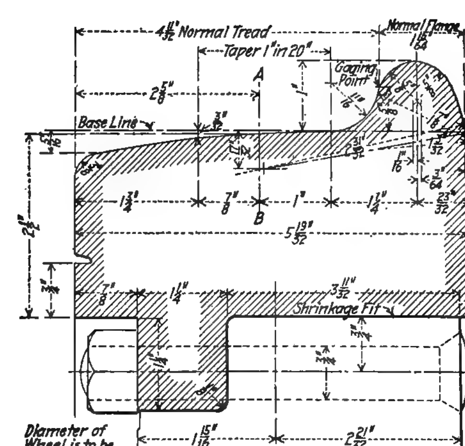


ROTUNDITY GAUGE
FOR 33" OR 36" OR 38" SOLID STEEL WHEELS



PLANE GAUGE
FOR SOLID STEEL WHEELS





Proposed Tire Fastening for Steel Tired Wheels

Fig. 2905—M. C. B. Recommended Practice for Minimum Thickness of Steel Tires, Wheel Tread and Flange for Steel Wheels, Rotundity and Plane Gages and Tire Fastening for Steel Tired Wheels. (M. C. B. Sheet C.)

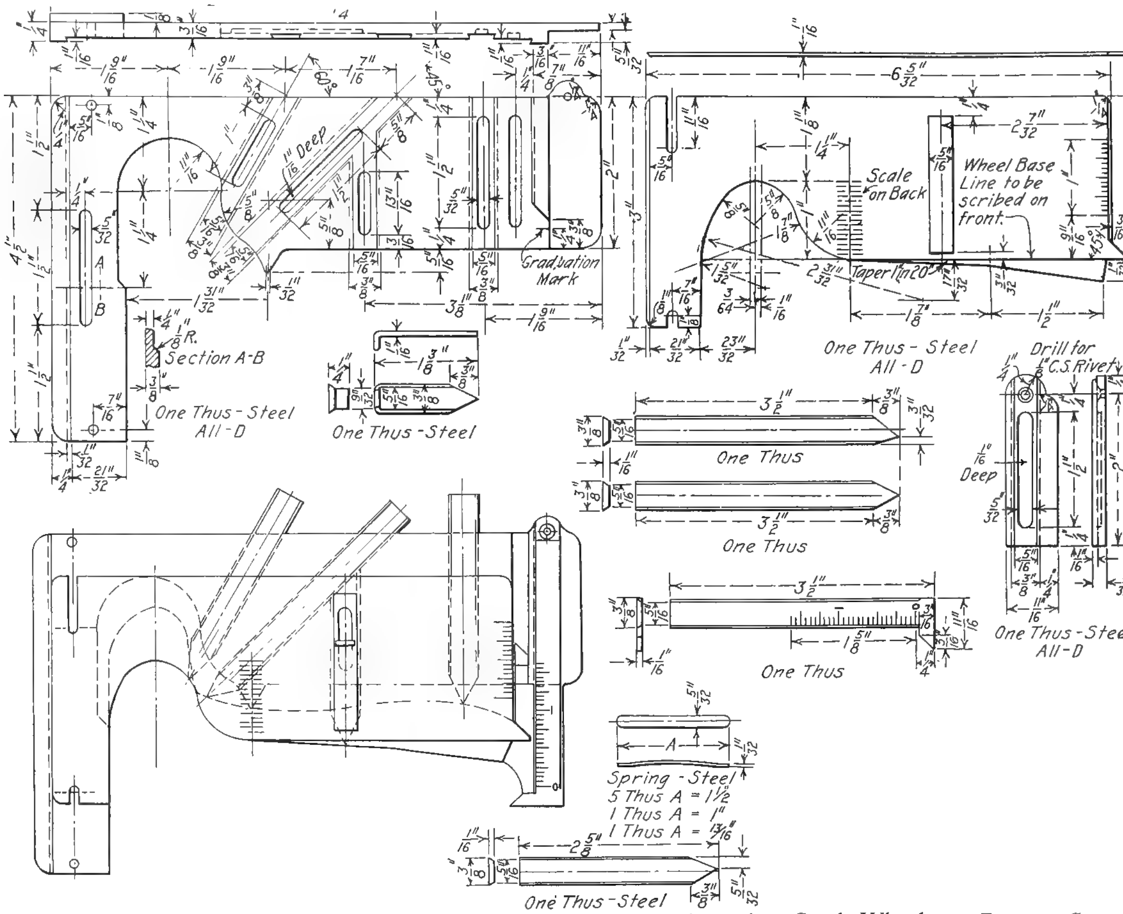


Fig. 2906—M. C. B. Recommended Practice for Gage for Measuring Steel Wheels to Restore Contour. (M. C. B. Sheet C1.)

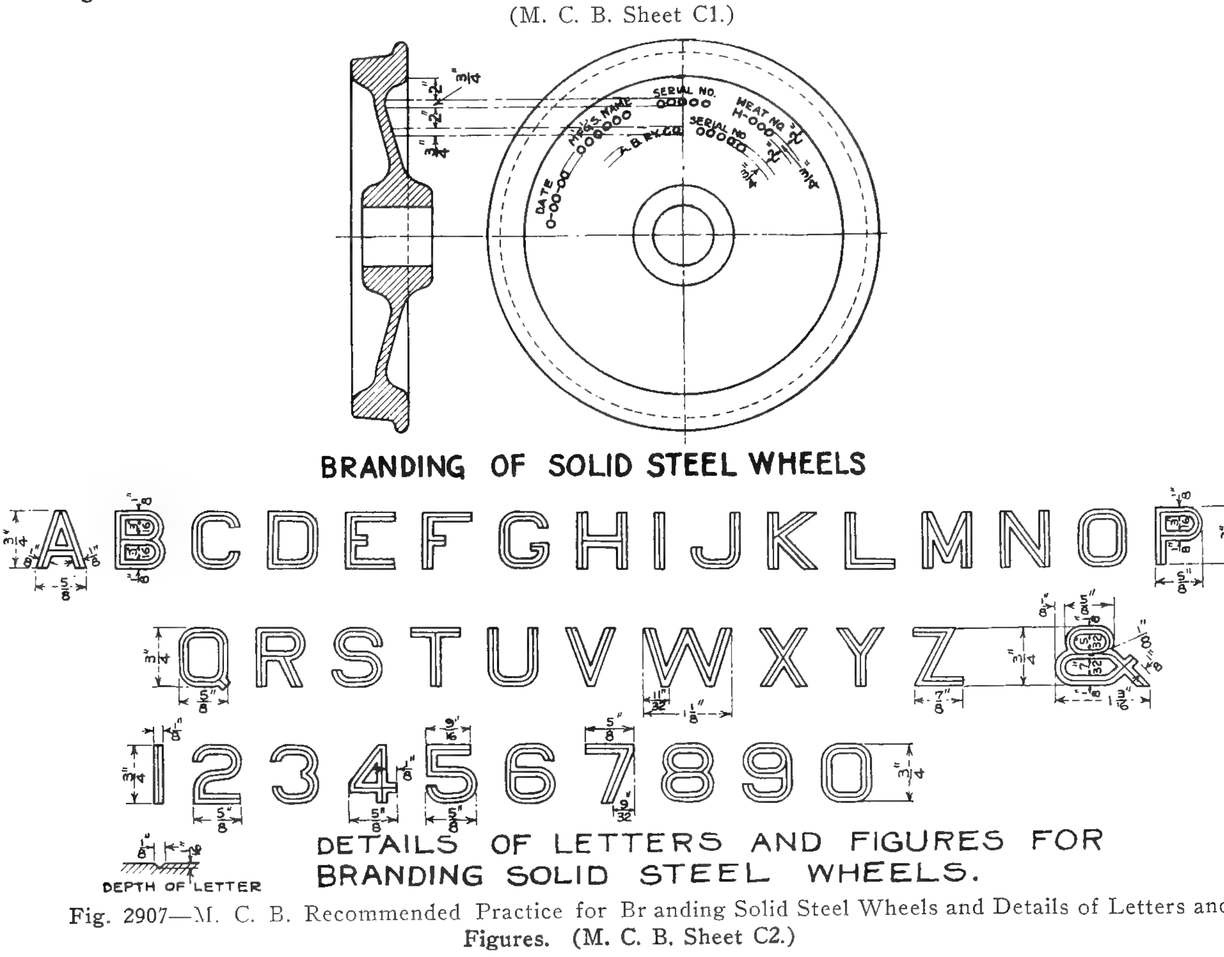


Fig. 2907—M. C. B. Recommended Practice for Branding Solid Steel Wheels and Details of Letters and Figures. (M. C. B. Sheet C2.)

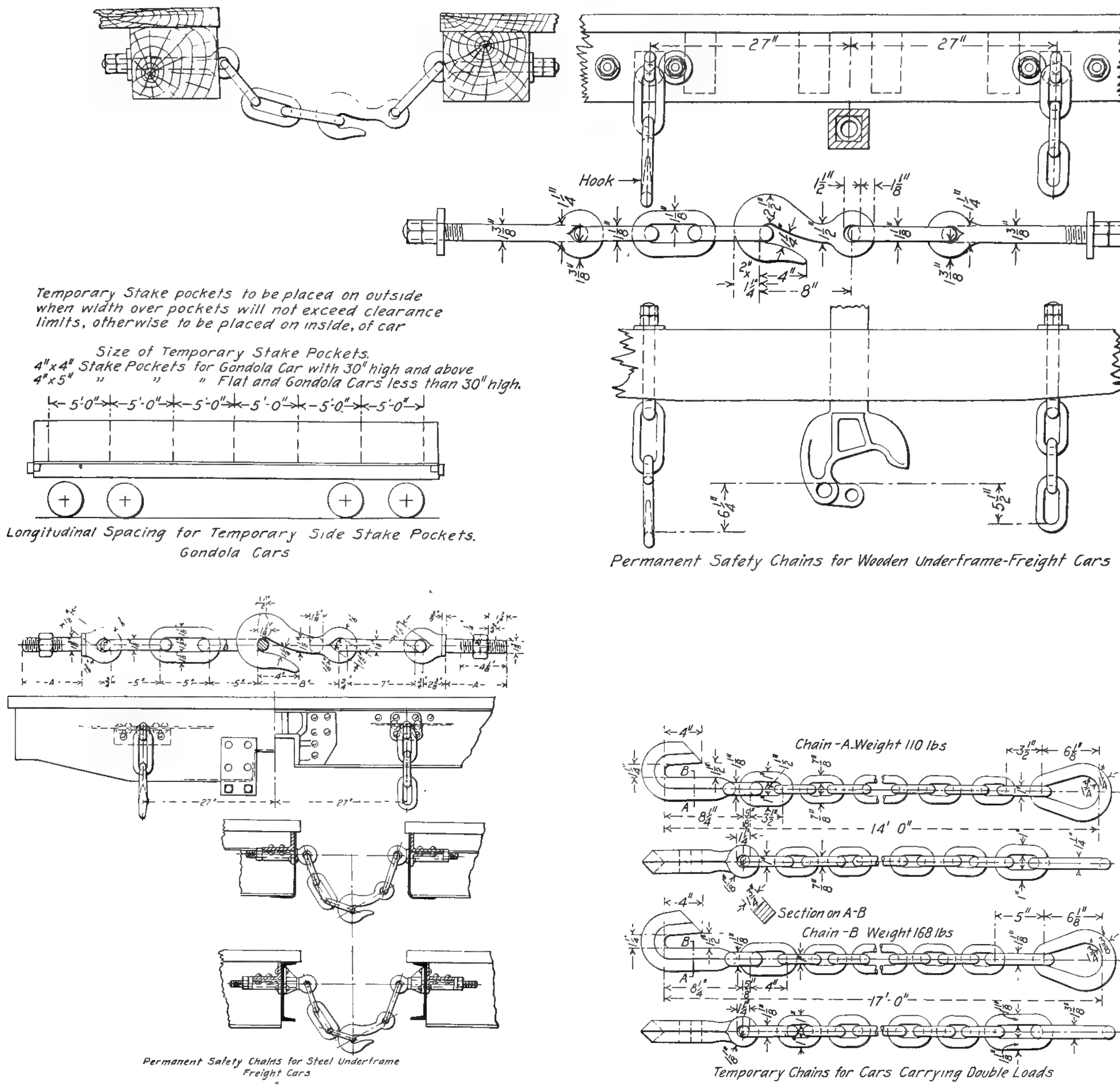


Fig. 2908—M. C. B. Recommended Practice for Safety Chains and Stake Pockets. (M. C. B. Sheet E.)

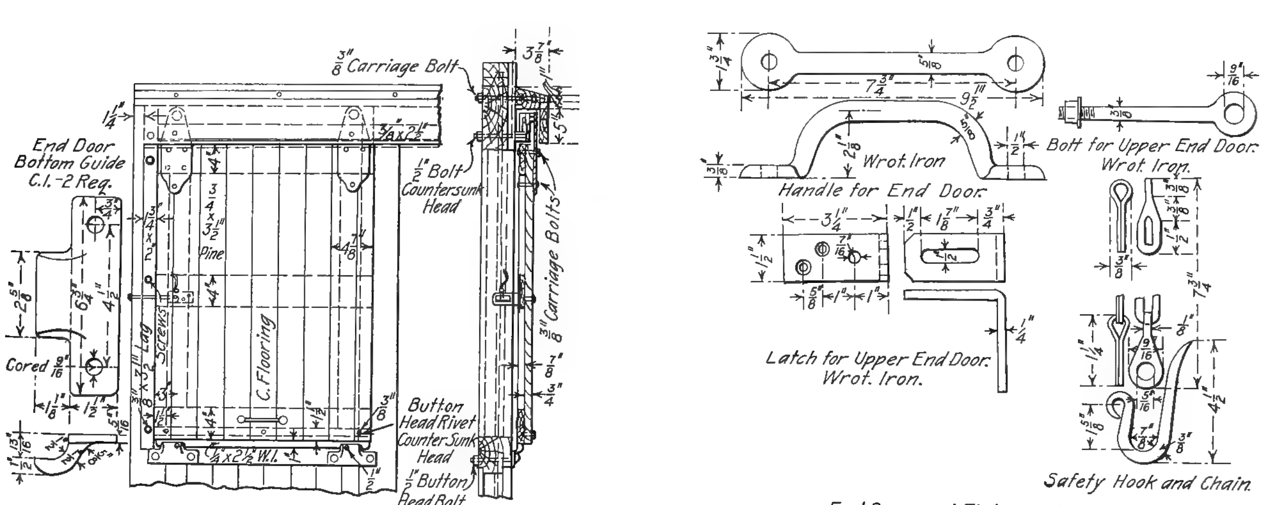


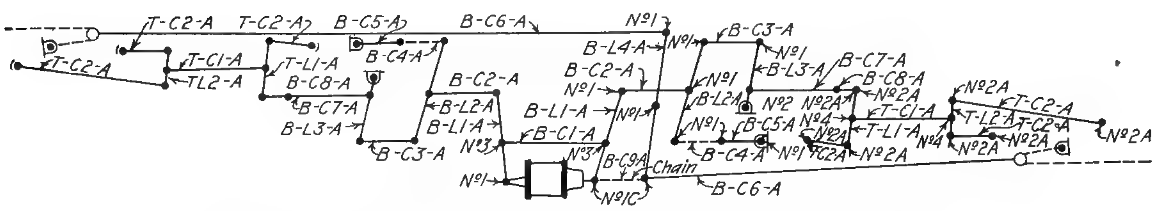
Fig. 2909—M. C. B. Recommended Practice for Box Car End Door and Fixtures. (M. C. B. Sheet F.)

Table I
Schedule A
For Cars Weighing 80,000 to 100,000 Lbs.

14" Brake Cylinder Cylinder Lever BL1-A				
For Car Weighing	% Brkg Power for Cyl. Pres. of 60 Lbs per Sq In	Lever No	A	B
		1	20"	16"
79,250 to 81,450	89.9 to 87.5	2	20¼"	15¾"
81,500 to 83,800	89.9 to 87.5	3	20½"	15½"
83,850 to 86,200	89.9 to 87.5	4	20¾"	15¼"
86,250 to 88,700	90.0 to 87.5	5	21"	15"
88,750 to 91,300	90.0 to 87.5	6	21¼"	14¾"
91,350 to 94,000	90.0 to 87.5	7	21½"	14½"
94,050 to 96,700	90.0 to 87.5	8	21¾"	14¼"
96,750 to 99,650	90.0 to 87.5	9	22"	14"
99,700 to 102,600	90.0 to 87.5	10	22¼"	13¾"
		11	22½"	13½"
Brake Beams should be suitable for Maximum Load at middle of Beam of 22,000 Lb's.				

Table II
Schedule A
For Cars Weighing 100,000 to 137,000 Lbs.

16" Brake Cylinder Cylinder Lever BL1-A				
For Car Weighing	% Brkg Power for Cyl. Pres. of 60 Lbs per Sq In	Lever No	A	B
100,500 to 103,300	90.0 to 87.5	1	20"	16"
103,350 to 106,300	90.0 to 87.5	2	20¼"	15¾"
106,350 to 109,300	90.0 to 87.5	3	20½"	15½"
109,350 to 112,500	90.0 to 87.5	4	20¾"	15¼"
112,550 to 115,750	90.0 to 87.5	5	21"	15"
115,800 to 119,100	90.0 to 87.5	6	21¼"	14¾"
119,150 to 122,700	90.1 to 87.5	7	21½"	14½"
122,750 to 126,200	90.0 to 87.5	8	21¾"	14¼"
126,250 to 129,850	90.0 to 87.5	9	22"	14"
129,900 to 133,900	90.2 to 87.4	10	22¼"	13¾"
133,950 to 137,900	90.0 to 87.4	11	22½"	13½"
Brake Beams should be suitable for Maximum Load at middle of Beam of 28,000 Lb's.				



The use of the floating lever fulcrum connection and chain may be discontinued and cylinder and floating lever connection (B-C2-A) and intermediate and truck-lever connection (B-C7-A) made in one piece, thereby eliminating five parts: B-C5-A, B-C4-A, B-L2-A, B-C3-A, and B-L3-A.

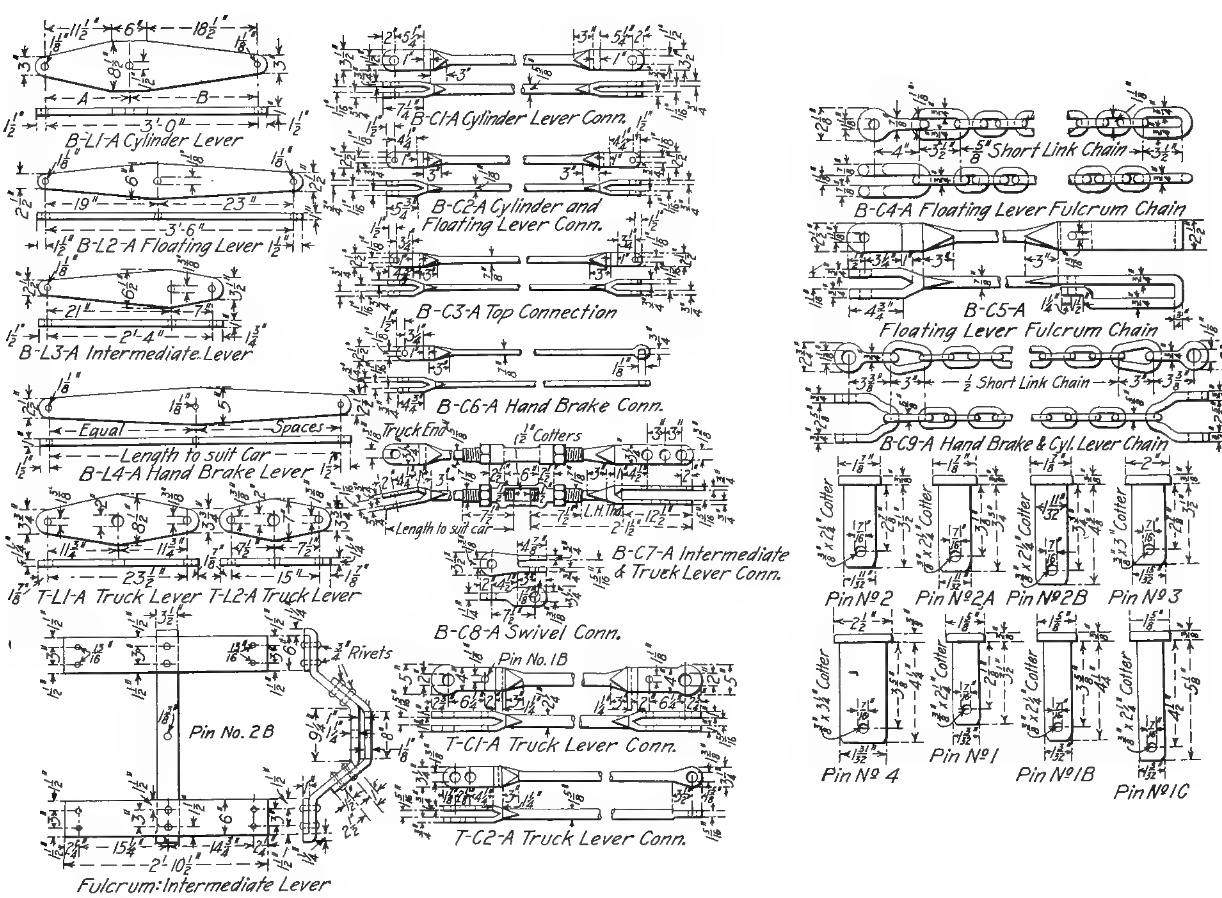
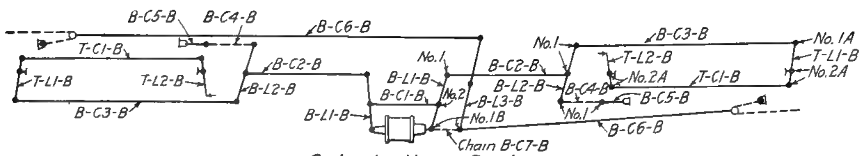
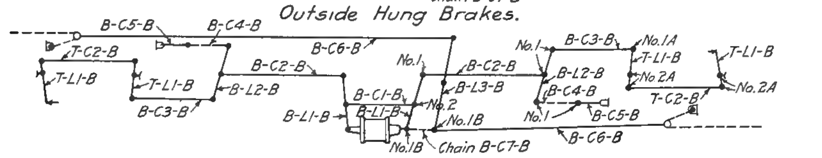


Fig. 2910—M. C. B. Recommended Practice for High Speed Foundation Brake Gear for Passenger Service; Schedule for Six-Wheel Trucks. (M. C. B. Sheet J.)



Outside Hung Brakes.



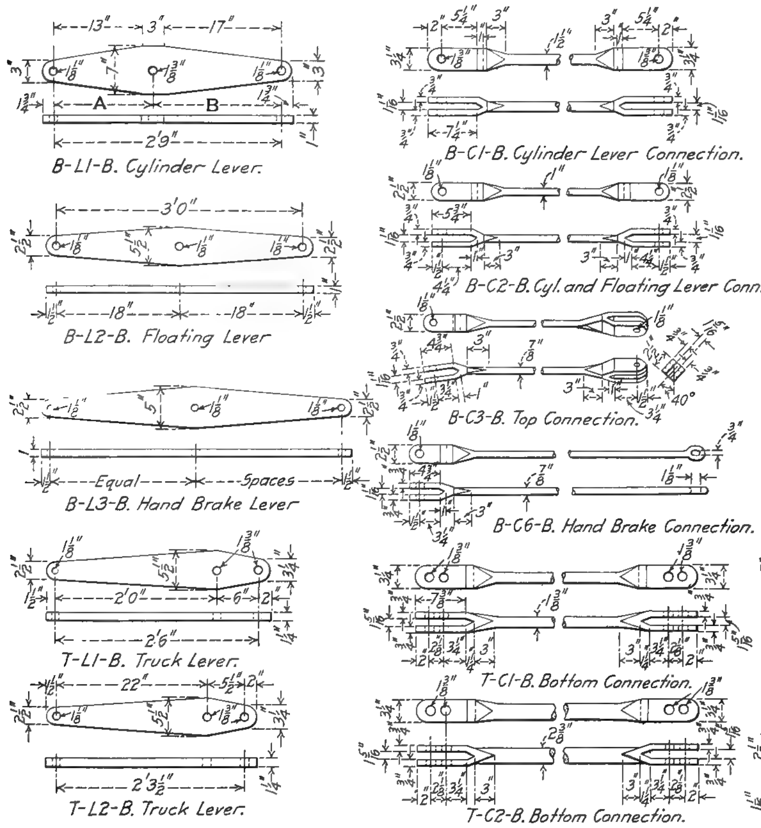
Inside Hung Brakes.

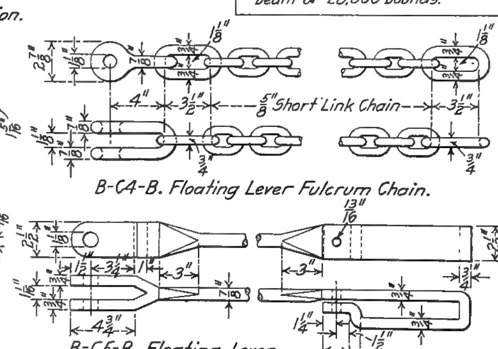
Table I.
Schedule B-1.
For Cars Weighing 50,000 to 70,000 Lbs.

12" Brake Cylinder Cylinder Lever B-L1-B.				
For Cars Weighing	% Br'kg. Power for Cyl Press. of 60 Lbs Per Sq. In.	Lever No	A	B
49,000 to 50,500	90.0 to 87.3	1	13"	20"
50,600 " 52,100	90.0 " 87.4	2	13¼"	19¾"
52,200 " 53,700	90.0 " 87.5	3	13½"	19½"
53,800 " 55,300	90.1 " 87.6	4	13¾"	19¼"
55,400 " 57,200	90.2 " 87.4	5	14"	19"
57,300 " 59,000	90.0 " 87.4	6	14¼"	18¾"
59,100 " 60,800	89.8 " 87.3	7	14½"	18½"
60,900 " 62,700	90.0 " 87.3	8	14¾"	18¼"
62,800 " 64,600	90.0 " 87.5	9	15"	18"
64,700 " 66,700	90.0 " 87.4	10	15¼"	17¾"
66,800 " 68,700	90.0 " 87.5	11	15½"	17½"
68,800 " 70,800	90.0 " 87.5	12	15¾"	17¼"
Brake Beams should be suitable for maximum load at middle of beam of 22,000 pounds.				

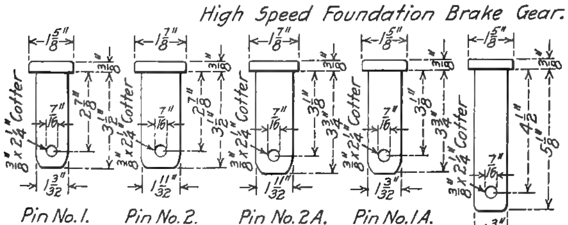
Table II.
Schedule B.
For Cars Weighing 70,000 to 90,000 Lbs.

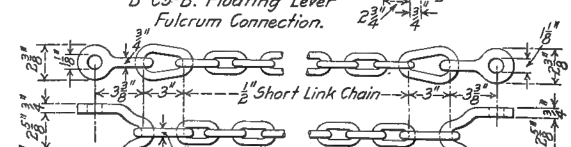
14" Brake Cylinder Cylinder Lever B-L1-B.				
For Cars Weighing	% Br'kg. Power for Cyl. Press. of 60 Lbs Per Sq. In.	Lever No.	A	B
		1	13"	20"
68,800 to 70,900	90.0 to 87.4	2	13¼"	19¾"
71,000 " 73,200	90.0 " 87.4	3	13½"	19½"
73,300 " 75,500	90.0 " 87.5	4	13¾"	19¼"
75,600 " 77,900	90.0 " 87.4	5	14"	19"
78,000 " 80,300	90.0 " 87.4	6	14¼"	18¾"
80,400 " 82,800	90.0 " 87.4	7	14½"	18½"
82,900 " 85,400	90.0 " 87.4	8	14¾"	18¼"
85,500 " 88,000	90.0 " 87.5	9	15"	18"
88,100 " 90,800	90.0 " 87.4	10	15¼"	17¾"
Brake Beams should be suitable for maximum load at middle of beam of 28,000 pounds.				



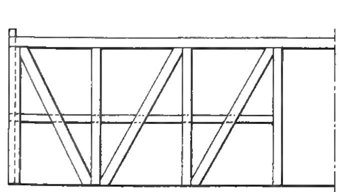


High Speed Foundation Brake Gear.

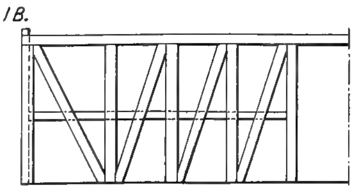




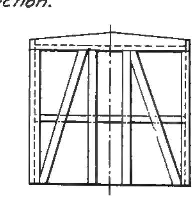
B-C7-B. Hand Brake and Cylinder Lever Connection.



Elevation Half Side Framing for 60,000-Lb. Capacity Cars.



Elevation Half Side Framing for 80,000, and 100,000-Lb. Capacity Cars.



Elevation End Framing for 60,000, 80,000 and 100,000 Lb. Capacity Cars.

Framing of Box Cars.

Fig. 2911—M. C. B. Recommended Practice for High Speed Foundation Brake Gear for Passenger Service, Schedule for Four Wheel Trucks; and Framing for Box Cars. (M. C. B. Sheet K.) See also Fig. 2912.

Schedule C.
For Cars Weighing 39,000 to 50,000 Lbs.

10" Brake Cylinder. Cylinder Lever B-L1-C.				
For Cars Weighing	% Brk'g Power for Cyl Pres of 60 Lbs. per Sq. In.	Lever No.	A	B
38600 to 39700	89.9 to 87.2	1	14"	19"
39800 to 40900	90.0 to 87.6	2	14¼"	18¾"
41000 to 42200	90.1 to 87.5	3	14½"	18½"
42300 to 43500	90.0 to 87.5	4	14¾"	18¼"
43600 to 44900	90.1 to 87.4	5	15"	18"
45000 to 46300	89.9 to 87.4	6	15¼"	17¾"
46400 to 47700	89.9 to 87.5	7	15½"	17½"
47800 to 50000	90.0 to 86.0	8	15¾"	17¼"
Brake Beams Should Be Suitable for Maximum Load at Middle of Beam of 15,200 Pounds.				

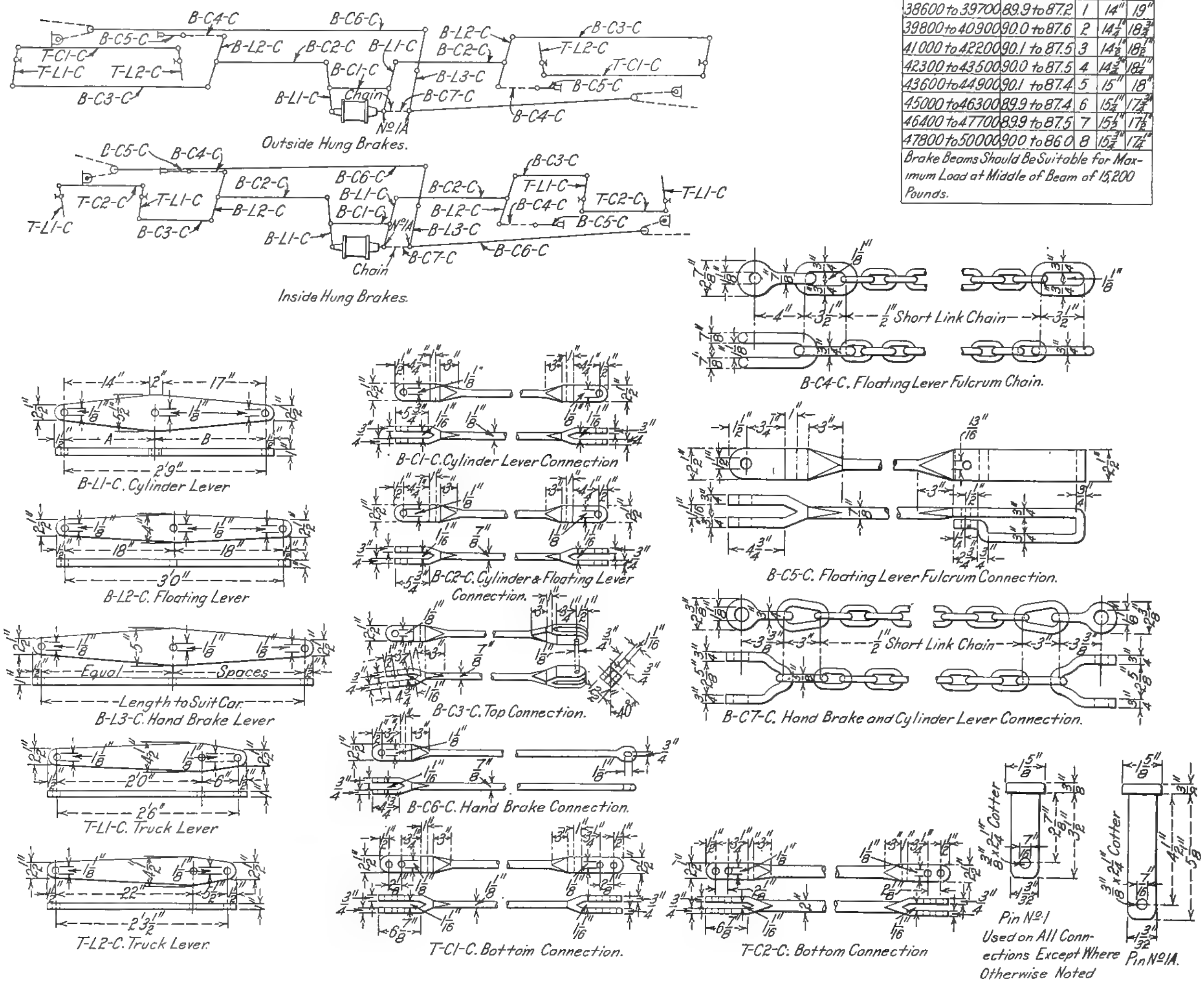
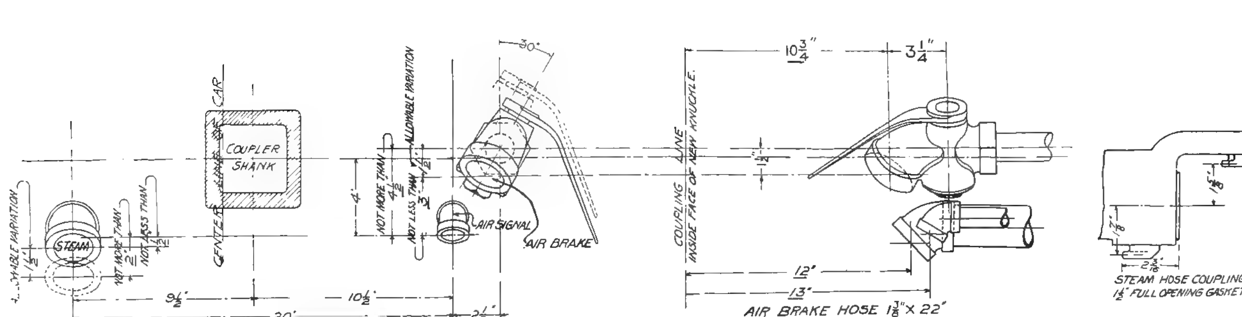


Fig. 2912—M. C. B. Recommended Practice for High Speed Foundation Brake Gear for Passenger Service. (M. C. B. Sheet L.) See also Fig. 2911.



NOTE:– THE DIMENSIONS UNDERSCORED SHOULD BE MAINTAINED BUT DEPARTURE FROM OTHER DIMENSIONS ARE ALLOWABLE TO SUIT CONDITIONS.

2 TRAIN LINE. END VALVES WITH NOT LESS THAN 1½ OPENING
DIAMETER OF STEAM HOSE TO BE 1⅝ INCHES, AND OF SUCH LENGTH THAT DISTANCE FROM FACE OF COUPLING GASKET TO END OF NIPPLE WILL BE 31 INCHES

Fig. 2913—M. C. B. Recommended Practice for Steam and Air Connections for Passenger Cars. (M. C. B. Sheet Q1.)

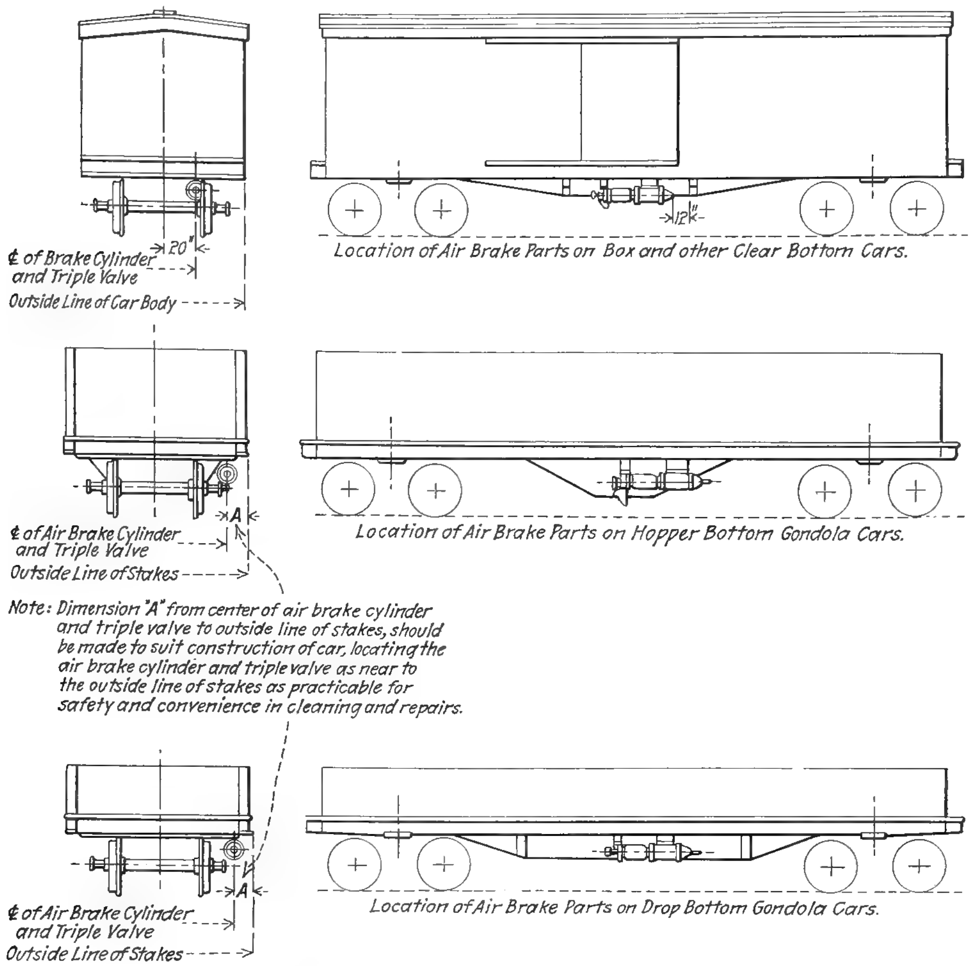


Fig. 2914—M. C. B. Recommended Practice for Location of Air Brake Parts on Freight Cars. (M. C. B. Sheet Q.)

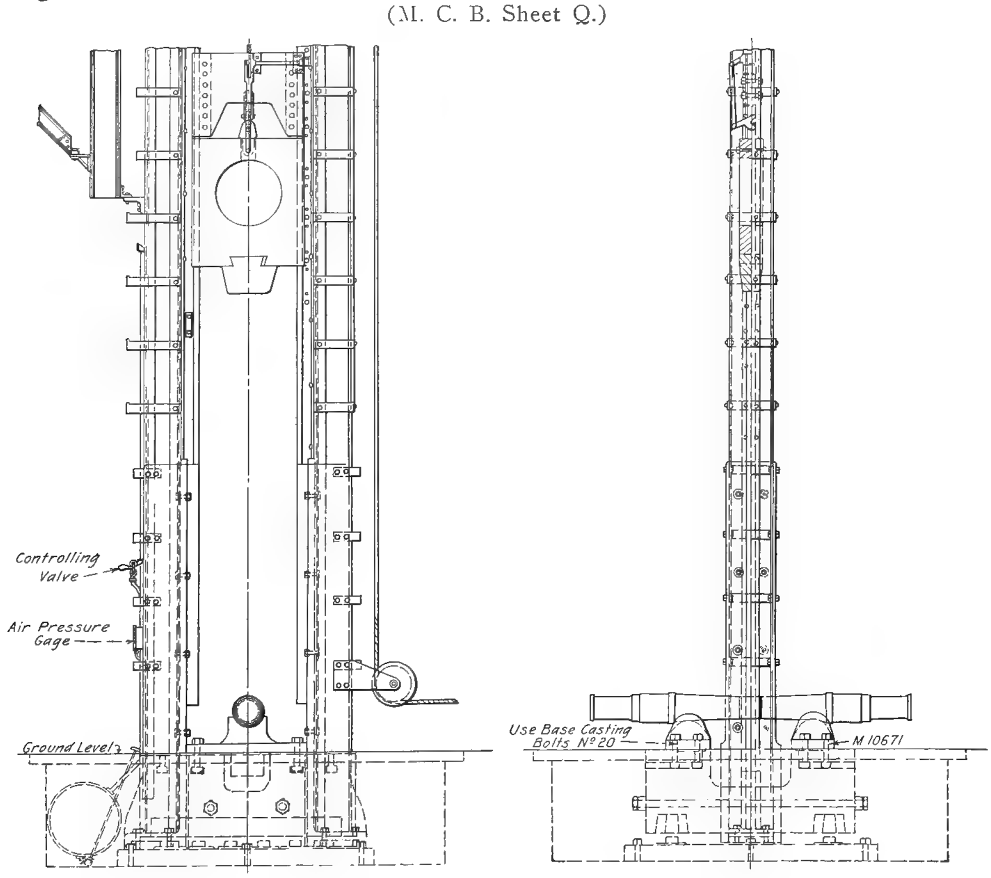


Fig. 2915—M. C. B. Recommended Practice for Axle Test. (M. C. B. Sheet 1.) See also Fig. 2916.

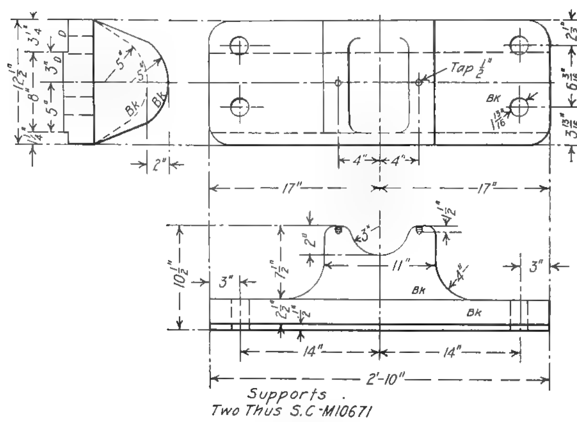


Fig. 2916—Detail for M. C. B. Recommended Practice for Axle Test. (M. C. B. Sheet I.) See also Fig. 2915.

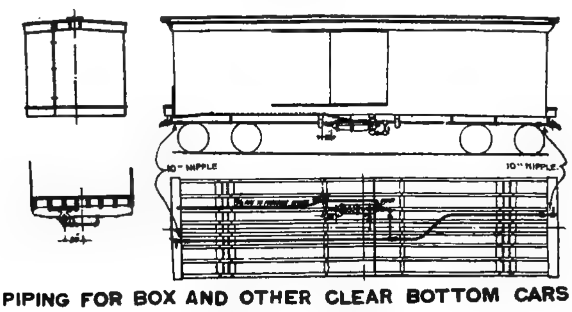


Fig. 2917—M. C. B. Recommended Practice for Piping of Box and Other Clear Bottom Cars. (M. C. B. Sheet Q.)

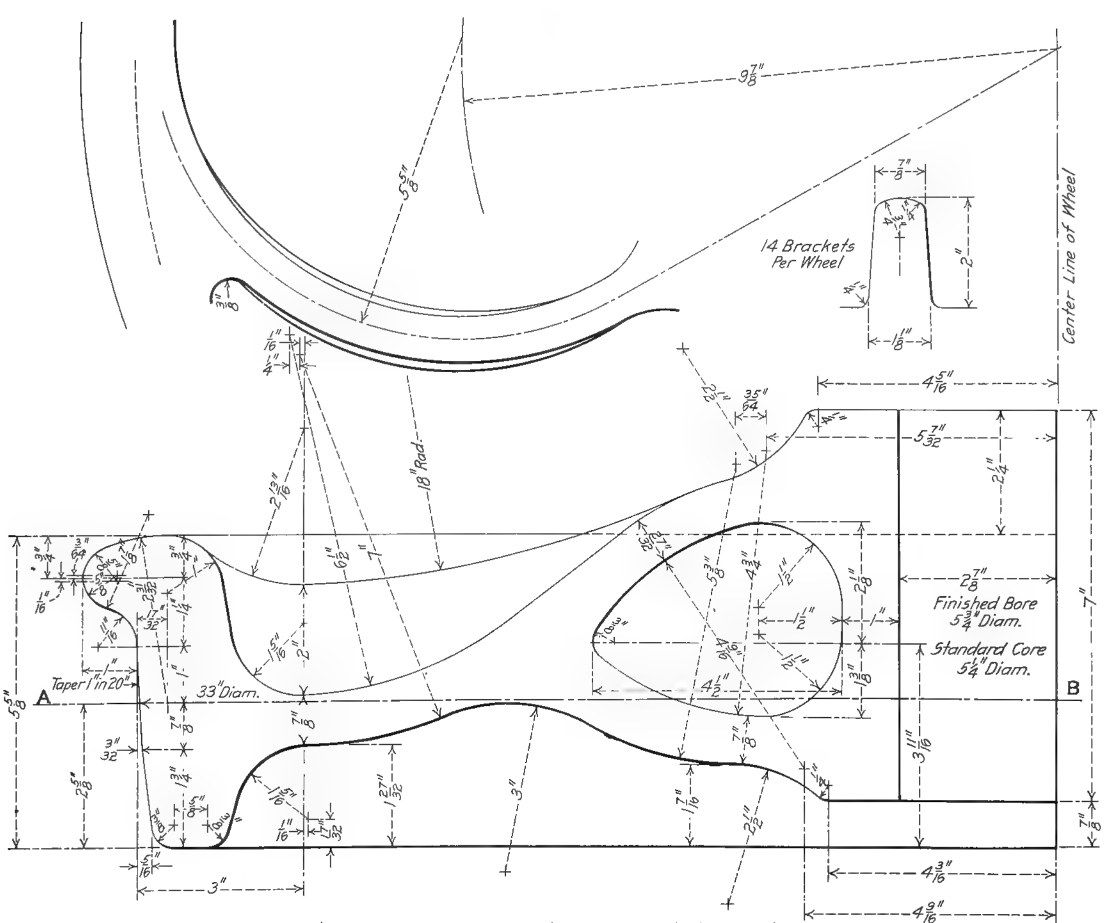


Fig. 2918—M. C. B. Recommended Practice for 33 in. Cast Iron Wheels for Cars of Maximum Gross Weight Not to Exceed 95,000 lb. (M. C. B. Sheet N.)

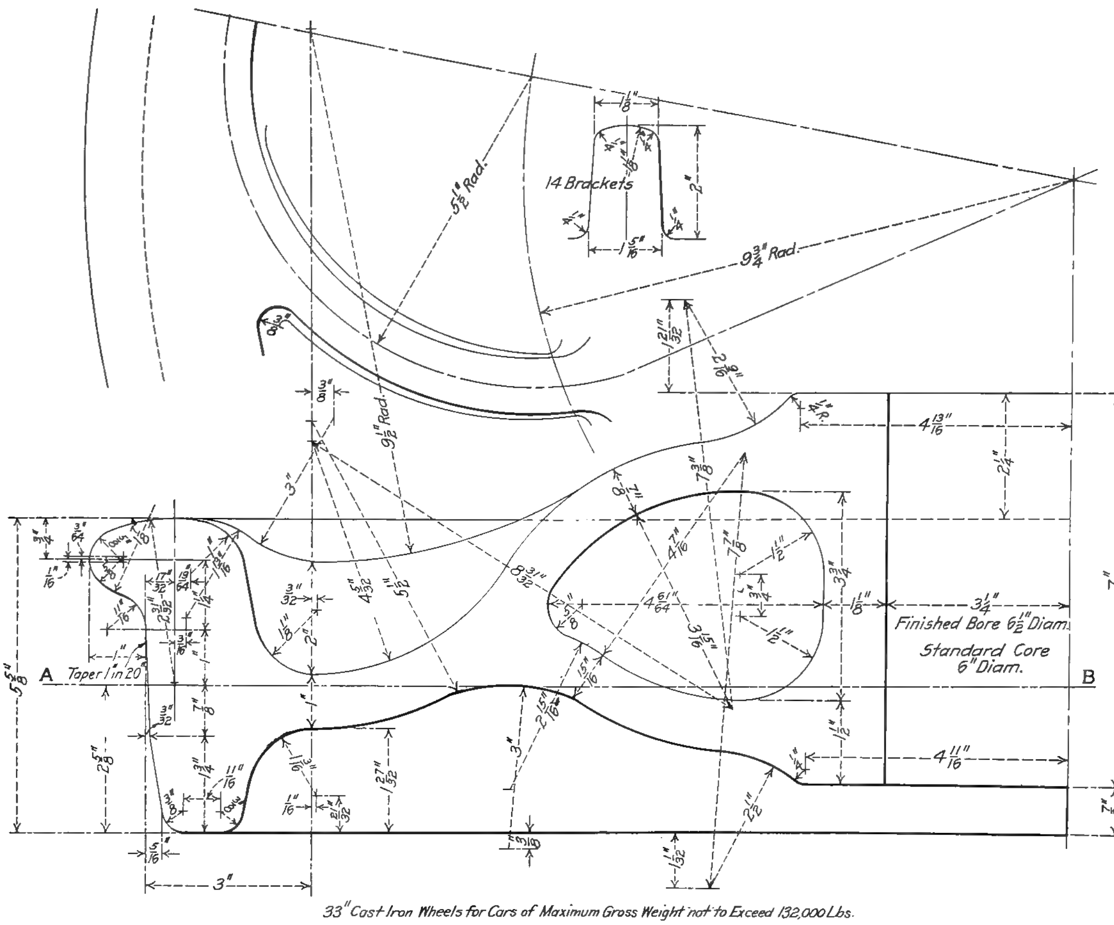


Fig. 2919—M. C. B. Recommended Practice for 33 in. Cast Iron Wheels for Cars of Maximum Gross Weight Not to Exceed 132,000 lb. (M. C. B. Sheet O.)

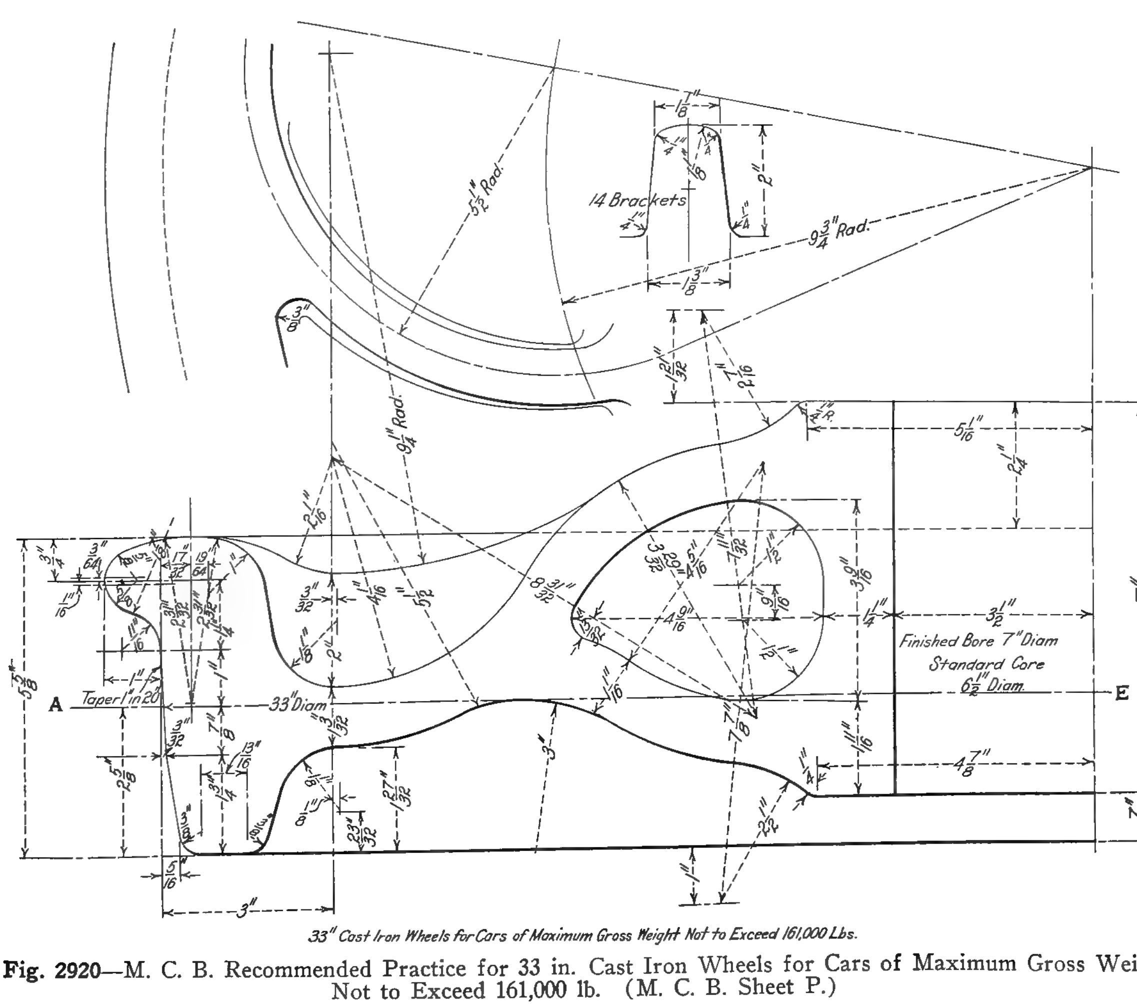


Fig. 2920—M. C. B. Recommended Practice for 33 in. Cast Iron Wheels for Cars of Maximum Gross Weight Not to Exceed 161,000 lb. (M. C. B. Sheet P.)

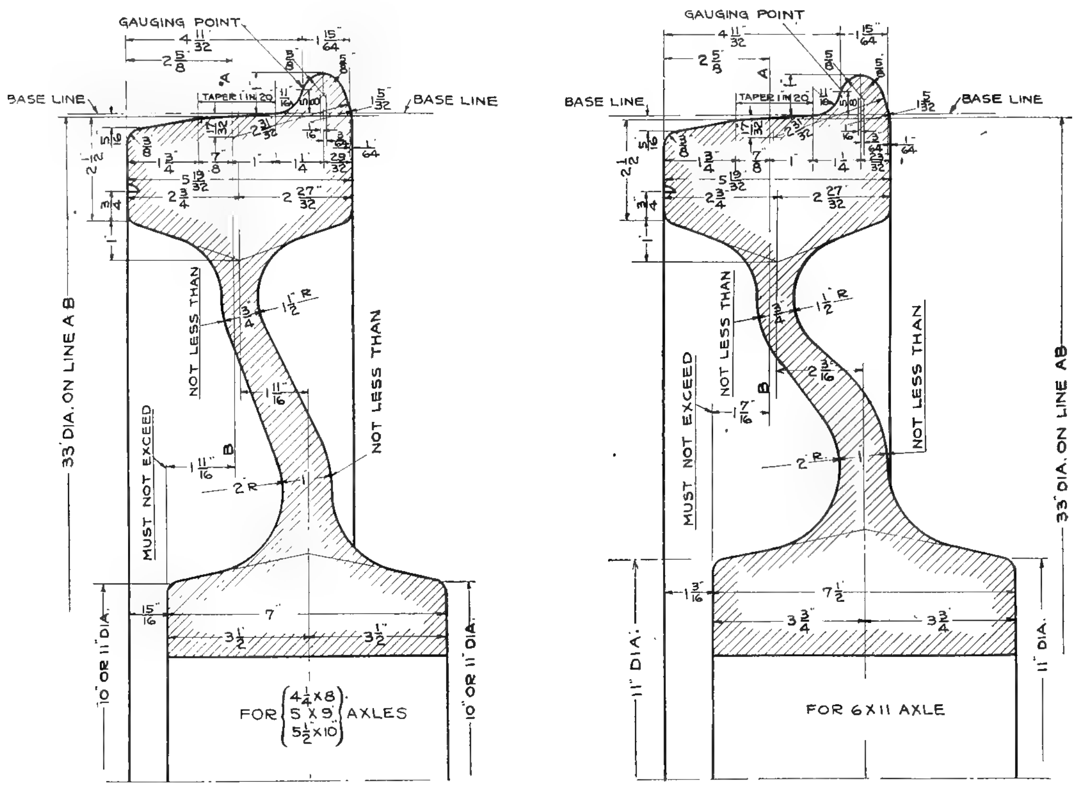


Fig. 2921—Recommended Practice for 33 in. Solid Steel Wheels. (M. C. B. Sheet R.)

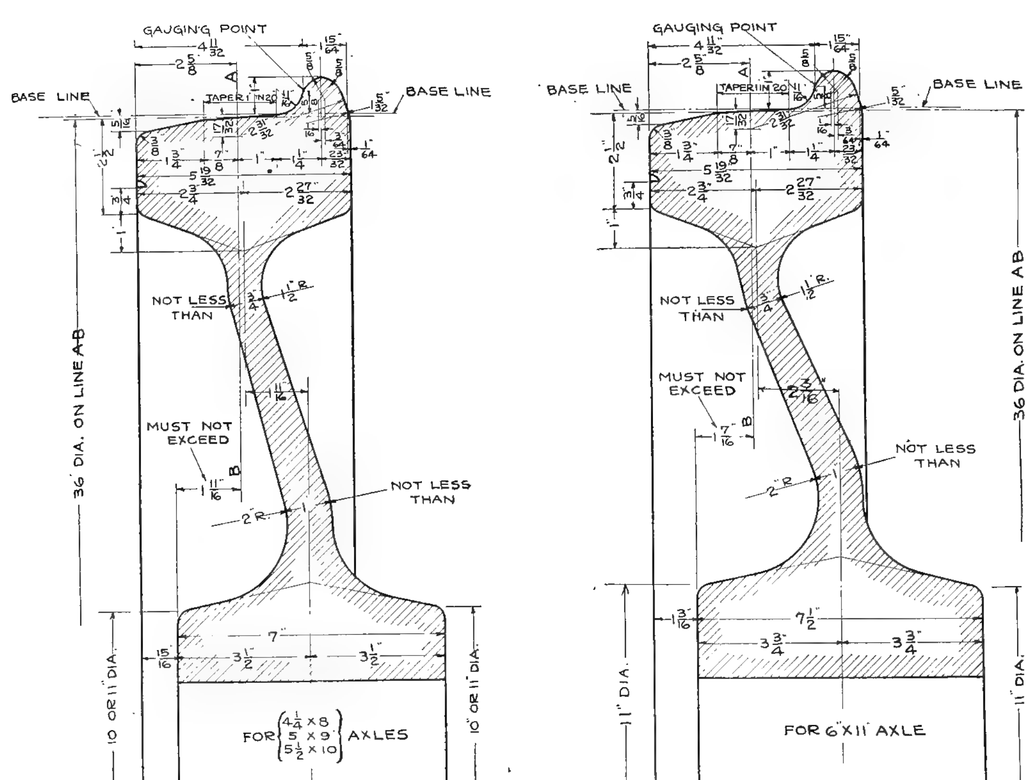


Fig. 2922—Recommended Practice for 36 in. Solid Steel Wheels (M. C. B. Sheet S.)

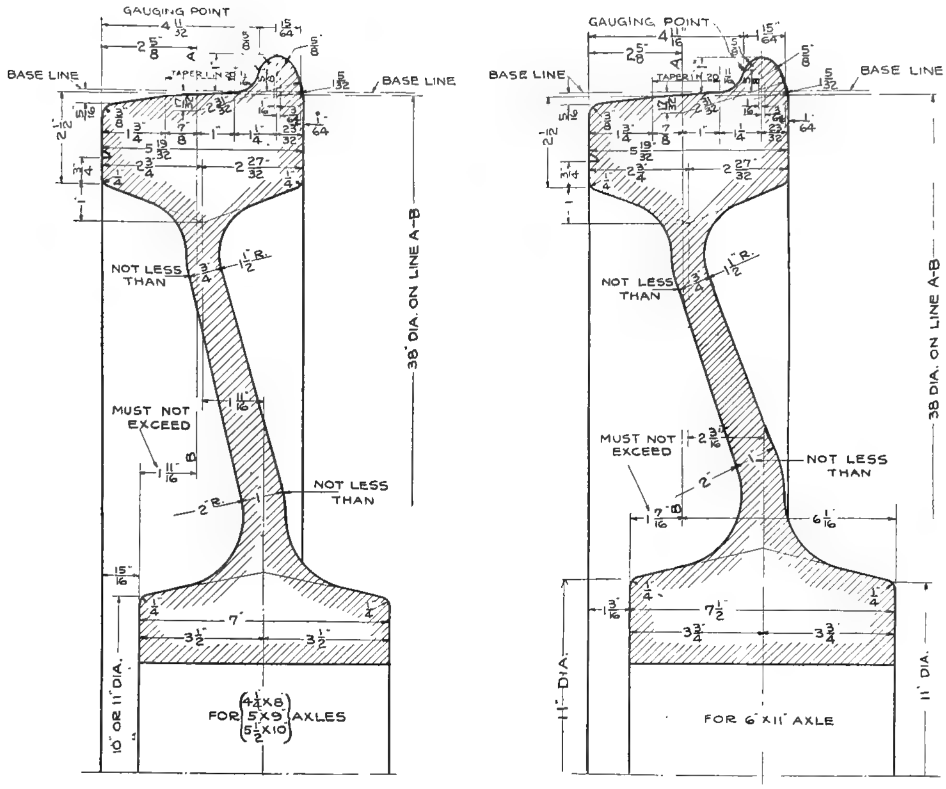


Fig. 2923—Recommended Practice for 38 in. Solid Steel Wheels. (M. C. B. Sheet T.)

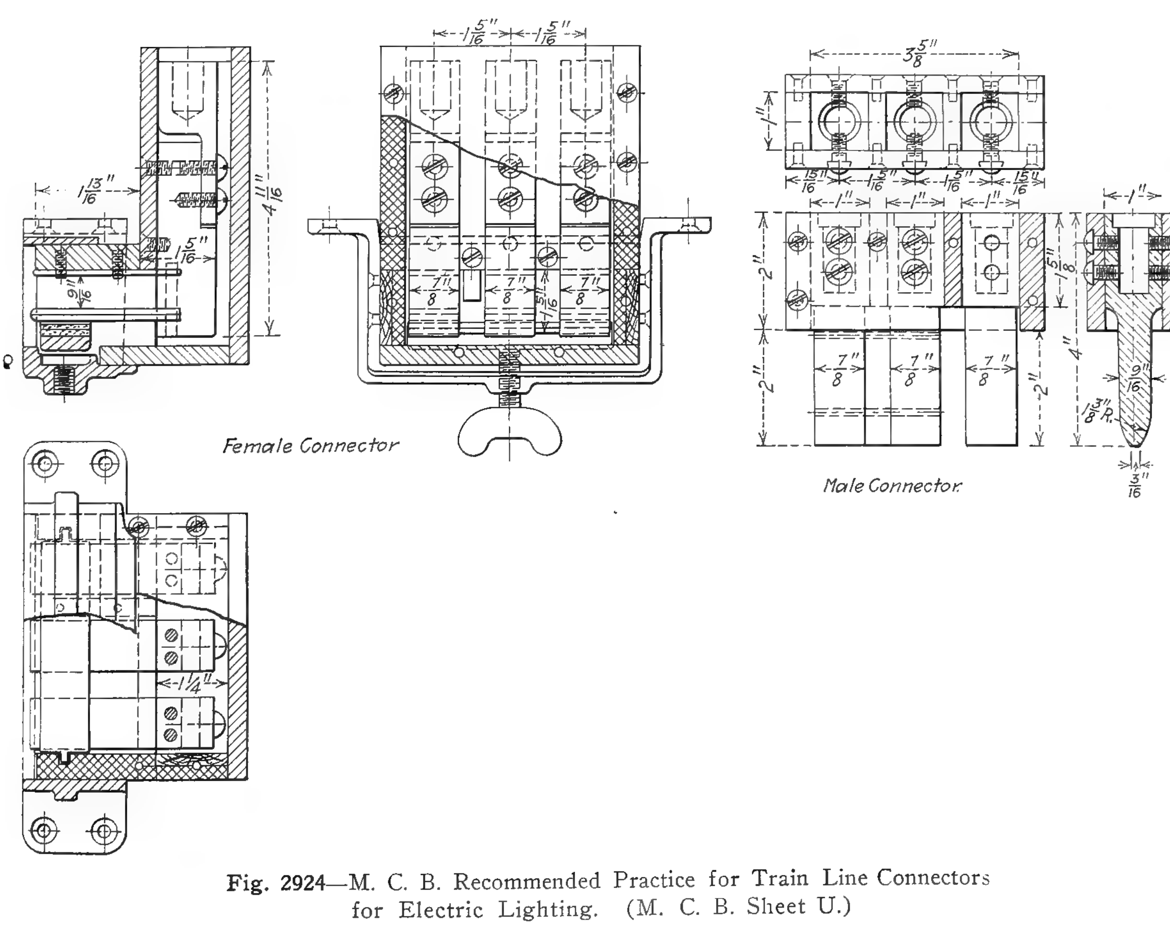


Fig. 2924—M. C. B. Recommended Practice for Train Line Connectors for Electric Lighting. (M. C. B. Sheet U.)

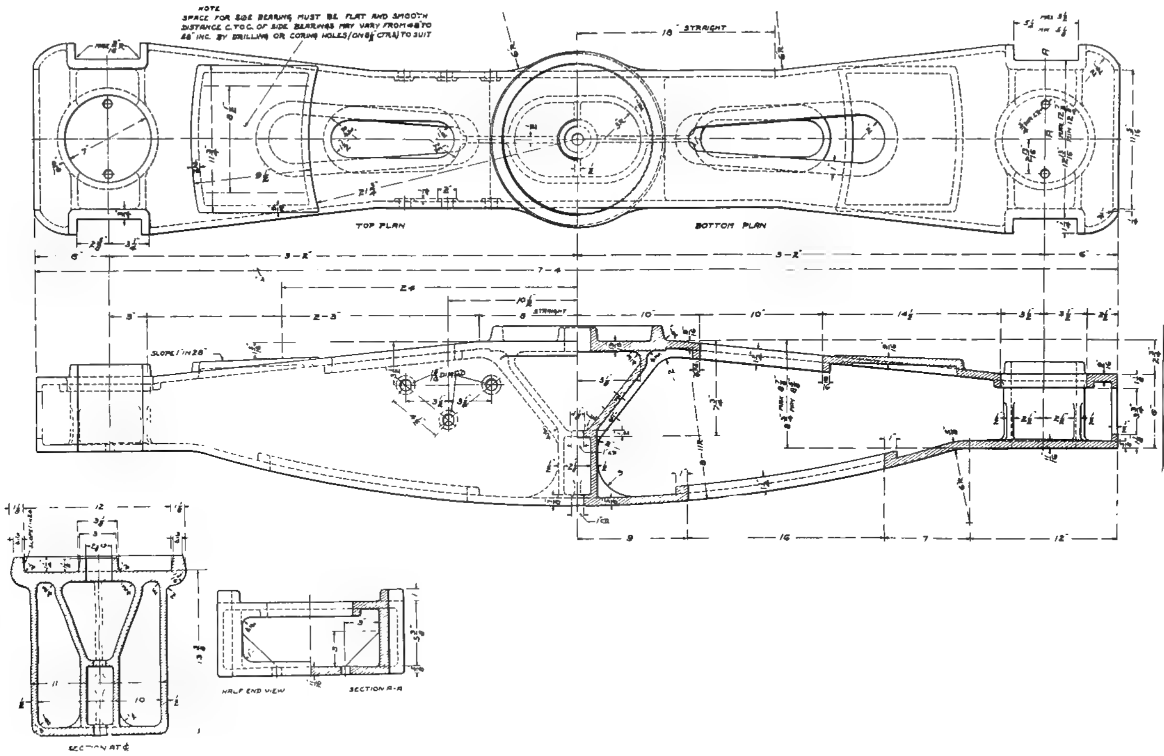


Fig. 2925—Recommended Practice for Cast Steel Truck Bolster for 80,000 lb. Capacity Car, With Center Plate Integral. (M. C. B. Sheet A.)

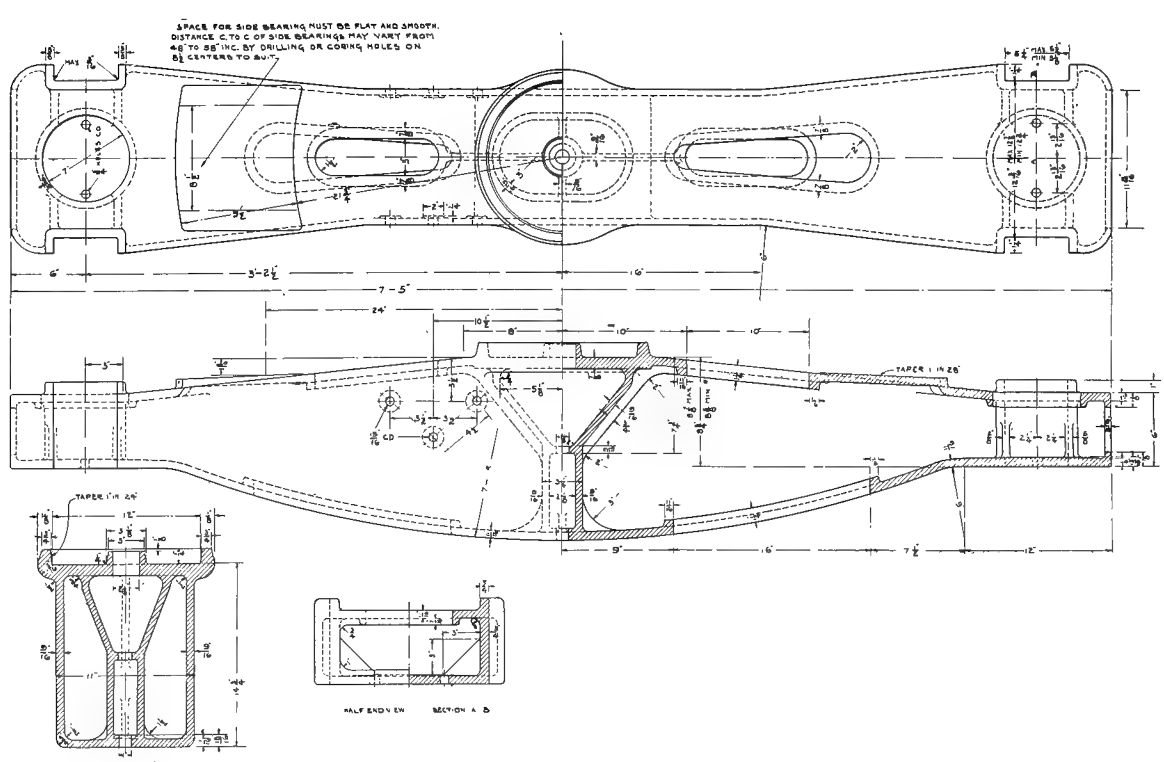


Fig. 2926—Recommended Practice for Cast Steel Truck Bolster for 100,000 lb. Capacity Car, With Center Plate Cast Integral. (M. C. B. Sheet A-1.)

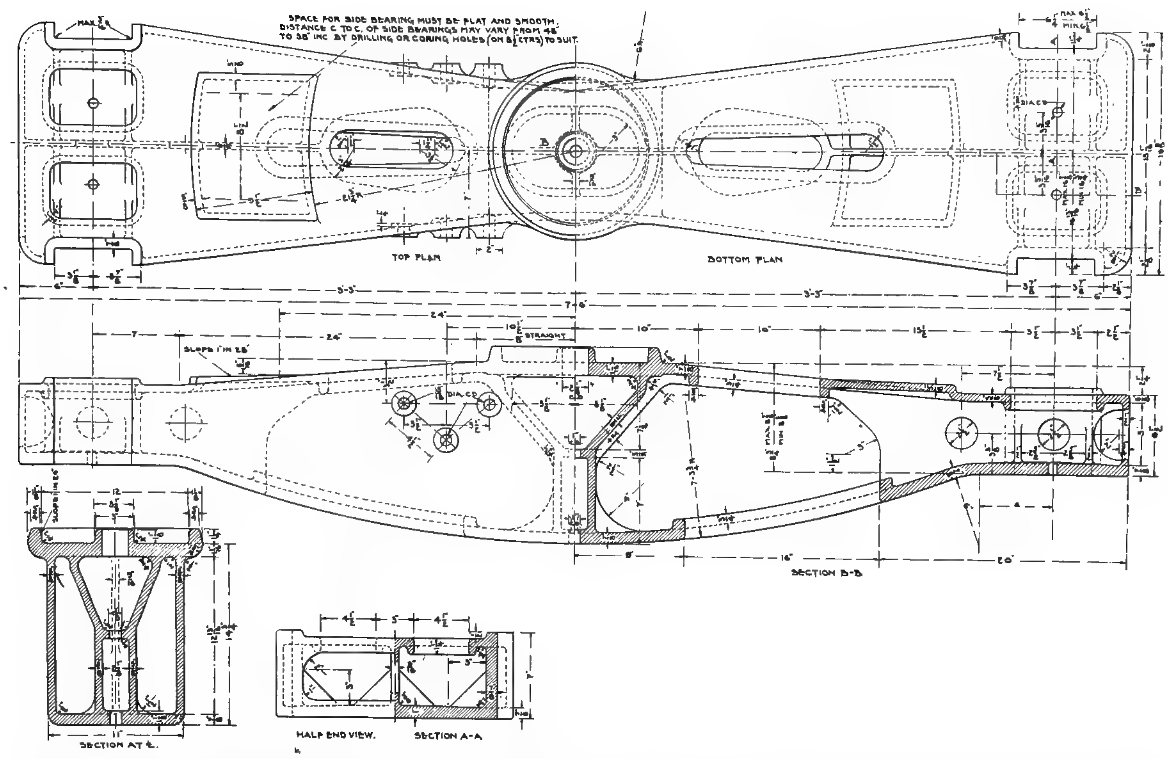


Fig. 2927—Recommended Practice for Cast Steel Truck Bolster for 140,000 lb. Capacity Car, With Center Plate Cast Integral. (M. C. B. Sheet A-2.)

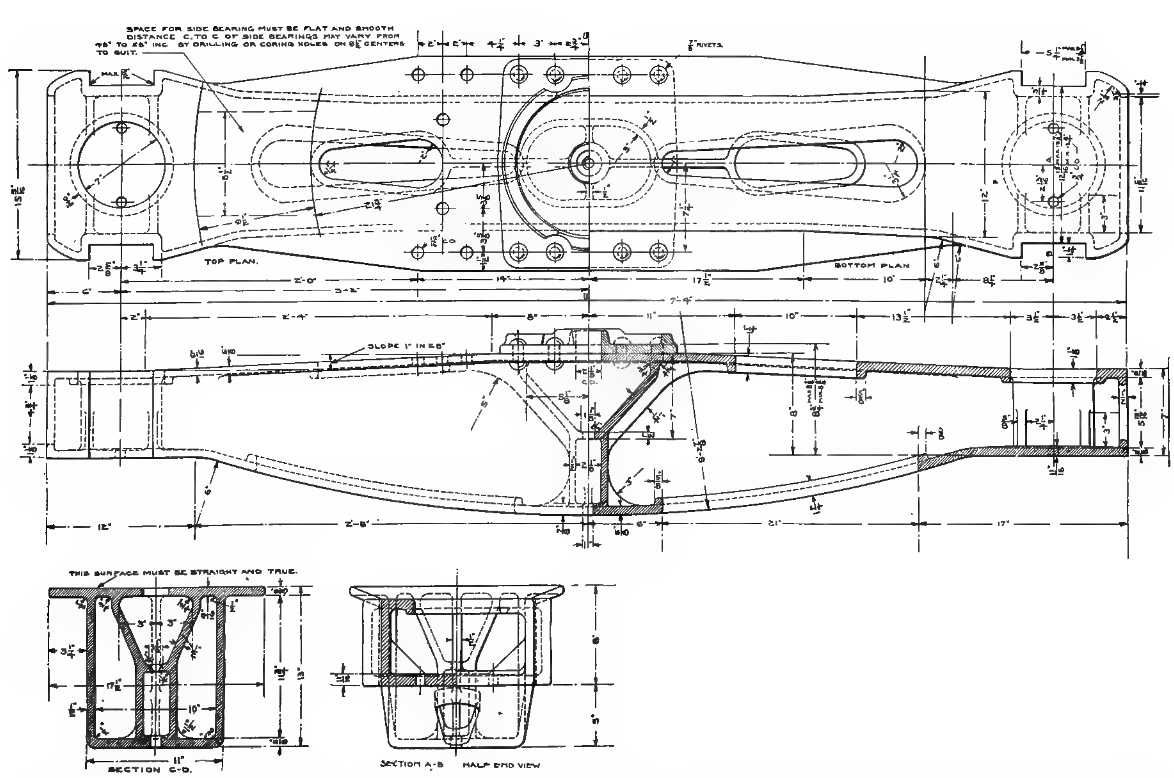


Fig. 2928—Recommended Practice for Cast Steel Truck Bolster for 80,000 lb. Capacity Car, With Separate Center Plate. (M. C. B. Sheet A-3.)

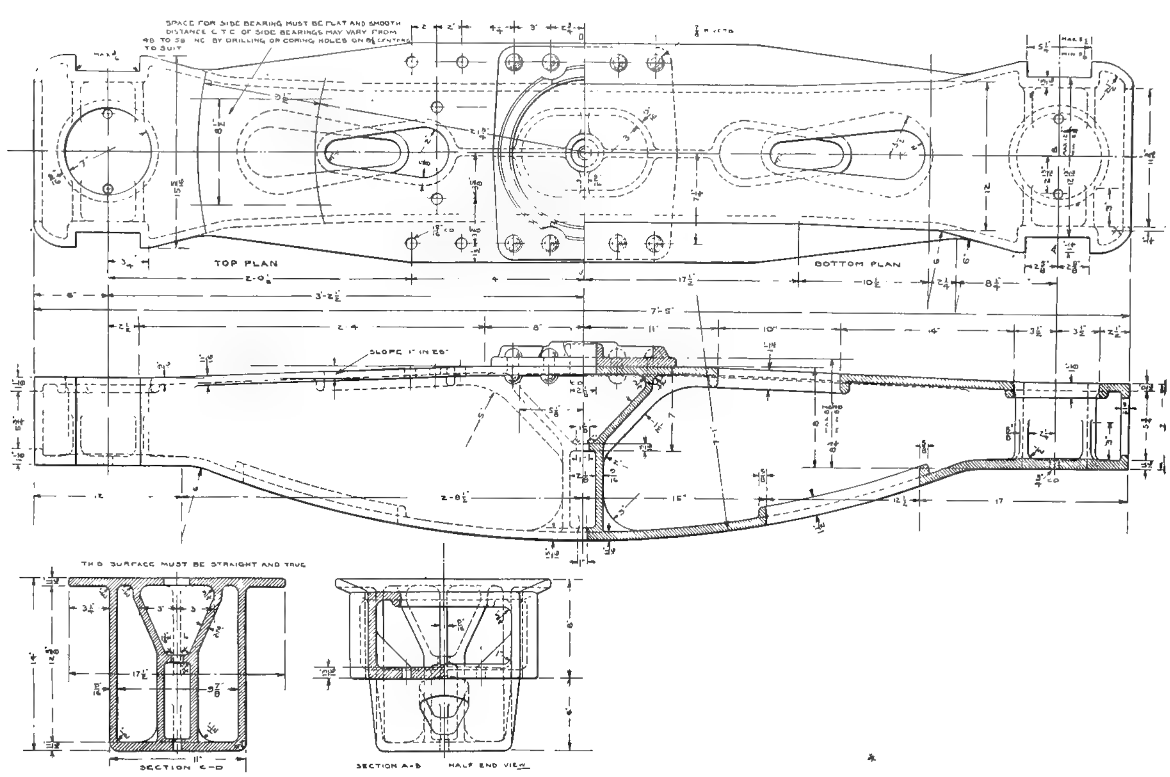


Fig. 2929—Recommended Practice for Cast Steel Truck Bolster for 100,000 lb. Capacity Car, With Separate Center Plate. (M. C. B. Sheet A-4.)

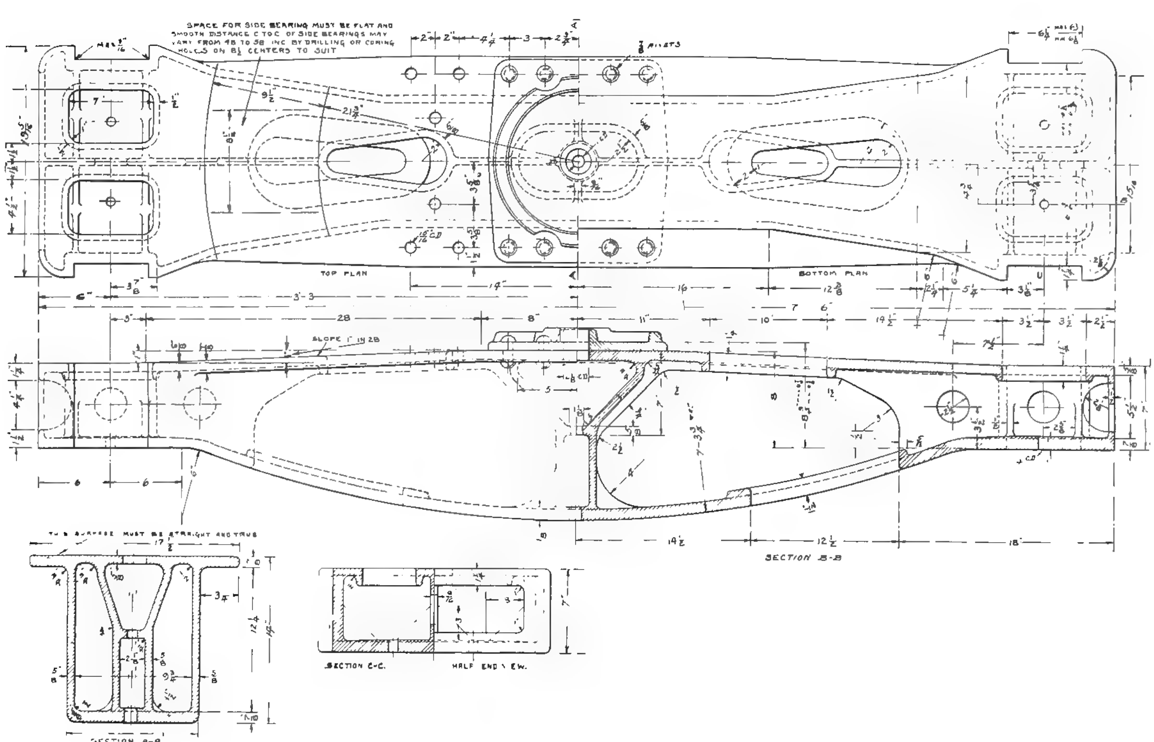


Fig. 2930—Recommended Practice for Cast Steel Truck Bolster for 140,000 lb. Capacity Car, With Separate Center Plate. (M. C. B. Sheet A-5.)

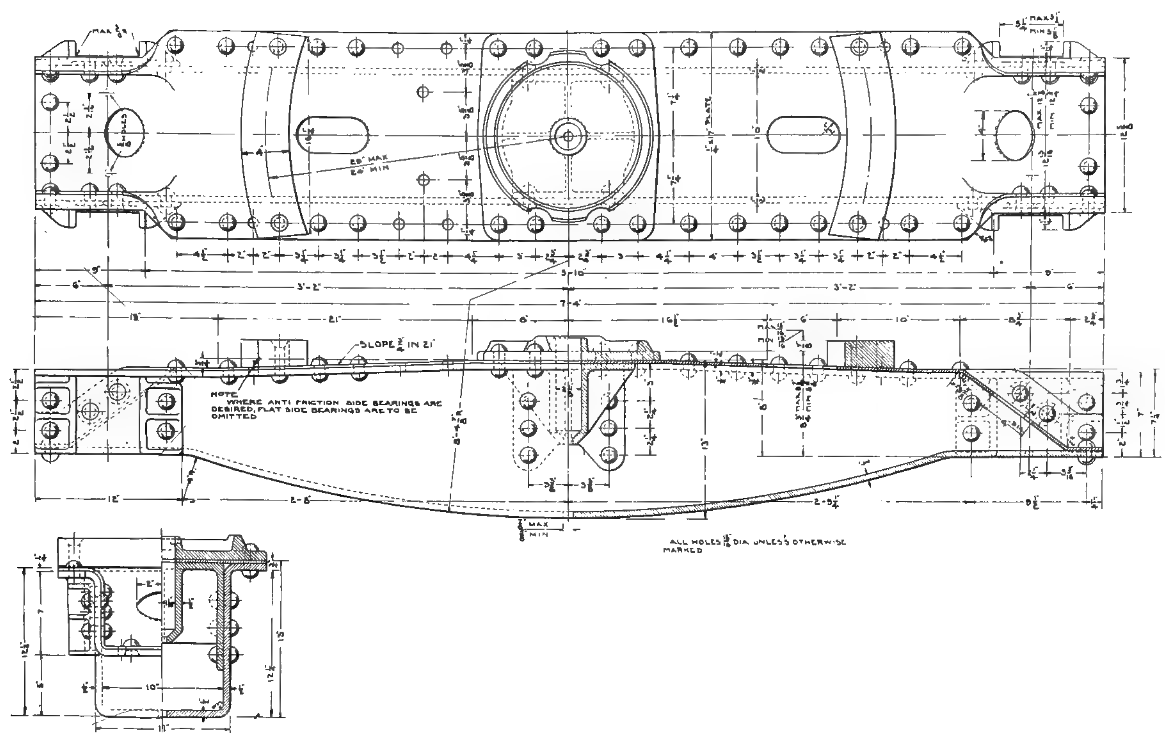


Fig. 2931—Recommended Practice for Pressed Steel Truck Bolster for 80,000 lb. Capacity Car. (M. C. B. Sheet A-6.)

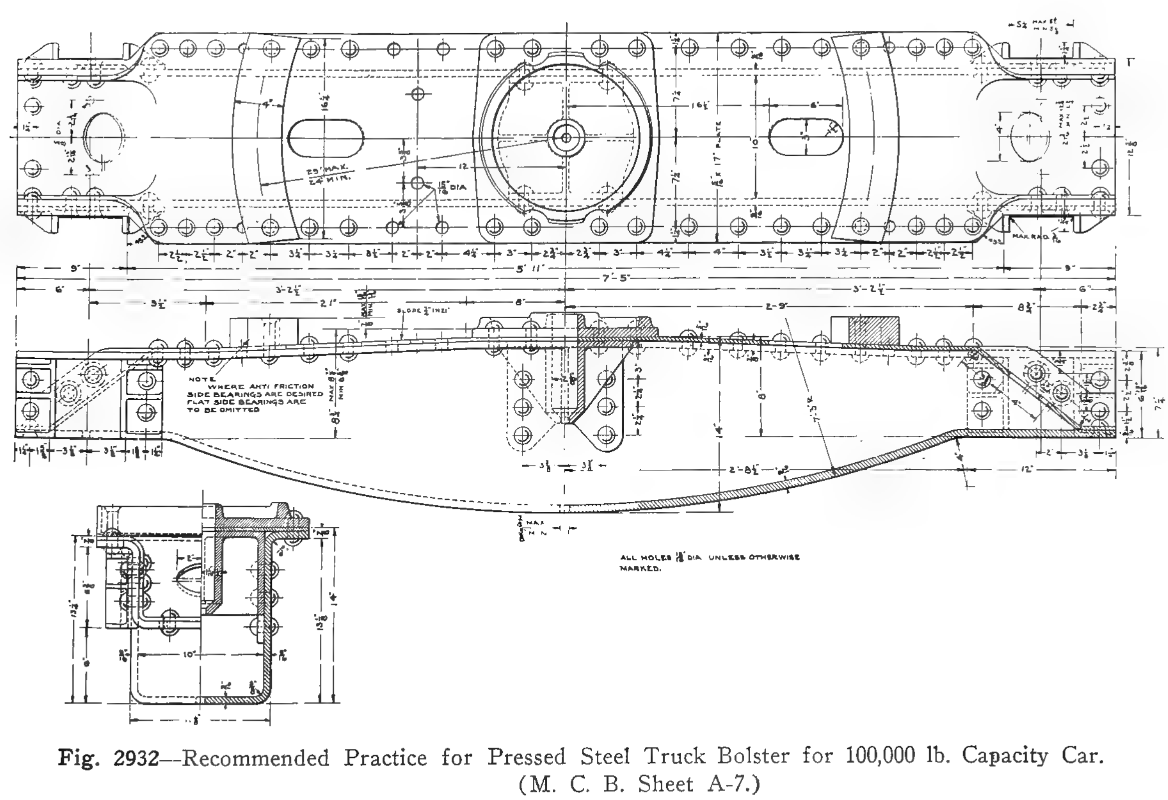


Fig. 2932—Recommended Practice for Pressed Steel Truck Bolster for 100,000 lb. Capacity Car. (M. C. B. Sheet A-7.)

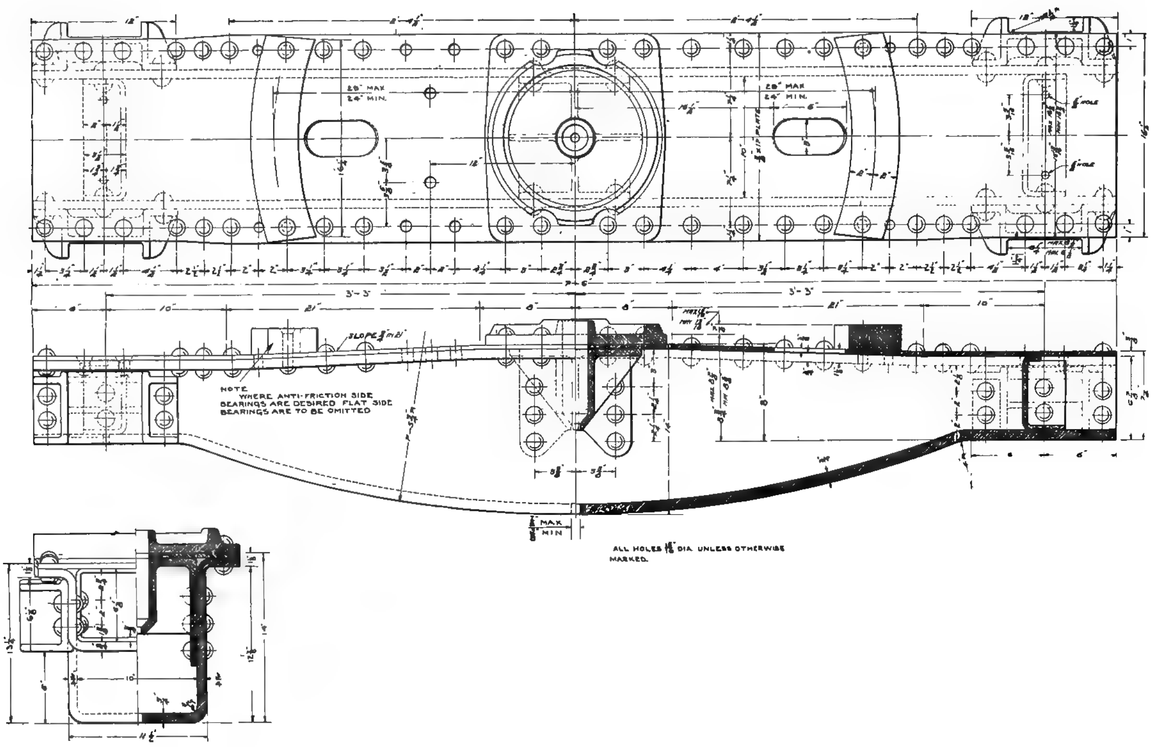


Fig. 2933—Recommended Practice for Pressed Steel Truck Bolster for 140,000 lb. Capacity Car. (M. C. B. Sheet A-8.)

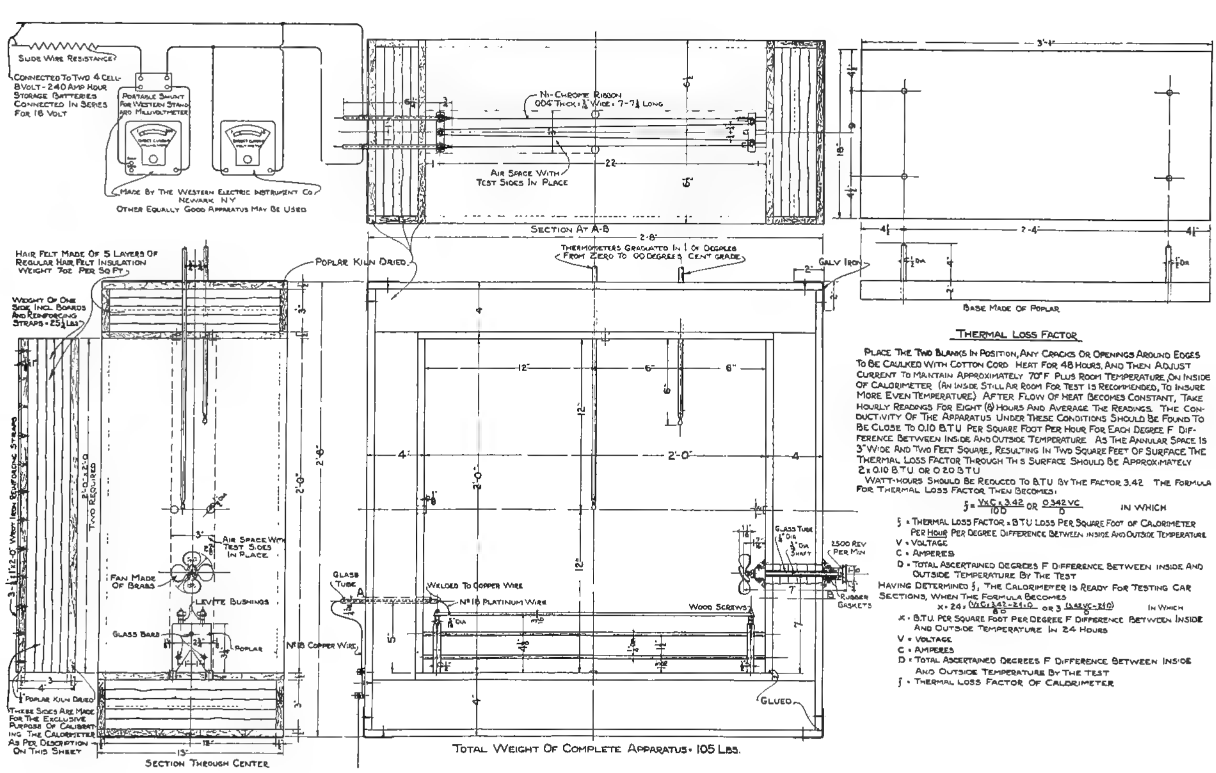
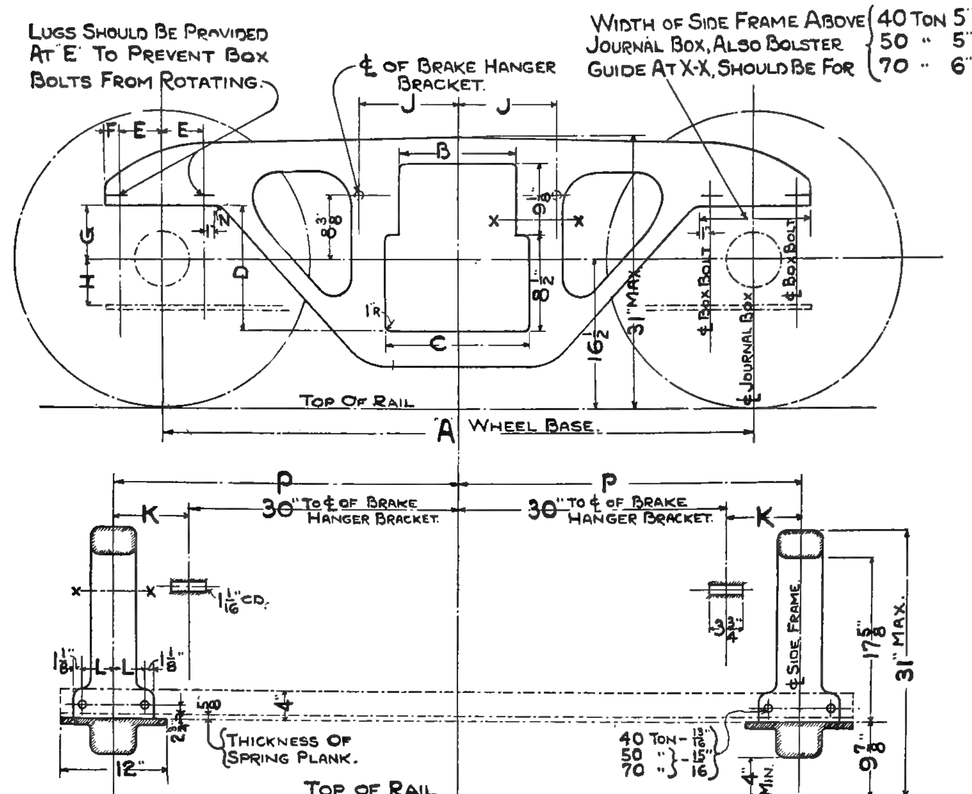
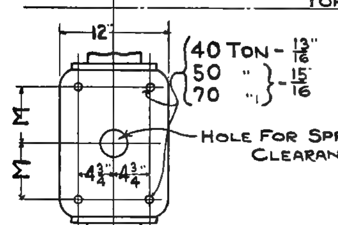


Fig. 2934—Recommended Practice for Insulation, Method and Apparatus for Testing. (M. C. B. Sheet G.)





PLAN OF SPRING SEAT.

SIDE FRAME.

Capacity	A	B	C	D	E	F	G	H	J	K	L	M	N	Box Bolts
40 Ton	5'-6"	13"	16"	12¼"	4½"	1½"	5⅝"	5⅞"	10½"	8"	3⅜"	6"	1½"	1⅛"
50 "	5'-6"	13"	16"	12½"	4¾"	1½"	5⅞"	6⅛"	10½"	8½"	3⅜"	6"	2"	1¼"
70 "	5'-10"	17"	20"	13⅛"	5¼"	1¾"	6½"	6½"	12½"	9"	3⅞"	8 1/16"	2½"	1⅜"

Dimensions "E", "G", & "H" Conform To M.C.B. Standard For Journal Boxes.
"F" Is A Minimum Dimension.

Fig. 2935—Recommended Practice for Truck Sides, Cast Steel, Limiting Dimensions for 80,000, 100,000 and 140,000 lb. Capacity Cars (M. C. B. Sheet B.)

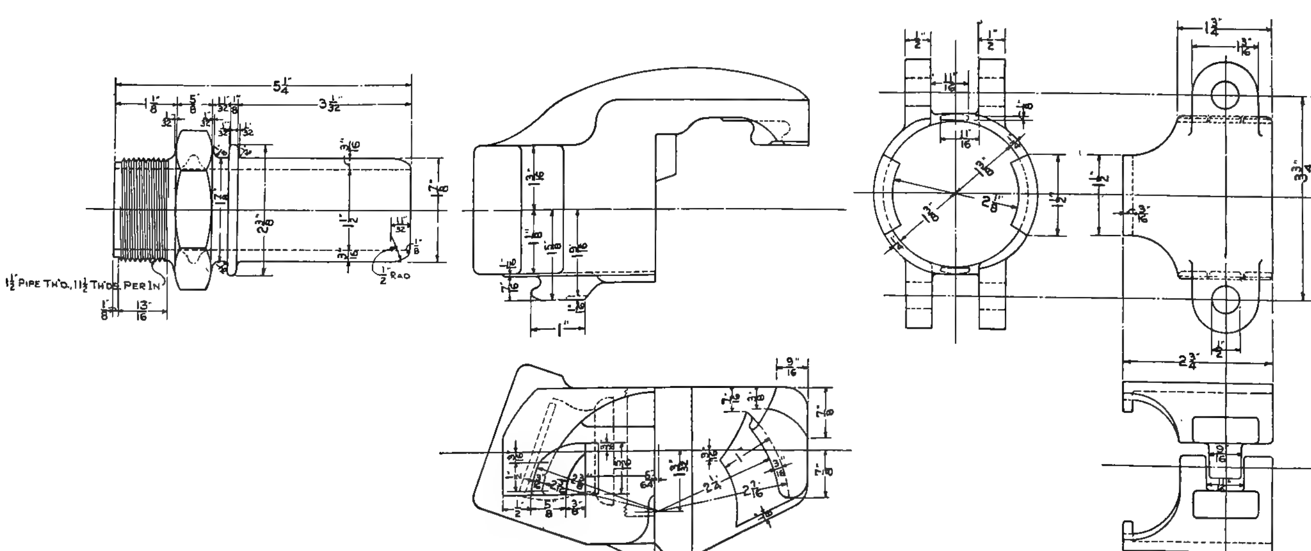


Fig. 2936—Recommended Practice for Steam Hose Couplings. (M. C. B. Sheet Q-1.)

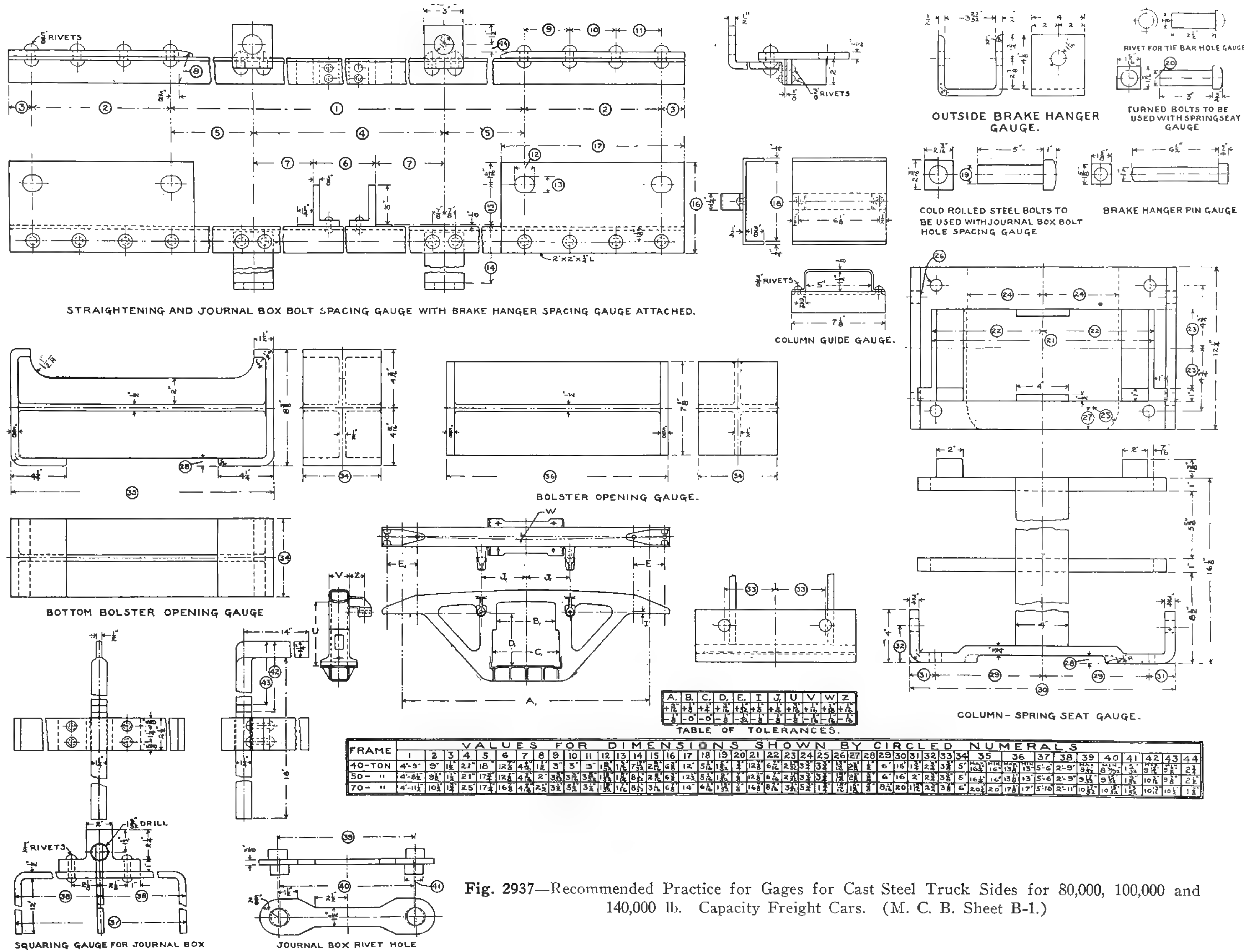


TABLE OF TOLERANCES.

A,	B,	C,	D,	E,	I	J,	U	V	W	Z
+3/16"	+1/8"	+1/4"	+3/16"	+1/32"	+1/8"	+1/4"	+1/16"	+1/16"	+1/16"	+1/16"
−1/8"	−0"	−0"	−1/8"	−1/32"	−1/8"	−1/8"	−1/8"	−1/16"	−1/16"	−1/16"

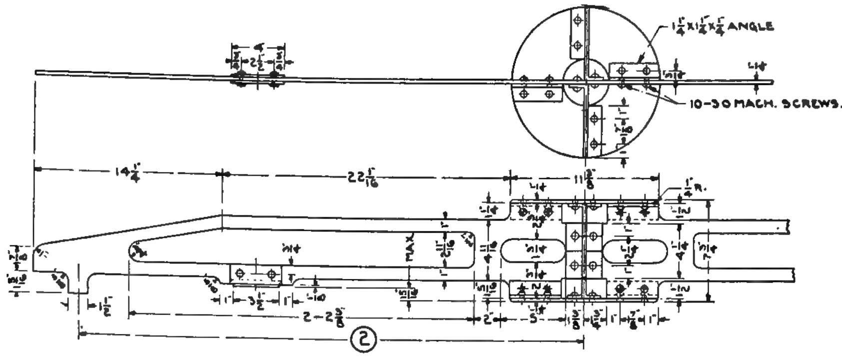
VALUES FOR DIMENSIONS SHOWN BY CIRCLED NUMERALS

FRAME	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
40-TON	4'-9"	9"	1 1/2"	21"	18"	12 7/8"	4 3/16"	1 1/2"	3"	3"	3"	1 13/32"	1 5/16"	7 17/32"	2 9/16"
50- "	4'-8 1/2"	9 1/2"	1 1/2"	21"	17 3/4"	12 7/8"	4 7/16"	2"	3 5/32"	3 5/16"	3 5/32"	1 13/32"	1 5/16"	8 1/32"	2 9/16"
70- "	4'-11 1/2"	10 1/2"	1 3/4"	25"	17 3/4"	16 7/8"	4 7/16"	2 1/2"	3 1/2"	3 1/2"	3 1/2"	1 13/32"	1 7/16"	8 1/32"	3 1/16"

FRAME	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
40-TON	6 3/8"	12"	5 1/16"	1 5/32"	3/4"	12 7/8"	6 7/16"	2 11/32"	3 3/4"	3 3/4"	13/16"	2 3/8"	1/2"	6"	16"
50- "	6 3/8"	12 1/2"	5 1/16"	1 5/32"	7/8"	12 7/8"	6 7/16"	2 11/32"	3 3/4"	3 3/4"	13/16"	2 3/8"	5/8"	6"	16"
70- "	6 7/8"	14"	6 1/16"	1 13/32"	7/8"	16 7/8"	8 7/16"	3 5/32"	5 3/4"	1 3/4"	15/16"	1 5/8"	5/8"	8 1/16"	20"

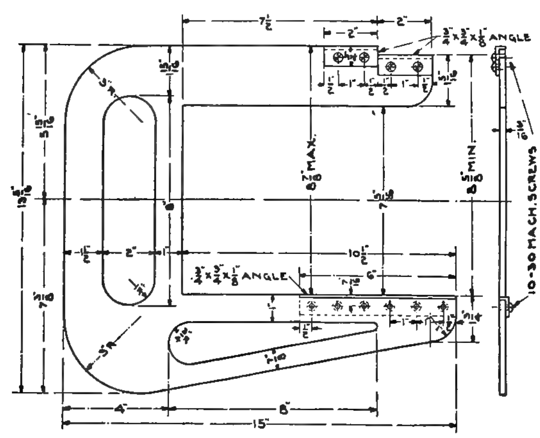
FRAME	31	32	33	34	35 MAX	35 MIN	36 MAX	36 MIN	37	38	39 MAX	40 MIN	41	42 MAX	43 MIN	44
40-TON	1 3/4"	2 3/4"	3 3/8"	5"	16 1/2"	16"	13 1/8"	13"	5'-6"	2'-9"	9 3/32"	8 31/32"	1 5/32"	9 11/16"	9 3/8"	2 3/4"
50- "	2"	2 3/4"	3 3/8"	5"	16 1/2"	16"	13 1/8"	13"	5'-6"	2'-9"	9 17/32"	9 15/32"	1 9/32"	10 3/16"	9 7/8"	2 1/2"
70- "	1 1/2"	2 3/4"	3 7/8"	6"	20 1/2"	20"	17 1/8"	17"	5'-10"	2'-11"	10 17/32"	10 15/32"	1 13/32"	10 13/16"	10 1/2"	1 7/8"

Fig. 2937—Recommended Practice for Gages for Cast Steel Truck Sides for 80,000, 100,000 and 140,000 lb. Capacity Freight Cars. (M. C. B. Sheet B-1.)

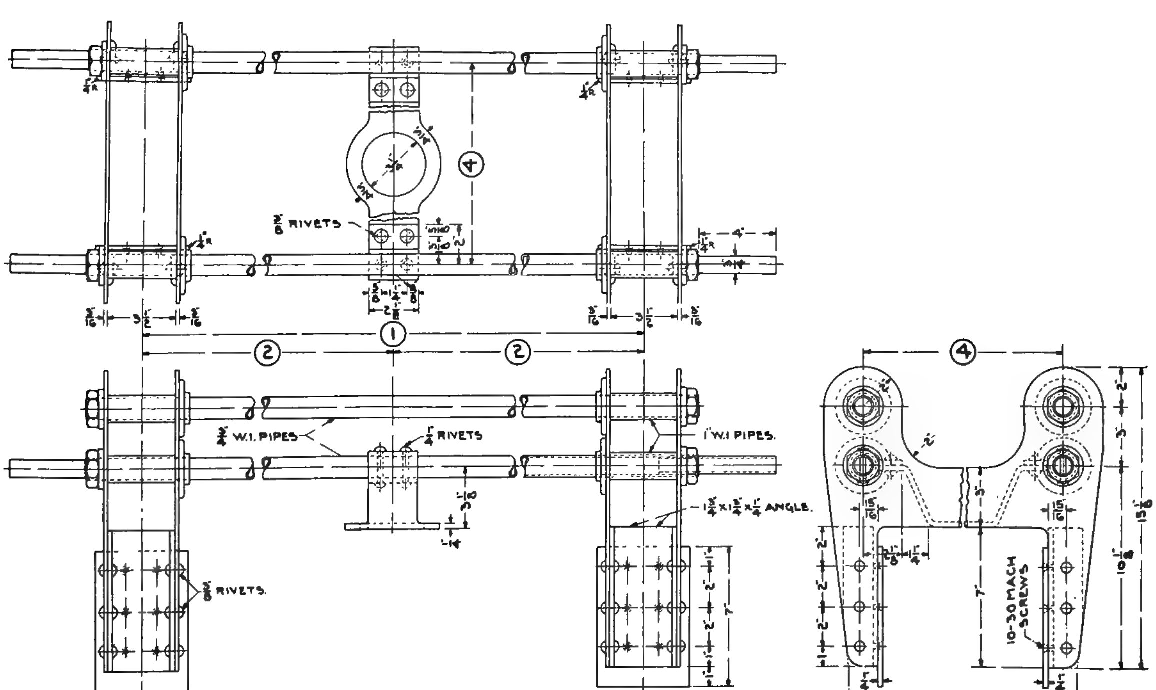


CENTER PLATE AND STRAIGHT EDGE GAUGE.

BOLSTER.	VALUES FOR DIMENSIONS SHOWN BY CIRCLED NUMERALS.								
	1	2	3	4	5	6	7	8	9
80000 LBS.	6'-4"	3'-2"	5 1/8"	14 7/8"	12 7/8"	MAX. 5 1/2"	MIN. 5 1/8"	MAX. 12 7/8"	MIN. 12 3/4"
100000 "	6'-5"	3'-2 1/2"	5 1/8"	14 7/8"	12 7/8"	5 1/2"	5 1/8"	12 7/8"	12 3/4"
140000 "	6'-6"	3'-3"	6 1/8"	18 7/8"	16 7/8"	6 1/2"	6 1/8"	16 7/8"	16 3/4"

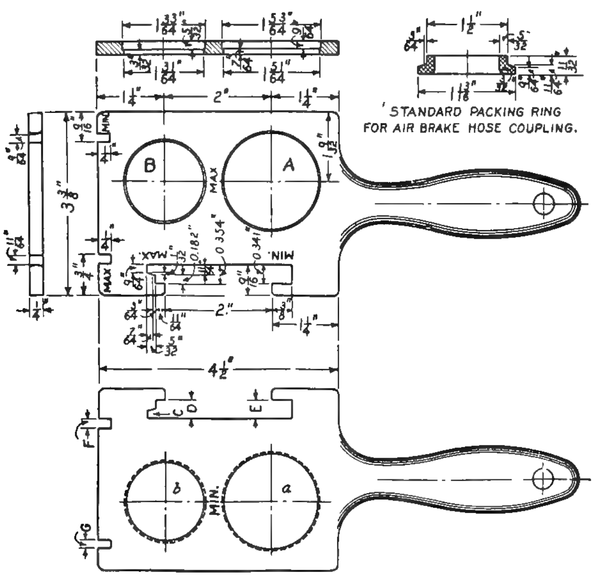


SPRING SEAT TO SIDE BEARING GAUGE.



COLUMN POST LENGTH GAUGE.

Fig. 2938—Recommended Practice for Gages for Truck Bolsters for 80,000, 100,000 and 140,000 lb. Capacity Freight Cars. See also Fig. 2941. (M. C. B. Sheet D.)



OPENINGS A AND a ARE FOR GAUGING MAX. AND MIN. (EXTERNAL) DIAMETER OF PACKING RING FLANGE.
OPENINGS B AND b ARE FOR GAUGING MAX. AND MIN. (EXTERNAL) DIAM. OF PROJECTING WALL OR FACE PORTION OF RING.
SLOT C IS FOR GAUGING THICKNESS OF FLANGE AND BEVEL ON SURFACE OF FLANGE.
SLOTS D AND E ARE FOR GAUGING MAX. AND MIN. OVERALL DEPTH OF RING AT FACE.
SLOTS F AND G ARE FOR GAUGING MAX. AND MIN. THICKNESS OF PROJECTING WALL OR FACE PORTION OF RING.
FLANGE OF PACKING RING MUST FIT SLOT C. RINGS MUST ENTER ALL SECTIONS OF GAUGE MARKED "MAX." AND MUST NOT ENTER ANY SECTION OF GAUGE MARKED "MIN."

Fig. 2939—Recommended Practice for Gage for Air Brake Hose Coupling Packing Ring. (M. C. B. Sheet Q-1.)

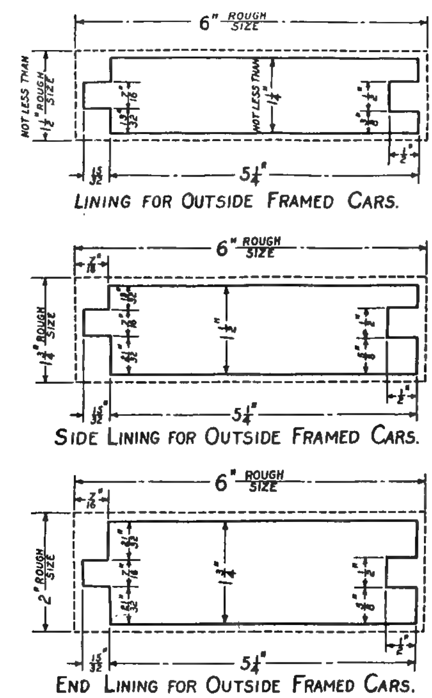


Fig. 2940—Recommended Practice for Lining for Outside Framed Cars. (M. C. B. Sheet F.)

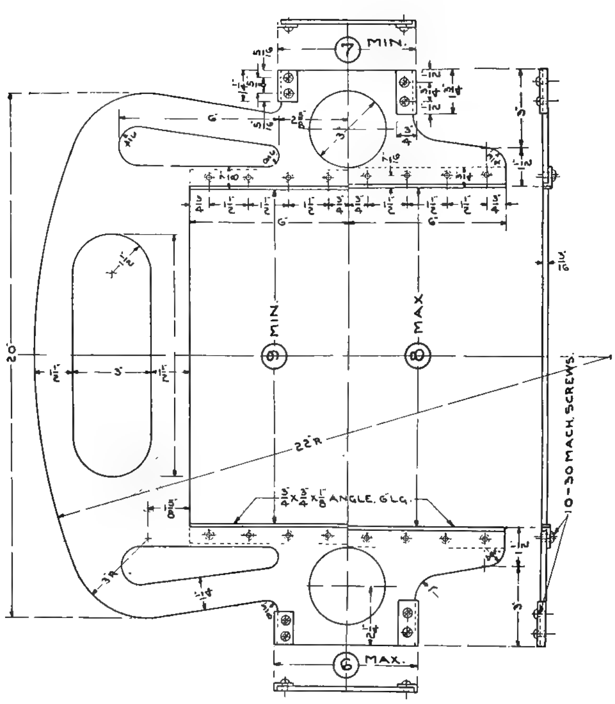


Fig. 2941—Recommended Practice for Gages for Truck Bolsters. See Fig. 2938. (M. C. B. Sheet D.)

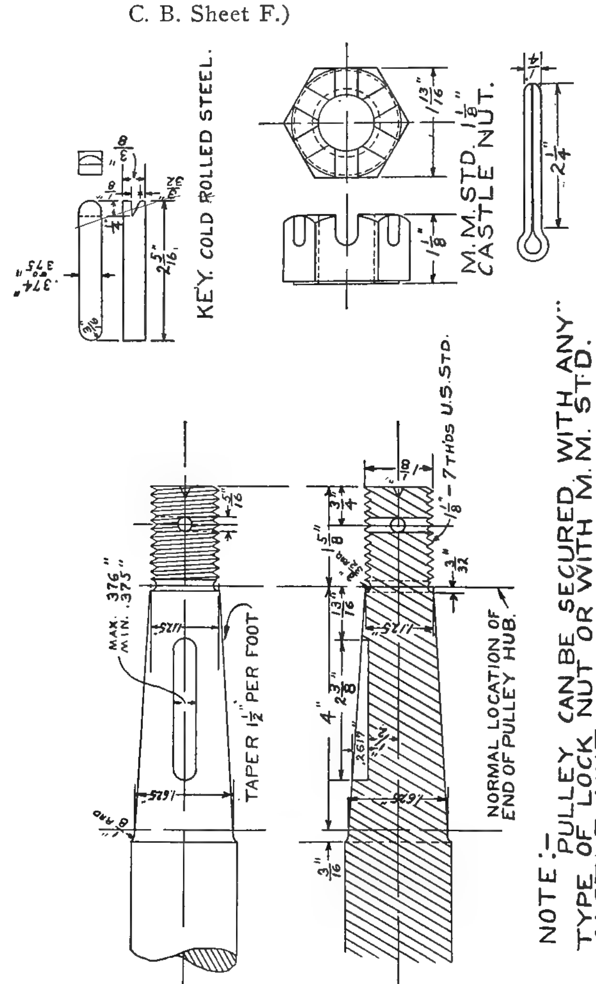


Fig. 2942—Recommended Practice for Pulley End of Armature Shaft. (M. C. B. Sheet U-11.)

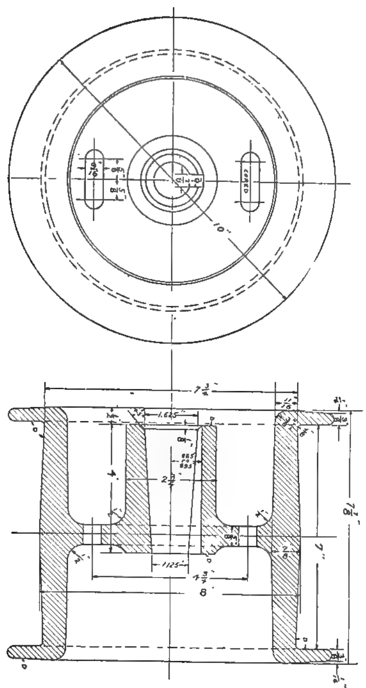


Fig. 2943—Recommended Practice for Pulley for Generator Armature Shaft. (M. C. B. Sheet U-11.)

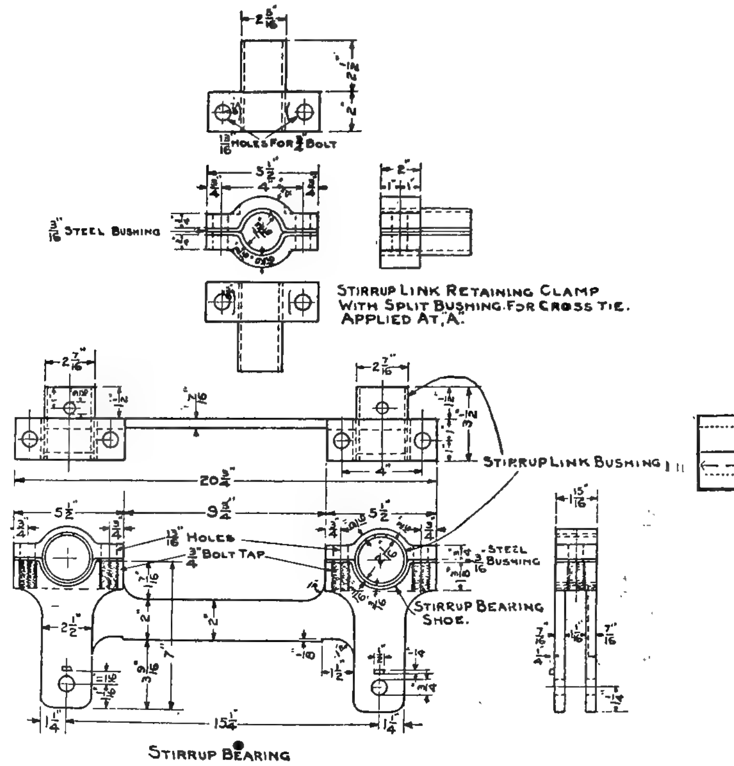


Fig. 2943A—See Fig. 2944.

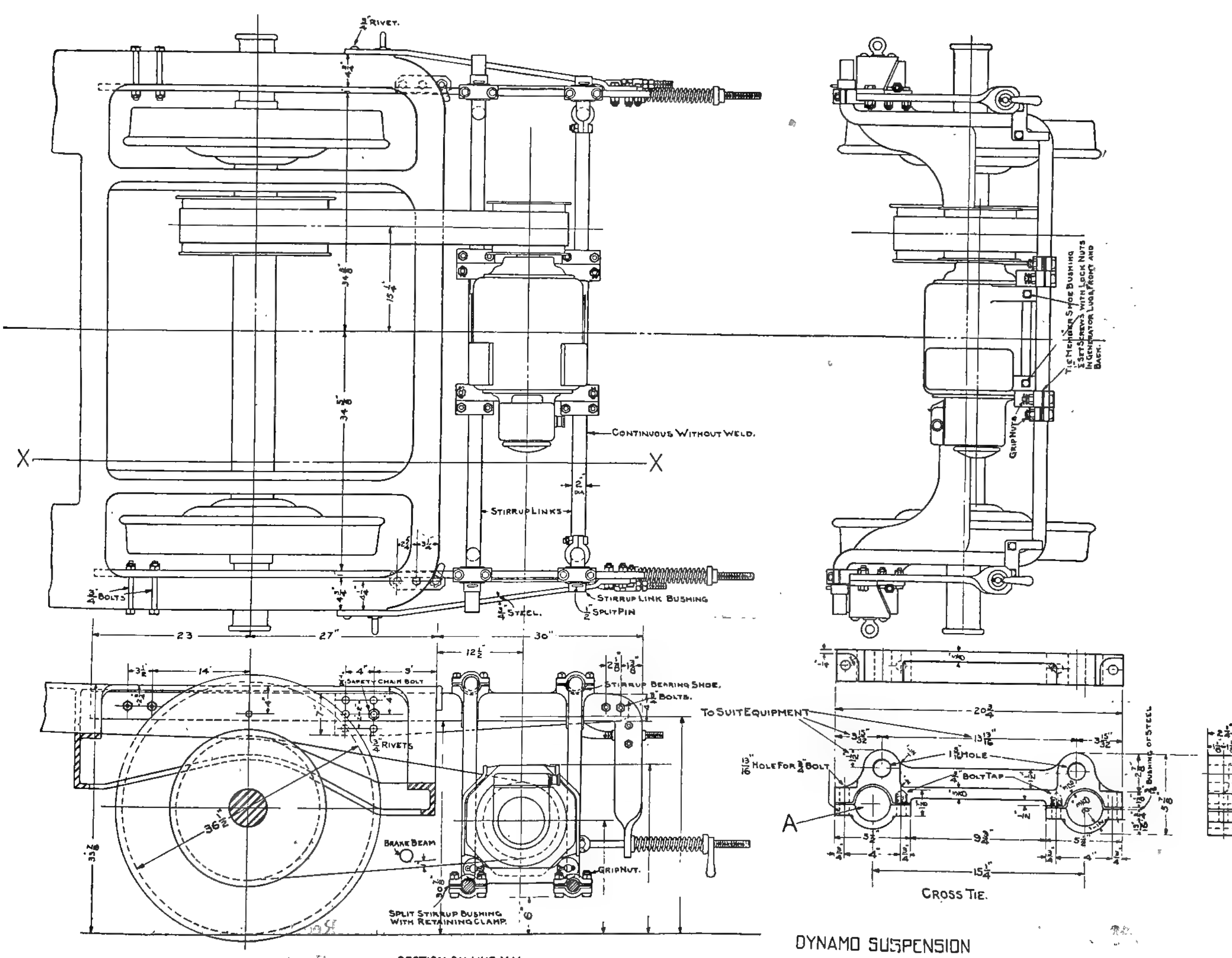


Fig. 2944—Recommended Practice for Dynamo Suspension, Link Type Drive. (M. C. B. Sheet U-10.)

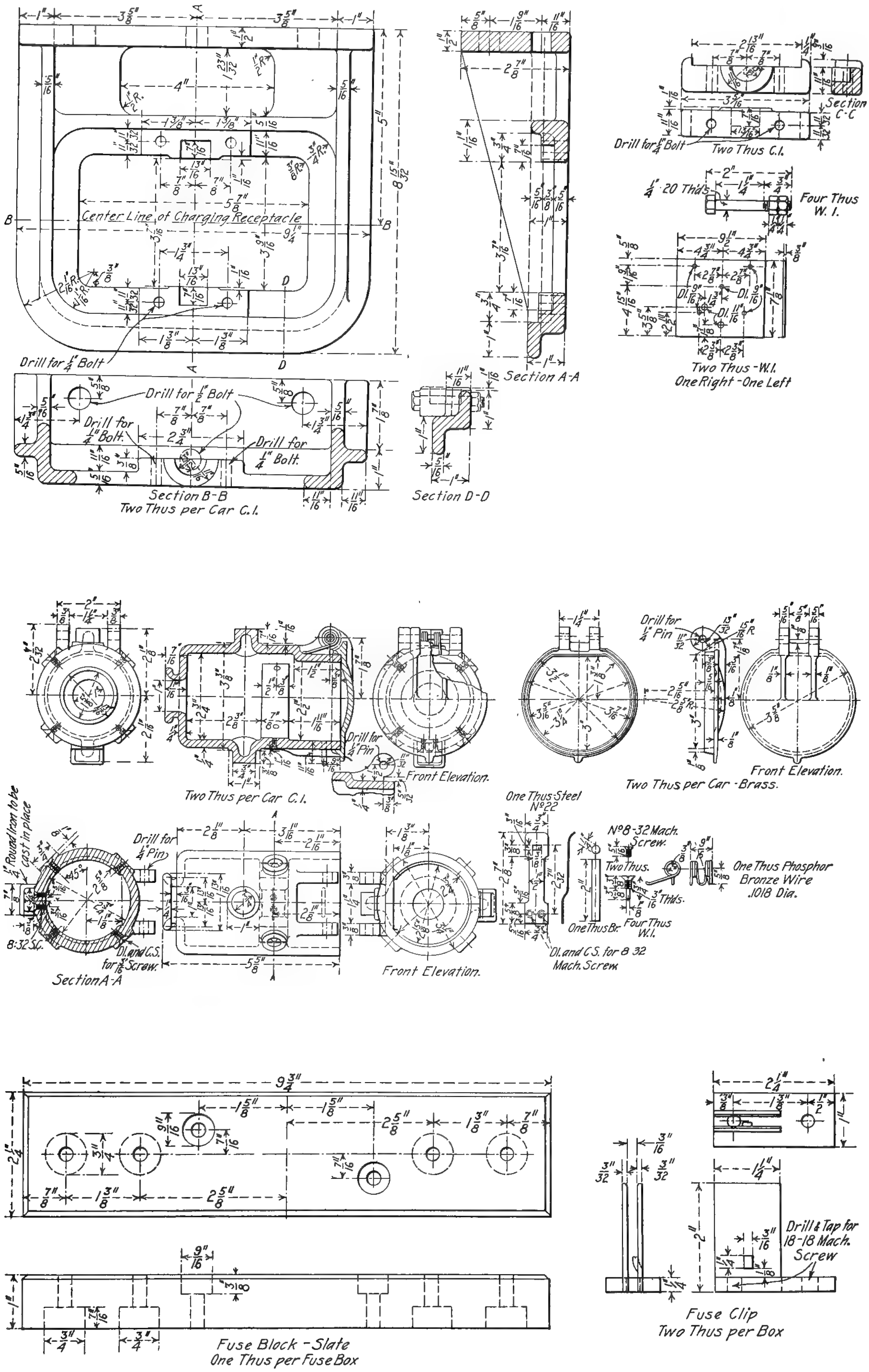


Fig. 2945—M. C. B. Recommended Practice for Electric Lighting; Charging Receptacle and Details. (M. C. B. Sheets U1 and U2.) Fuse Box Slate and Fuse Clip, (M. C. B. Sheet U5).

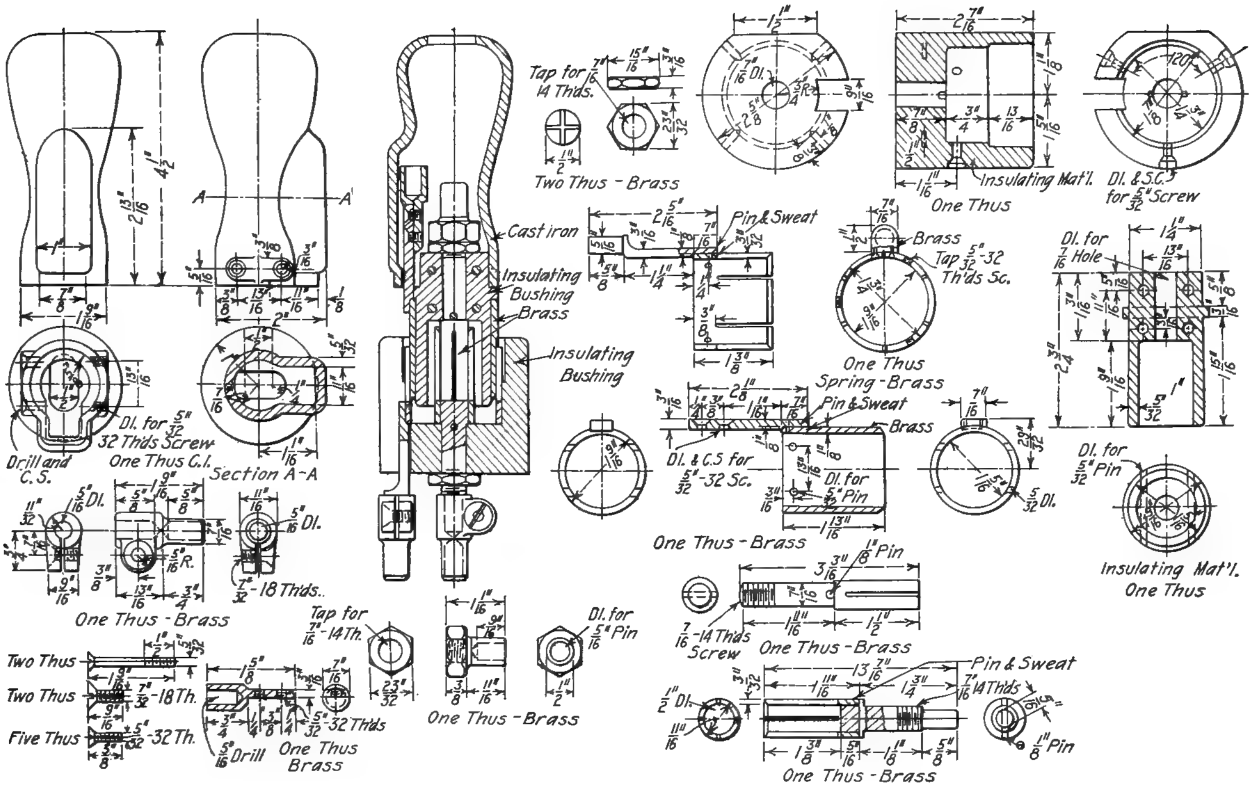


Fig. 2946—M. C. B. Recommended Practice for Charging Receptacle Details for Electric Lighting. (M. C. B. Sheet U3.) See also Fig. 2945.

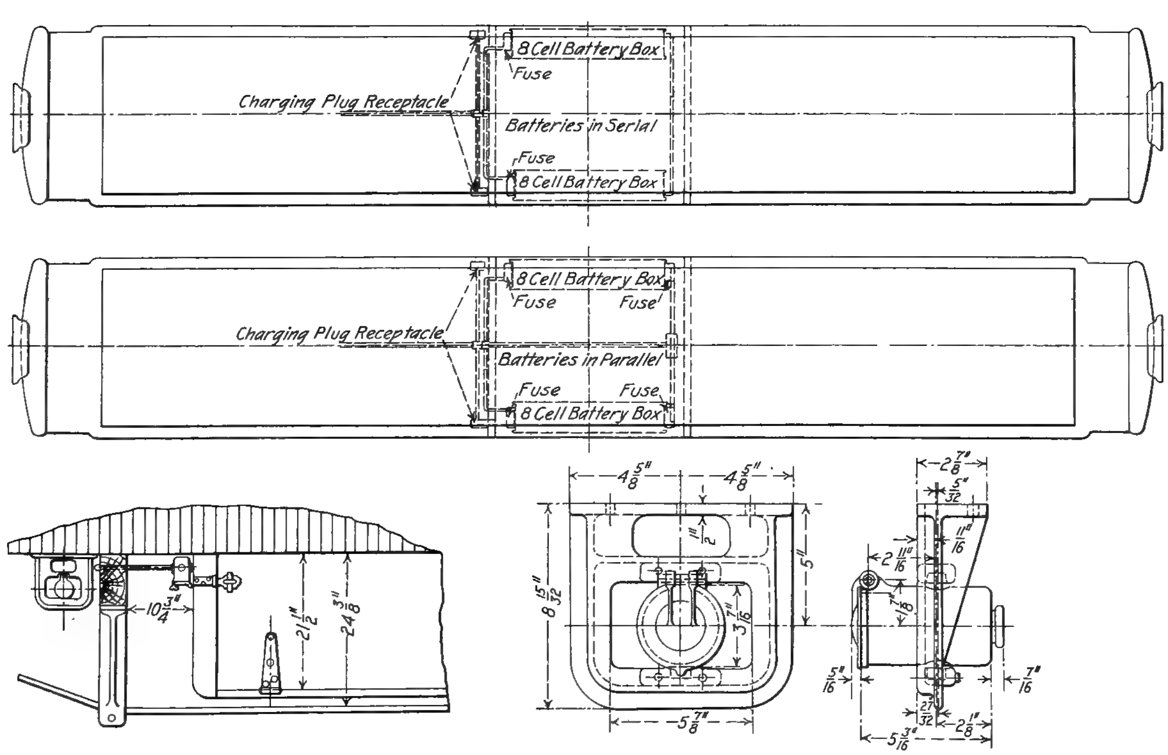
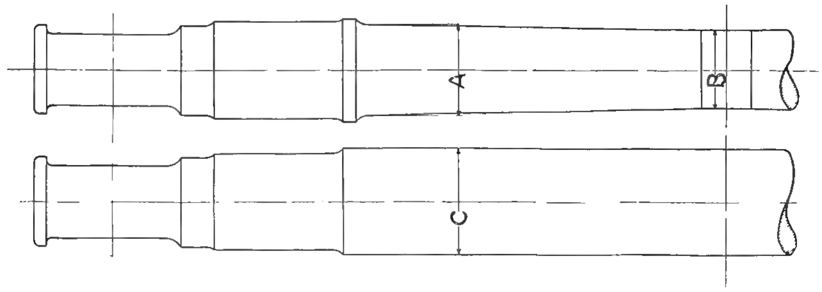
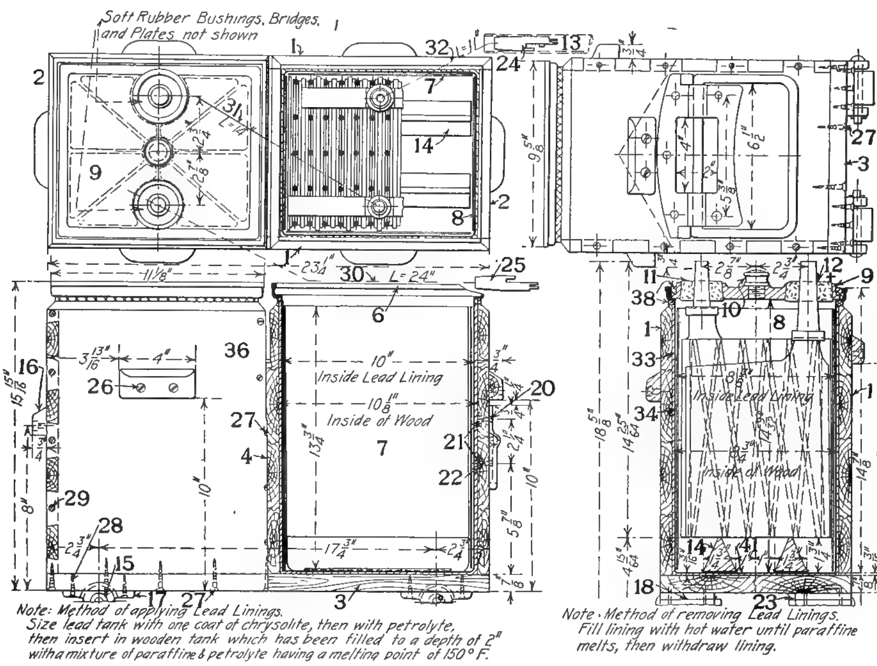


Fig. 2947—M. C. B. Recommended Practice for Application of Fuse Block for Electric Lighting. (M. C. B. Sheet U4.)



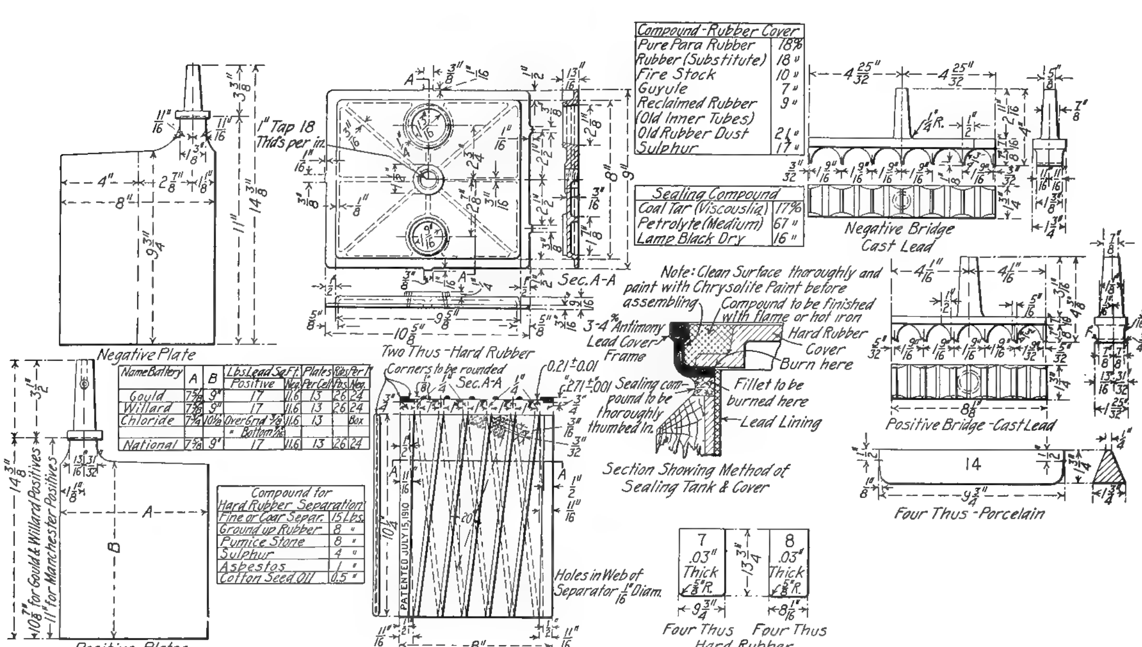
Size of Journal	A	B	C
$4\frac{1}{4}$	$5\frac{13}{16}$	$4\frac{3}{4}$	$6\frac{7}{16}$
5	$6\frac{3}{16}$	$5\frac{1}{8}$	$6\frac{9}{16}$
$5\frac{1}{2}$	$6\frac{3}{4}$	$5\frac{7}{8}$	$6\frac{3}{4}$

Fig. 2948—Arrangement of Axle to Take Electric Lighting Generator Pulley.



No.	Prs.	Name	Material
1	2	Tank Sides	Wood
2	2	" Ends	"
3	1	" Bottom	"
4	1	" Partition	"
5	2	4 lbs. Lead Lining	Lead
6	2	Cover Frame	"
7	4	Rubber Side Lining	Hard Rub.
8	4	" End "	" "
9	2	Covers	" "
10	2	Vents	" "
11	2	Negative Term'l Bush.	Soft "
12	2	Positive " "	" "
13	1	Connector Sleeve	" "
14	4	Bottom Insulators	Porcelain
15	4	Rollers	"
16	6	Buffers	"
17	4	Roller Brackets	M. I.
18	4	" " Spindle	Steel
19	1	Chest Handle	"
20	6	¼" Fl Thread Stove Bolt	W. I.
21	6	¼" Nuts	"
22	6	¼" Washers	"
23	4	⅛" Cotter Pin	"
24	1	West'house Con'tor Male	Brass
25	1	Style #11557 " Female	"
26	12	#10-1" Rd Head Wood Sc.	"
27	26	#10-1½ Flat " " "	"
28	16	#14-1" " " " "	"
29	32	3/16" Wood Dowels	Wood
30	1	#6 Flex. R.C. Wire L=24	49 Strands
31	1	#6 — " " L=14	Solid
32	1	#6 Flex " " L=11	49 Strands
33		Petrolyte	
34		Paraffine	
35		Paint	
36		Solder Hard	
37		" Special Low Melting	
38		Sealing Compound	
39	8	#6-1½" Fl Head Wood Sc.	Brass
40	4	Connector Terminal	"
41	4	Bottom Ins. Support	Wood
42	2	Lead Tubing	Lead

Fig. 2949—M. C. B. Recommended Practice for Double Compartment Tanks for Lead Storage Batteries for Electric Lighting. (M. C. B. Sheet U6.)



Compound-Rubber Cover	
Pure Para Rubber	18%
Rubber (Substitute)	18 "
Fire Stock	10 "
Guyule	7 "
Reclaimed Rubber (Old Inner Tubes)	9 "
Old Rubber Dust	21 "
Sulphur	17 "

Sealing Compound	
Coal Tar (Viscousliq)	17%
Petrolyte (Medium)	67 "
Lamp Black Dry	16 "

Name Battery	A	B	Lbs. Lead Sq. Ft. Positive	Neg.	Plates Per Cell	Ribs Per 1" Pos.	Neg.
Gould	7⅝	9"	17	11.6	13	26	24
Willard	7⅝	9"	17	11.6	13	26	24
Chloride	7¼	10⅛	Over Grid ⅝	11.6	13		Box
			" Bottom 7/16				
National	7⅝	9"	17	11.6	13	26	24

Compound for Hard Rubber Separation	
Fine or Coar Separ.	15 Lbs.
Ground up Rubber	8 "
Pumice Stone	8 "
Sulphur	4 "
Asbestos	1 "
Cotton Seed Oil	0.5 "

Fig. 2950—M. C. B. Recommended Practice for Double Compartment Tank Details for Electric Lighting. (M. C. B. Sheet U7.)

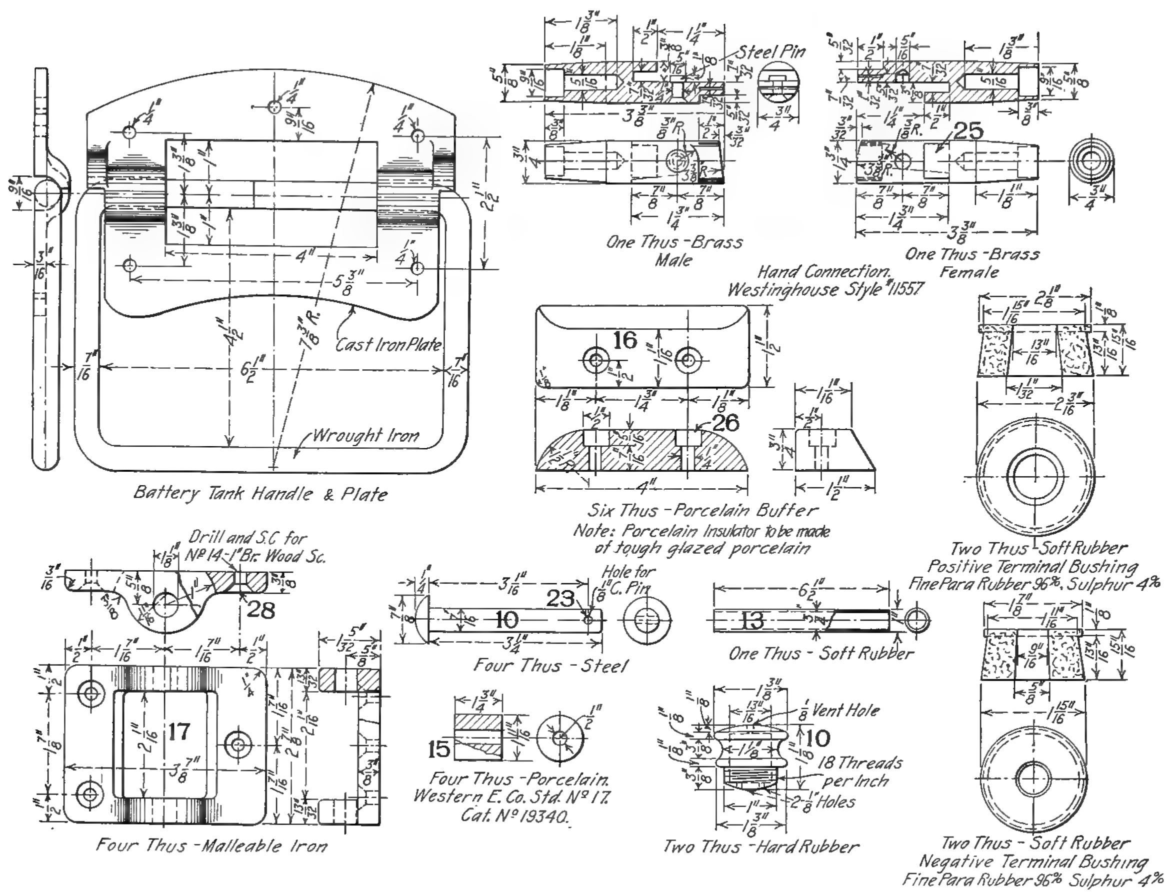


Fig. 2951—M. C. B. Recommended Practice for Double Compartment Tank Details for Electric Lighting. (M. C. B. Sheet U8.)

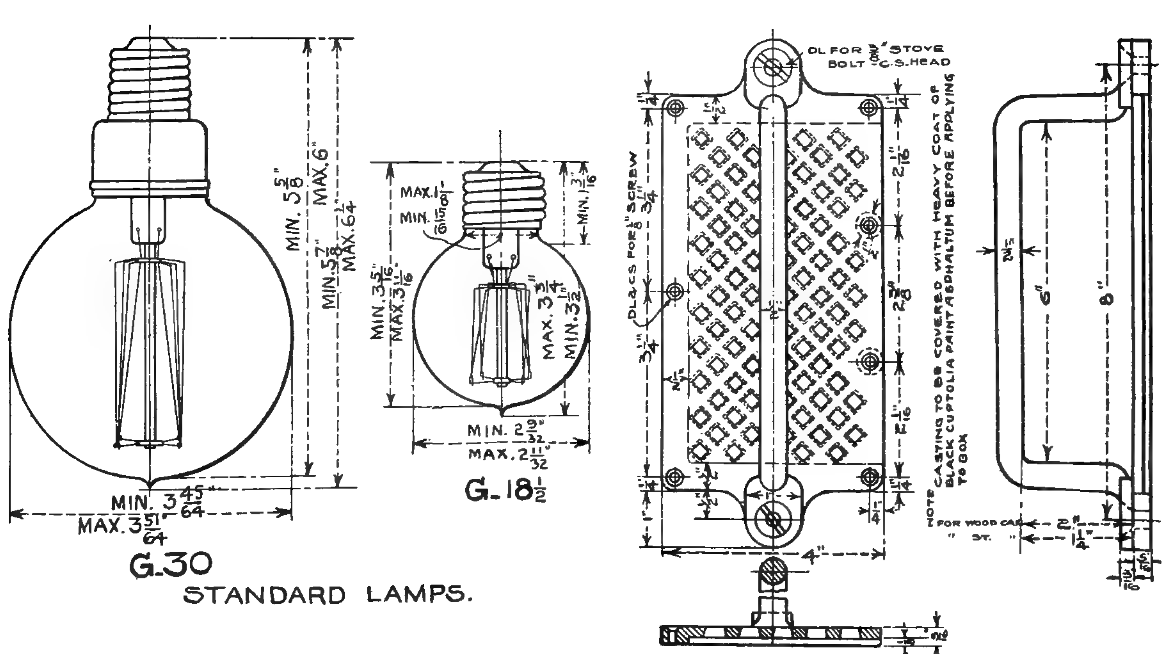


Fig. 2951—M. C. B. Recommended Practice for Double Compartment Tank Details for Electric Lighting. Lighting. (M. C. B. Sheet U9.)

Catalogue Section

The Catalogue Section which follows is shown for the first time in this edition of the Car Builders' Dictionary. A number of requests have been made by users of this book for more detailed information about the devices shown in the Illustrated Section. By confining that section to illustrations, captions, and dimensions, it has already grown to a large size, so that it is impractical to add thereto.

In the Catalogue Section, however, pages 977 to 1021, an opportunity has been given manufacturers to supply information that will be helpful to those interested in car building and maintenance. A serious attempt has been made to furnish data that is informative and practical.

The Buyers' Classified Directory, pages 1023 to 1028B, has also an added feature. Under the name of any given product is not only the manufacturers' name but reference to the page or pages used by that concern and, also, the various figure numbers referring to cuts in the Illustrated Section. Thus a complete reference is quickly obtainable.

The Trade Name Index, pages 1029 and 1030, makes it easy to find a product where only the trade name is known.

Following the indexes is the usual Advertising Section.

The Alphabetical Index, on page 1022, contains a complete list of the names of all manufacturers represented in either the Catalogue or Advertising Sections.

Safety Electric Light

"Under-frame" System

The "Under-frame" car lighting electric equipment has the generator suspended from the under-frame or body of the car, instead of from the car truck. This method of suspension has eliminated many difficulties arising from the present designs of steel trucks and steel car bodies, with the deep center sill.

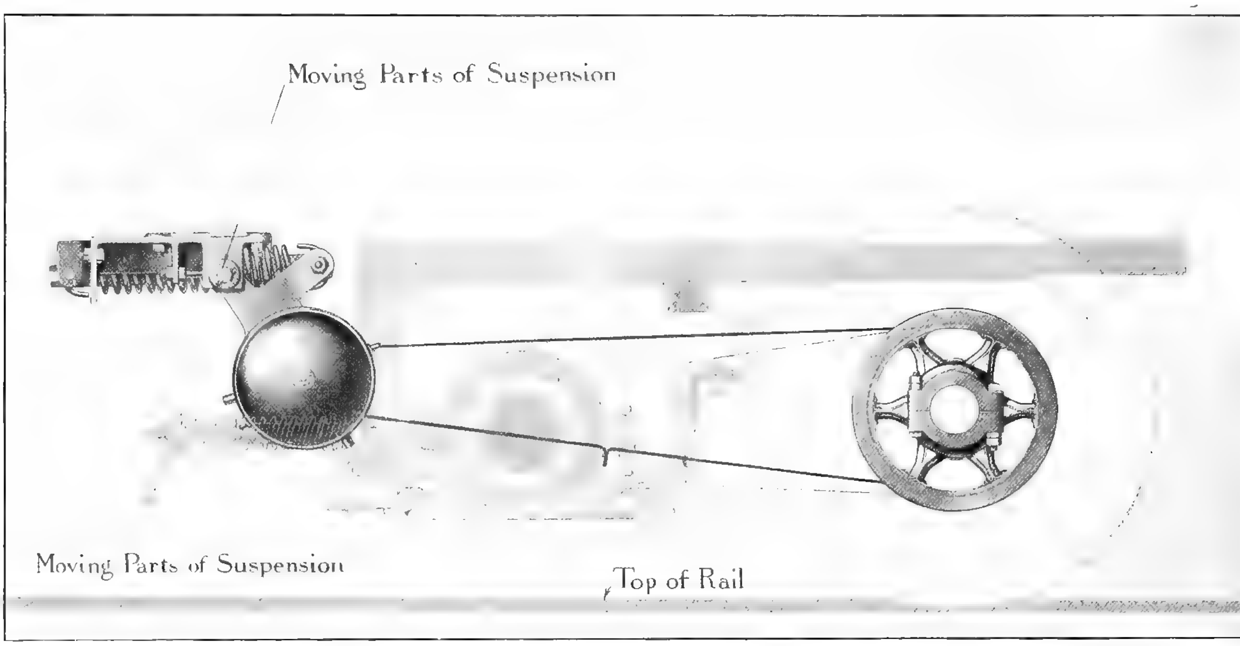
Advantages

The advantages, demonstrated in actual service, are:

(1) Reduction of about 60 per cent in weight of generator and suspension.

(2) Removal of three-fourths of a ton of overbalancing weight from the car truck.

(3) Increased clearances between end sill or brake rigging and belt.



A graphical comparison of size, simplicity and clearances between "Under-frame" equipment and equipment mounted on the car truck.

(4) Increased clearances between generator and track (see illustration).

(5) Moving parts of the suspension are located out of danger from ice, snow and dropping condensation from traps on steam heating systems (see illustration).

(6) Decrease in wear of generator and suspension parts.

(7) Increased accessibility for inspection and repairs. An inspection can be made without getting between the rails beneath the car.

(8) Ease of installation. This type of equipment accommodates itself to the standard positions of brake rigging and other parts underneath the car.

Constant Belt Tension

With this system of suspension, changing angle between the car and truck as well as variable distance between the centers of the car axle and generator shaft must be adequately taken care of. This is accomplished by a simple belt tension device which utilizes the weight of the generator, working in conjunction with a tension spring; the parts being so designed that the sum of these two varying factors is constant. Excessive belt tension is prevented and belt slippage is eliminated.

No adjustment of this belt tension device is required to maintain its proper operation.

Specifications

The generator is four pole, shunt wound, gives sparkless commutation and has a capacity of 3 K.W. (75 amperes at 40 volts).

The magnet frame is a one-piece casting; the supporting lugs being cast solid with the frame.

A hand-hole cover is provided at the commutator end to facilitate inspection.

The field coils are oilproof and waterproof, held securely in position to guard against wear caused by rubbing against the pole pieces.

The armature is form wound, the conductors having fireproof insulation. The armature core is built up of transformer iron laminations, insulated after punching.

The commutator bars are of hard drawn copper, having liberal wearing depth and ample area to carry the maximum output of the generator. Best grade mica insulator is used, having the same rate of wear as the commutator bars.

Ball-bearings, of a type especially designed for this service, are used throughout. Grease grooves and felt washers prevent the entrance of dirt into the bearings and the leakage of grease into portions of the dynamo where it should not go.

Brushes are of high-grade carbon and provided with a device for maintaining constant pressure of the brush on the commutator. The direction of current from the dynamo is kept constant by rotating the brushes through an angle of 90 degrees whenever the direction of rotation of the armature is changed.

Truck Suspended Generators

The design of suspension employed in Safety equipments, where the generator is to be suspended from the truck, is simple, gives maximum strength and permits easy access to all parts of the equipment. It provides a parallel suspension with the points of support below the dynamo. All parts subjected to wear are lubricated from grease pockets, requiring no adjustment by the car builder.

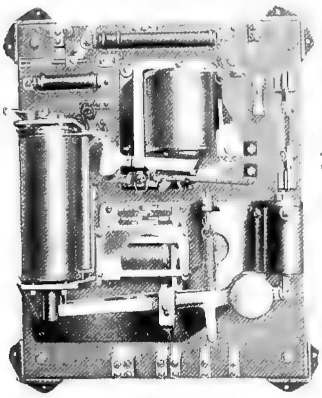
Generators are furnished for truck suspensions with 1 K.W., 2.6 K.W., 4 K.W. (40 volts—100 amperes), and 4 K.W. (80 volts—50 amperes) capacities. The specifications are in other respects similar to the "Under-frame" generator.

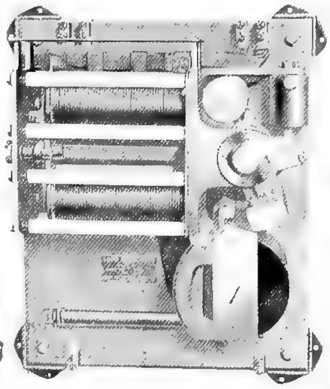
Safety Electric Light

(Continued)

"Type F" Regulator

The Safety "Type F" dynamo regulator protects the dynamo from overload and the batteries from overcharge and also ensures recharging of the batteries in the shortest possible time, when recharging is necessary. The dynamo is controlled to give the proper output through changes in speed and changes in battery conditions.



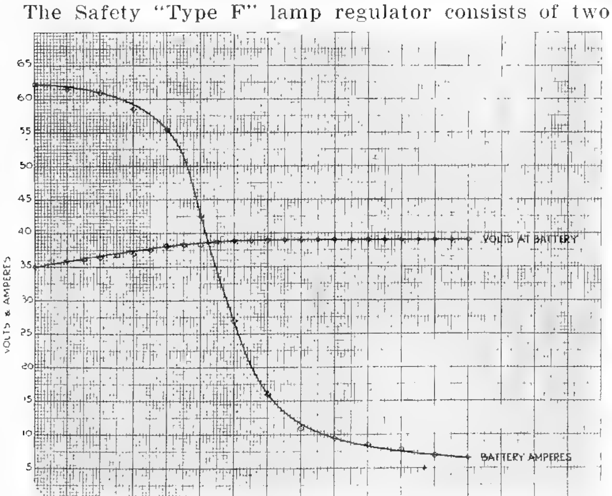


"Type F" Dynamo Regulator. "Type F" Lamp Regulator.

This system of regulation, wherein the current delivered to the batteries by the generator automatically tapers down to a low value as the batteries become fully charged, will maintain the service with a higher lighting load than with a system, having a generator of the same capacity, but in which the regulator maintains the current constant, regardless of lamp load.

All parts of the dynamo are mechanically balanced by springs. Inverted air dashpots with graphite plungers give constant action winter or summer and do not become clogged by the dust of service.

The Safety "Type F" lamp regulator consists of two parallel piles of carbon discs in series with the lamps. The resistance of these carbons is regulated by pressure, determined by the armature of a magnet, the windings of which receive lamp voltage.



Battery Charging Curve with "Type F" Dynamo Regulator.

A unique design of magnet and levers maintains a degree of accuracy in voltage regulation without the use of any auxiliary control.

Inverted air dashpots, of the same type as on the dynamo regulator, are used on the lamp regulator.

Voltage coils on both dynamo and lamp regulators are compensated for change in voltage, due to heating of the coil windings, by zero co-efficient resistances placed in series with the coils.

Pintsch Mantle Light

Where Used

For passenger coach lighting and postal car lighting, no system is so adequately adapted on account of its low cost of operation, brilliant illumination, availability, reliability and simplicity. For dining cars, cafe cars, etc., where decorative effect is desired, it is used to advantage. As an auxiliary to electric light it is particularly recommended, since it incurs no operating expense when not used.

Advantages

By the use of Pintsch gas with special inverted mantle burners, the candlepower is increased more than threefold, and a steady, pleasing white light is produced. A light of 100 candlepower for one cent a burning hour.

Maximum available capacity: based on 4 hours burning a day, a two-tank Pintsch equipment will supply lights of total 600 candlepower for nearly 40 burning hours, or over 9 days, without replenishment of the supply.

Minimum weight of equipment. A Pintsch two-tank equipment is about one-third the weight of an electric lighting equipment, with an economy in haulage of from $10.00 to $20.00 a car month.

Sleeping Car with Pintsch Mantle Light.

Simplicity of operation. This system is not affected by weather conditions, and having no delicate mechanisms, is not affected by the severe conditions of railway service.

Low cost of installation. The cost of the entire equipment, including labor, is about one-half that of electric light.

In staterooms and compartments, or wherever local control of the light is desired, electric ignition is provided. A combination gas cock and electric switch is so arranged that the lamp is lighted by simply turning the switch.

Car Lighting Fixtures

Phantom view of Safety Shade Holder.

Essential Features

The aim in design of Safety car lighting fixtures is to combine artistic excellence with practical means for utilizing the light source and reflecting media for the most satisfactory illumination of passenger and postal cars. The specifications which govern our designs, are:

(1) Location and candle-power of light units with the selection of proper light distributing (reflecting and diffusing) media to obtain the best illumination. We have a well-equipped illuminating engineering department.

(2) The best means of supporting the light units and accessories in their proper relation for these selected locations.

(3) Selection of materials and design to withstand the severe conditions of railway service.

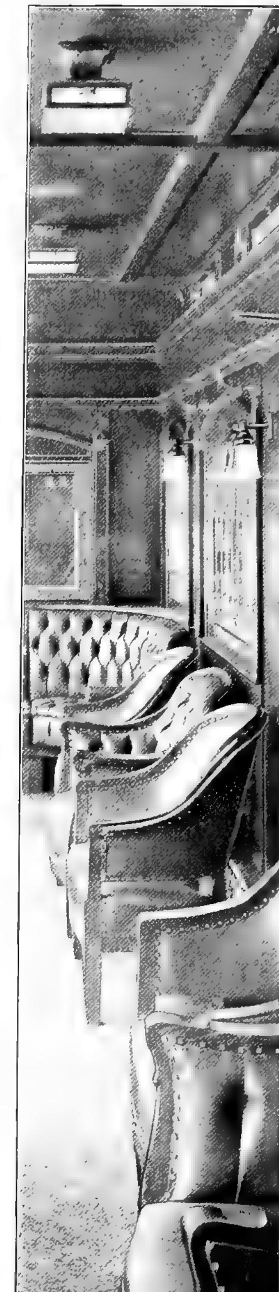
(4) Operation of the fixture to obtain the lowest maintenance cost.

(5) Appearance, contour, color and decoration best conforming to the environments of the fixture in the car.

These specifications have been embodied in our large variety of both gas and electric lighting fixtures; direct, semi-indirect and indirect lighting units, enclosing bowl units, deck lamps, bracket lamps, berth lamps, table lamps, candelabra, etc.

Safety Shadeholder

The Safety shadeholder, used exclusively on our fixtures, is especially designed for railway service. Its principle is a series of flexible metal fingers, engaging the neck of the shade or reflector with a firm grip, but with sufficient elasticity to absorb the shock of vibration and expansion. These fingers are reinforced by a locking cap. The shade is easily inserted or removed. The holder is compact and has no loose or delicate parts to wear. Over 100,000 of these shadeholders are now used in railway service.



Car Lighting Fixtures

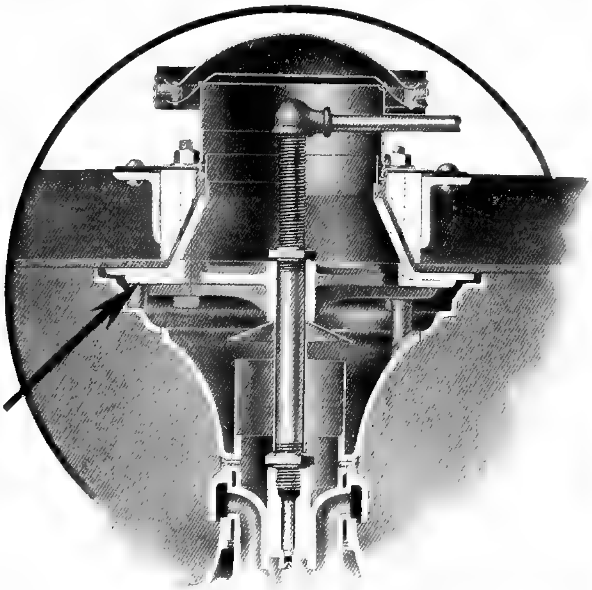
(Continued)

Special Features

All Safety fixtures, designed for use on car ceilings or in other locations which require occasional renovation, have the exterior or ornamental parts removably attached to the supporting frame in a manner to permit easy and quick removal. This facilitates installation and inspection and saves the exterior of the fixture from paint mutilation.

The Pintsch mantle, used on gas lamps, and the Safety lamp socket, used on electric fixtures, are both the result of careful experimentation in railway service. They are both made exclusively for railway service. The Safety electric lamp socket is heavily insulated, has a strong spring base-contact and is equipped with moulded wire leads.

Electric Berth Lamp No. 2485.

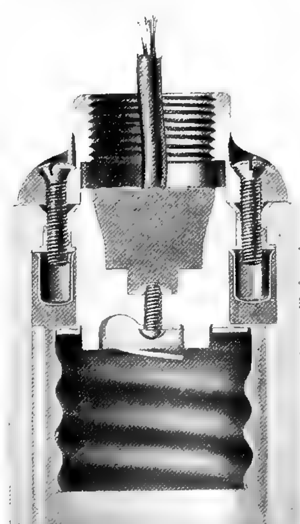


Showing roof connections.

We have a complete line of both Pintsch mantle and electric fixtures for postal cars. The fixtures with their reflectors are especially designed to meet the United States Post Office Department specifications.

Our engineering and designing departments will submit designs of fixtures to meet any exceptional requirements, and will be glad to engineer any new illuminating propositions.

As a result of careful laboratory and service tests, covering practically every type of light reflecting and diffusing media, we have selected a line of glass and metal reflectors and bowls to meet every car lighting requirement.



Safety Electric Socket.

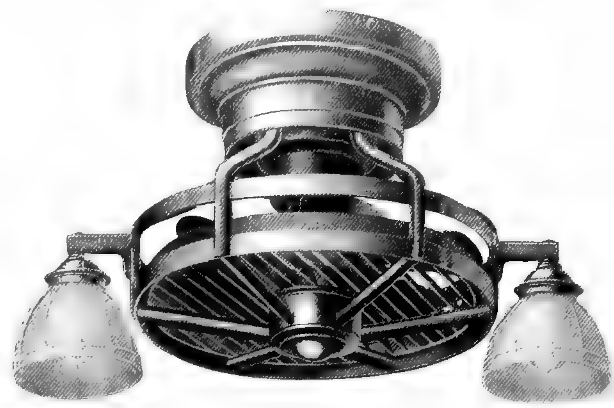
Safety Electric Fans

Special Service

The proportions of passenger car interiors have exacted conditions which the ordinary commercial electric fans will not satisfy. To meet these special requirements, the Safety fan has been developed on entirely new principles.

Operation

The principle of operation utilizes a series of air deflecting planes geared to the shaft of the fan and revolving at variable speeds to suit the requirements. These deflecting planes distribute the air currents to the required locations in the car, and provide a soft, cooling breeze



Combination Electric Fan No. 9980B.

every three seconds or at less frequent intervals if desired. The fans are equipped for three-speeds and at maximum speed consume about 60 watts.

These fans are located along the center deck of the car at intervals of 6 feet or 9 feet, or in the center of the ceiling in staterooms. They are furnished with or without electric lights as desired; either one, two or four lights being used.

Electric Fan No. 9980A.

All parts are located below the car ceiling, with the motor easily accessible for inspection. Ball bearings are used throughout.

Advantages

Equal distribution of the air currents throughout the entire length of the car. Economy of energy, since the air is moved only where it is needed. Avoidance of harsh, steady blasts of air on the head of the passenger, which frequently result in colds and other discomforts.

Utilization of an efficient fan and a lighting unit in one fixture, avoiding overcrowded car ceilings.

Low cost of operation.

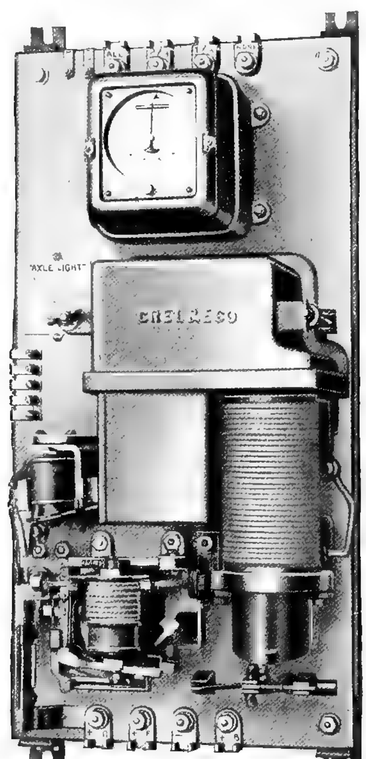
Distribution of air circulation on scientific principles.

Electric Car Lighting Equipment

Regulator with Ampere Hour Meter Control

Storage battery maintenance is one of the largest items in electric car lighting costs. Any car lighting system, therefore, that prolongs the life of the battery and saves labor and renewals by preventing overcharging, is worth more to the railways than one that does not take the conservation of the battery into account.

The type L regulator with ampere-hour meter control of the battery charging current, permits the storage battery on a car to be charged at its proper rate until fully charged, at which time the meter shows "full charge" in the battery. The indicating hand of



Type L Regulator.

the meter controls a small switch located at the "full charge" point, which, when closed, causes additional resistance to be put in the generator field, thus reducing the output of the generator to a small or insignificant amount, at the same time the generator is held in condition to assume the load of lamps or other devices that may be turned on, without calling upon the battery to furnish any current until the car comes to a stop. The discharge that has taken place while standing is immediately replaced in the battery upon the car resuming a speed of 20 miles per hour or more, the generator furnishing the necessary current for the lamps, plus the current required to replenish the battery until such time as the meter indicates "full charge," whereupon the same forces are brought into play as before and the charging of the battery is discontinued, the generator furnishing sufficient current for the lamps only.

It will thus be seen that the generator lights the car at all times when running at 20 miles per hour or more; the battery is only used when standing, and is left fully charged at all times, yet it cannot be overcharged.

The life of the battery is prolonged by using it less than on other equipments, and by the prevention of overcharging. On four hundred cars the saving is at least $15,000 per year.

The meter itself keeps accurate record of the amount of charge and discharge that the battery has been getting during any period. It is the most accurate method of controlling batteries, and is equivalent to having an expert battery man on every car.

Advantages

(1) The battery is operated for the most part over the "top" range of its capacity with only occasionally a long discharge. This is very much like floating battery service where ten years' average life is expected

(2) In measuring the current by a meter, that is put into the battery, the well-known inaccuracies and unreliability of voltage regulation are avoided.

(3) Battery is charged for a predetermined number of ampere-hours, then the generator voltage is automatically reduced to battery "floating voltage," which may be any voltage desired.

(4) An indicator is provided, showing at all times the amount of available current in the battery.

(5) The recording train of dials show at all times the total amount of current the battery has delivered since installation.

(6) Record can thus be kept of performance of equipment.

(7) Ampere-hour meter is provided with a shunt through which the battery current passes. The mechanism of the meter is connected across the terminals of this shunt. Thus any disarrangement of the meter will cause no interruption of the lighting.

(8) Battery is kept fully charged at all times, but cannot be overcharged.

(9) Maximum battery capacity is available in shortest possible time after any discharge, which cannot be done by other methods of charging. With this system the full battery is always ready for emergencies.

(10) Reduced cost of maintenance by prolonging the life of the battery, saving in washing, flushing and general maintenance.

(11) By means of the meter a check-up is provided on the use of current for car cleaning at night, and also wasteful use of lights by the train crew.

Electric Car Lighting Equipment (*Concluded*)

Truck Suspension

Consolidated Axle Light truck suspensions are distinguished by the small number of wearing parts. They have two lubricated bearings as compared with as many as eight unlubricated bearings on others. The two bearings are as far apart as possible, so that slight wear on one or the other does not affect the alignment of the pulleys as is the case when the bearings are close together.

Axle Light equipments are furnished for either truck suspension or "body hung," as desired.

Lamp Regulator

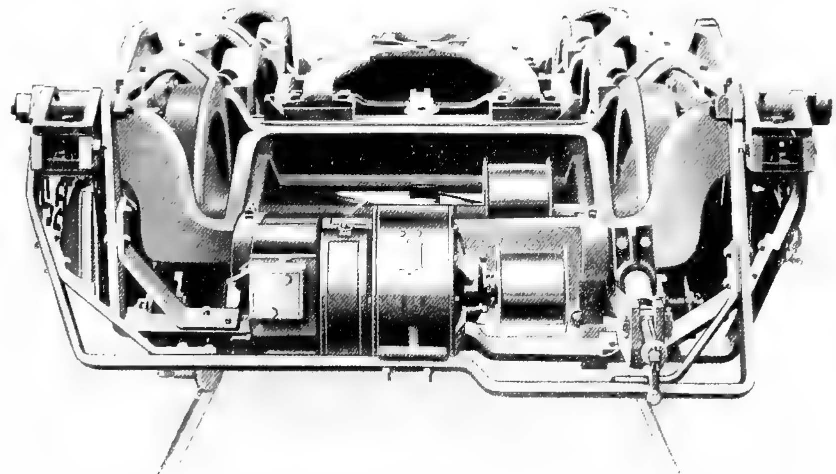
Axle Light lamp regulators employ metallic resistances, thus avoiding the losses, unreliability and incident mechanical and electrical red tape found in carbon pile regulators for the same purpose.

Generator

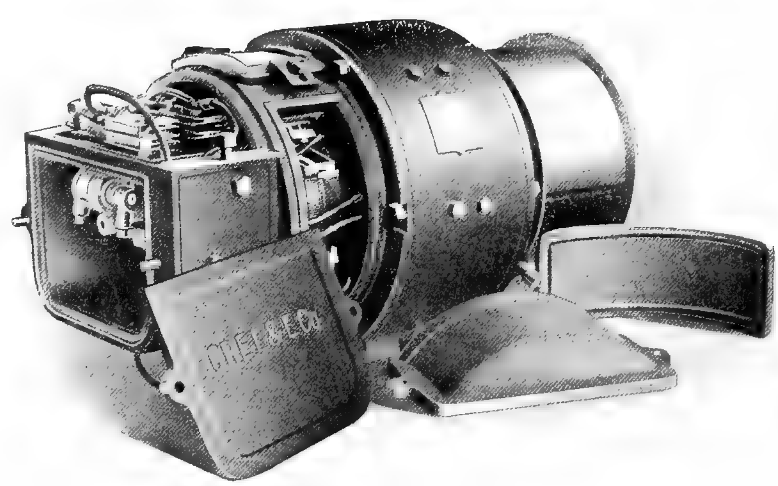
Axle Light generators employ commutating poles, which insure sparkless commutators at all speeds and loads, thus insuring low cost of maintenance. Standard 412 ball-bearings are employed in the 2, 3 and 4 kw. sizes.

Belting

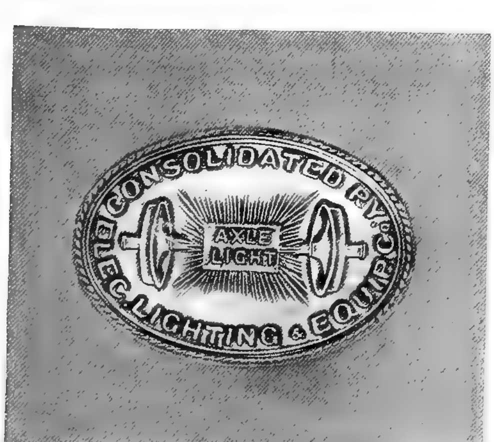
Axle Light belting is made in accordance with specifications which are the result of over fifteen years' actual experience in operating electric light equipments. It is the best rubber belting that it is possible to make, and is cheaper in the long run than belts of lower price and inferior quality.



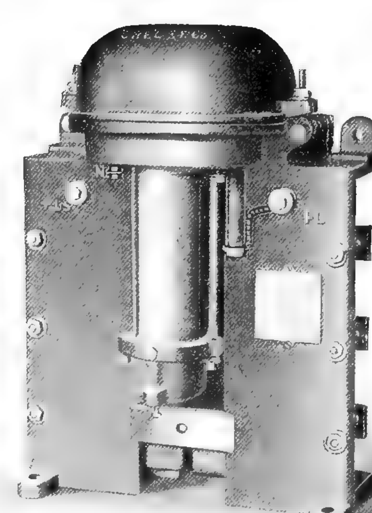
Axle Light Truck Suspension.



Axle Light Generator.



Axle Light Belting.

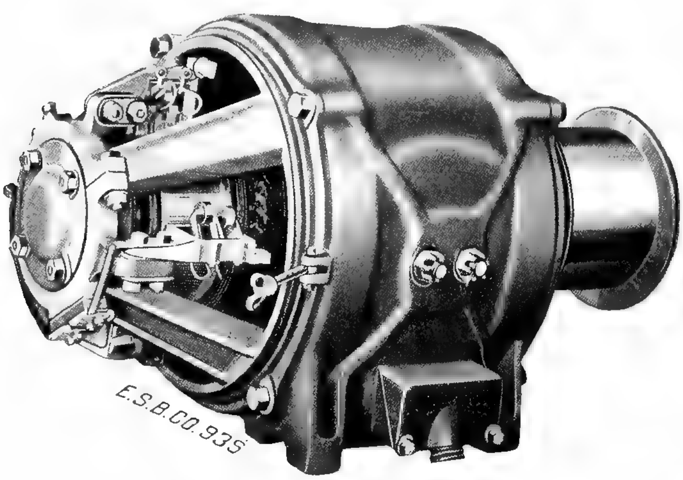


Axle Light Lamp Regulator.

E. S. B. Constant Voltage Axle Lighting System

Simplicity

The generator is of the Rosenberg type and develops the same polarity with either direction of rotation, requiring no pole changer.



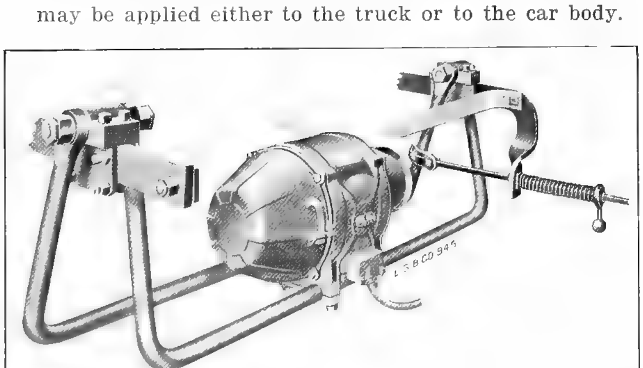
Constant voltage field control is secured by means of resistance units having special temperature coefficients, permanently connected into a Wheatstone bridge. There are no moving parts, carbon piles, dash pots, pivots, levers, moving or vibrating contacts.

An automatic switch closes in response to very small difference of voltage between generator and battery, insuring positive action, absolutely free from arcing and chattering, causing not the slightest flicker at the lamps.

No lamp regulator is required, the voltage of the generator being held close to the normal floating voltage of the battery.

The switchboard measures 18 inches by 15 inches.

The suspension is the E. S. B. type, the generator being carried on interchangeable loop bars suspended from two bearing pins, free to turn in steel bushings clamped in the bearing saddles, and adjustable longitudinally along the side bars. There is no wear except at these two bearings, and these (two pins and two bushings) are easily and cheaply renewed. There is no motion or wear at feet of machine, which are solidly clamped to the loop bars. Permanent belt alignment insures long belt life (80,000 to 90,000 miles per belt). This suspension may be applied either to the truck or to the car body.

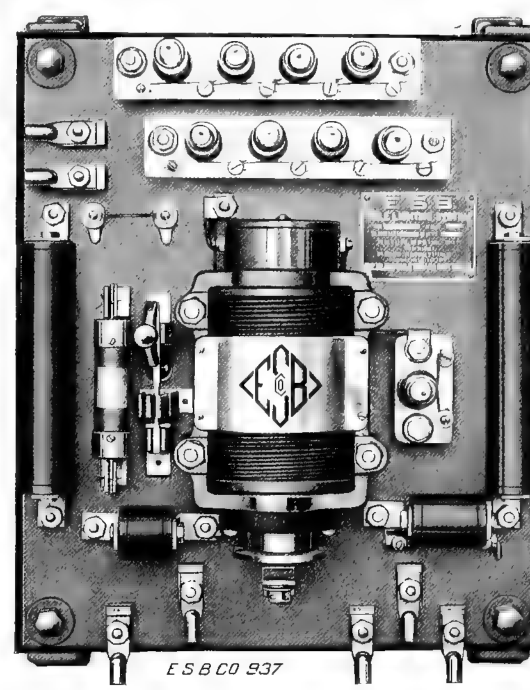


Points of Superiority in Operation

With this system no adjustments are necessary. The apparatus will automatically adjust itself to various conditions of load and service, the generator output varying to meet the requirements.

There is no excessive overcharging of the battery and no appreciable gassing. This prolongs the life of the plates and gives ideal conditions from the battery standpoint, insuring long plate life, infrequent flushing (twice a year), reduction in amount of sediment and frequency of cleaning (once in five years).

The cost of inspection is reduced to a minimum. The simplicity of the apparatus is such as to require but little attention. By throwing over the test switch on the switchboard, the inspector can determine in a few seconds the condition of the control circuits.



Reversal of polarity, whether caused by crossed leads from battery or generator or otherwise, is immediately and automatically corrected as soon as the generator starts up; the polarity of the machine, if wrong, being reversed by the battery when the automatic switch closes.

The charging rate is automatically adjusted to the condition of the battery. A considerably discharged battery will be rapidly charged at the maximum safe output of the generator. A fully charged battery will receive just sufficient trickling charge to keep it full, but will recharge rapidly for a few minutes after a short discharge until the current taken out has been restored.

There is no leakage of current from the battery when the generator is shut down. There are no polarizing or "teaser" coils taking current from the battery when the car is standing. The equipment may, therefore, stand idle for months and yet the battery will be ready for service when wanted.

The highest quality of material and workmanship are used throughout, insuring low maintenance costs and long life.

Detail drawings of this equipment are shown in the illustrated section of this dictionary, pages 855 and 856.

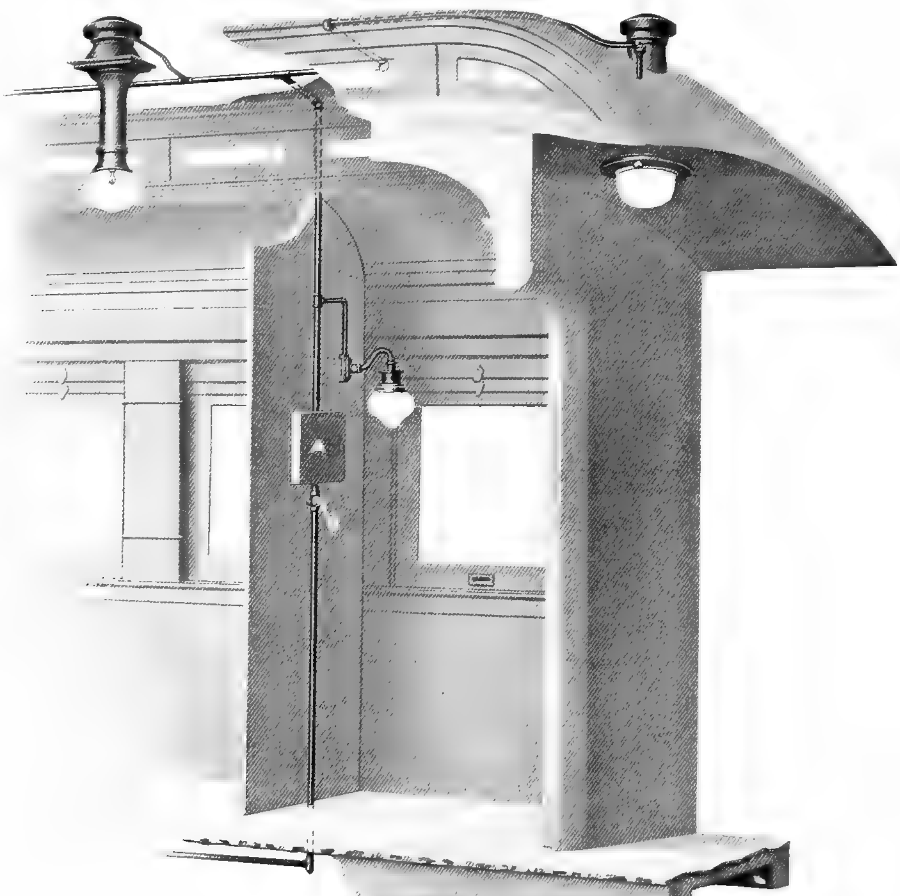
Acetylene Mantle Light
Dalén System

Application

This system has advantageously been employed for the lighting of passenger coaches, postal cars and baggage cars and proved its unsurpassed efficiency, both as to economy and reliability. The flexibility of the system makes it the ideal illuminating system for such cases where an even distribution of the light is required. Where an auxiliary to an electric lighting equipment is desired, this is highly recommended.

Maintenance

The standard passenger car of the present day requires approximately 600 candlepower for good lighting. A cylinder containing 500 cu. ft. of Commercial Acetylene will supply this light for 25 days, with an average burning of $4\frac{1}{2}$ hours per day. The cylinder can be recharged on the car from a yard line or exchanged when empty for one fully charged in about one-half hour's time.



Merits

The light is pleasingly soft and any artistic effects desired can easily be produced at a low cost of installation and maintenance. Its economy is proved by the fact that more than three times the candlepower is produced by the same amount of gas over any other system known.

The candlepower per cubic foot of gas remains constant regardless of the size of burner used. A light of 150 candlepower consumes one cubic foot of gas per hour. This can be distributed to, say, ten units each of 15 c.p. and consuming 1/10 cu. ft. per hour or, in any other proportion that would produce the desired distribution of light. The lights can all be controlled by means of a simple valve arrangement from one end of the car, eliminating the lighting of lamps by trainmen passing through the car with the old familiar torch and taper.

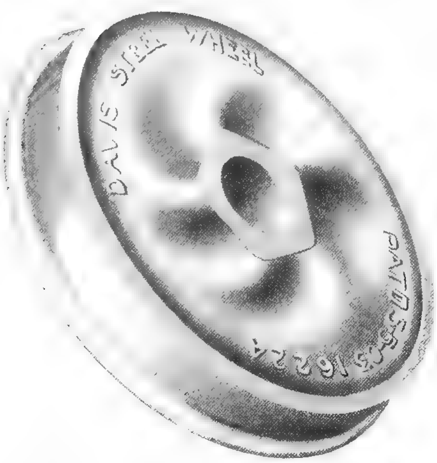
Operation

The simplicity in operation of the Dalén system is best illustrated by the fact that once installed and with gas in the cylinder there is no other work necessary in connection with the system, but to turn on the gas when the light is required. If it is desired to change the candlepower of a certain light, to increase or decrease it, all that is necessary to do is to change the burner tip and the mantle to the size wanted. The lamp fixture itself remains untouched.

Weight and Cost of Equipment

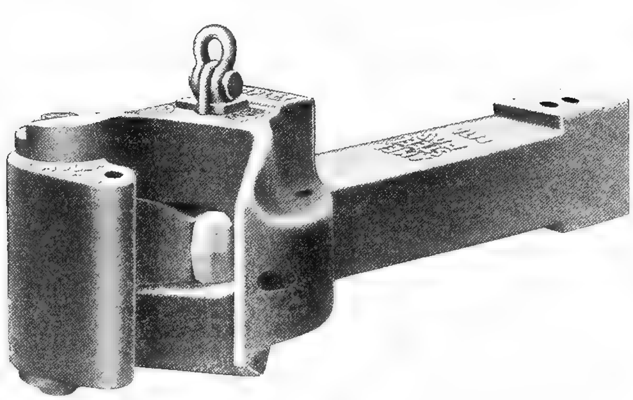
The weight of the equipment with a 500 cu. ft. cylinder is about one-sixth that of an electric equipment, and the cost of the equipment installed is a trifle over one-half that of any electric lighting system.

Davis Cast Steel Wheel



The essential feature of the Davis steel wheel is that it combines in one casting a hard, tough manganese tread and flange and a medium soft, open-hearth steel plate and hub. In casting the Davis wheel the mold is revolved at high velocity. The first metal entering the mold is treated with ferro-manganese, which passes to the circumference, forming a hard, tough tread and flange, while the remainder of the wheel is formed of soft open-hearth steel. The Davis steel wheel has the strength demanded by present-day equipment but retains the advantages of the time-tried one-wear principle. Its hard manganese flange and tread resist not only wear, but shock, and it is possible to obtain the full mileage value without the expense incident to turning the wheel down several times. The tread of each wheel is ground to contour, insuring perfect rotundity and the percentage of "slid flats" is greatly reduced. Tests have shown the strength of that vital part—the flange—to be very high. The plate and hub being of a softer steel, effectively resist the expansive action due to brake-shoe heating. Due to the strength of cast steel, the Davis wheel effects a saving in dead, non-revenue weight of from 1,000 to 1,600 pounds per car. This item alone shows a saving in addition to the decrease in maintenance expense. The cost per thousand miles is the measure of its service.

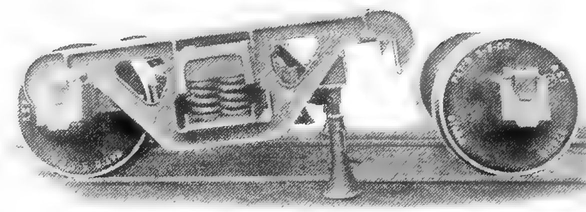
Simplex Coupler



The knuckle of the Simplex Coupler is one of unusual strength. Records show that the percentage of Simplex knuckle repairs is remarkably low. The knuckle has a section of large area between the hub and the lock bearing surface of the tail. In addition, the design of this section is such that it affords the greatest possible strength. The location of the knuckle pin center on the coupling line reduces the leverage about the pin center, thereby decreasing the liability of breakage through the knuckle hub. This also allows a very wide opening of the knuckle and is one of the reasons why the Simplex coupler "makes" easy.

The parts of the coupler are few and simple, and are well protected against damage. The lock is a steel drop forging and has a positive anti-creep hook on its rear end, preventing the lock from working up. The lifter is of one piece and cannot kink. The knuckle pin has a "D" head which prevents the pin from turning and reduces the wear of the holes in the ears of the coupler body. The knuckle tail closely engages the tail pocket of the bar and the coupler will withstand severe pulling stresses, even with the pin omitted.

Vulcan Truck



The Vulcan side frame incorporates in a simple one-piece steel casting, strength and light weight. It combines in one casting the many parts of the old style arch bar truck and eliminates the use of a large number of bolts and nuts. Its pedestal ends fit over and around the journal boxes, holding them securely. The separable journal boxes, should they be broken in a wreck or otherwise, do not involve the loss of the side frame. In changing wheels with the Vulcan truck, it is only necessary to remove one small safety tie-bolt over each journal box, jack up the ends of the truck and roll out the wheels.

Because the Vulcan truck is a square truck, there is a decrease in wear and tear, and in frictional resistance. This fact, together with its strength and low maintenance cost, is the reason for the large number of Vulcan trucks in service today.

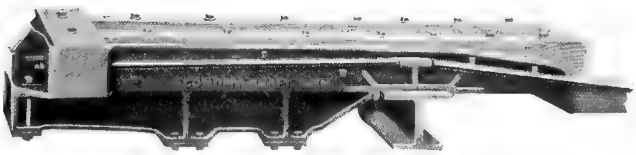
Susemihl Side Bearings

The use of Susemihl side bearings results in a substantial saving in wheel flange wear, especially with modern heavy equipment. The Susemihl side bearing contains no springs or other small parts to become lost. By means of a lever the carriage compels the rollers to roll and to return to their proper positions after rolling. The carriage and lever are of malleable iron and the bearing plate is of high carbon spring steel.

Six Wheel Truck

We also handle the Lewis-Pilcher articulated six-wheel truck for freight service. This truck is in use on approximately two thousand 90-ton cars and is the latest development in the high capacity freight car. It is illustrated fully in the descriptive section of this dictionary.

Economy Draft Arm

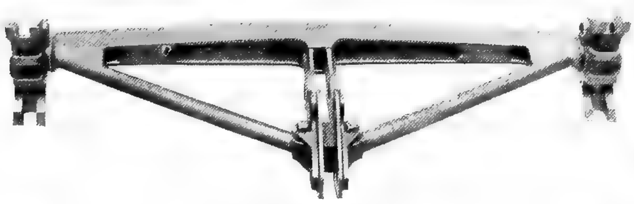


The Economy draft arm is a device for strengthening the center sills of old wooden underframe cars and thereby prolonging the revenue-producing life of such cars. It is a solid steel casting which passes alongside and under the center sills and extends thirty inches back of the bolster, at which point it butts against the sub-sill. The gear pockets are cast integral, and in the design the metal is so distributed as to give strength where strength is needed. The construction of the Economy arm does away with the uncertain shear values of numerous riveted and bolted joints.

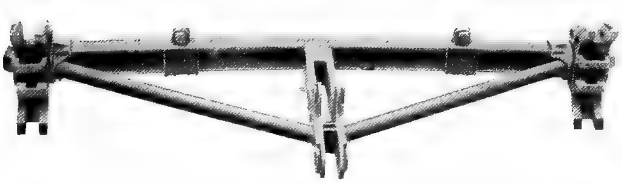
There are various designs of the Economy arm which can be adapted to suit existing conditions. Its cost is small in comparison to the additional years of service which the car will give.

Economy draft arms are essential to car economy on old equipment.

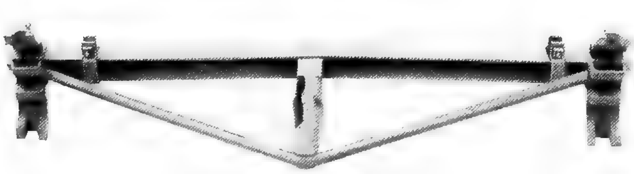
Brake Beams



Vulcan Passenger.



Ajax & Hercules Passenger.



Ajax Freight.

Ajax truss beams for freight service are furnished in any capacity desired. Requirements for passenger and tender service are met by Hercules, Vulcan and Ajax beams. The Vulcan beam is of integral cast steel construction and is used for high speed, heavy service. All these beams have channel compression members and round tension members, a type of construction which has been found to give the most satisfactory results.

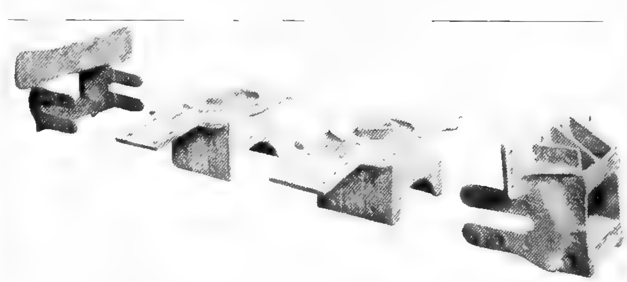
Compression channels and tension rods are made of open-hearth steel and to rigid specifications. Due to careful and accurate methods in the manufacture of Ajax, Hercules and Vulcan beams, all initial play and lost motion is eliminated, thus insuring the efficiency of the beams and prolonging their lives. Ajax, Vulcan and Hercules beams can be easily identified, as the name appears on the beam or on the heads.

The Acme I-section beam can be also furnished, although solid type beams of this or similar section are practically obsolete.

Bolsters

The box-shape bolster shown in the illustration unquestionably provides the strongest design obtainable for locomotive tenders or heavy freight equipment. In an integral steel casting it provides simplicity, service and low maintenance cost. We have many other designs in both steel and built-up body and truck bolsters, with which to meet your requirements. Our long experience in making bolsters and our extended knowledge of the steel-making art are combined in the making of high quality bolsters.

Steel Castings



Driving-wheel centers, engine frames, striking blocks, center plates, piston heads, stuffing boxes, frame braces, etc., are among the steel castings for car and locomotive use which are constantly passing through our foundries. We also have a fully equipped foundry for the manufacture of electric steel castings. Crossheads, valve links and other reciprocating parts, can be made stronger without an increase in weight, by making them of electric steel. With our varied experience in making railway castings, battleship castings, hydraulic cylinders, dredge castings and various castings for industrial use, we concentrate on your steel castings the expert knowledge of our nine plants.

Springs

Coil, elliptic and volute springs in any capacity desired are manufactured in our spring plant at Hammond, Ind.

Buckeye Cast Steel Truck Bolster

Description

The Buckeye Cast Steel Truck Bolster is designed to meet the exacting requirements of modern railway service. It is made in one piece of cast steel and the metal is distributed so as to give maximum and uniform strength. Side flanges on the top and bottom sections make it very strong transversely. The center plate is well supported by the center post and the side bearings are supported by the complete box section at each end of the bolster.

Advantages

The Buckeye Cast Steel Truck Bolster is practically indestructible in service. Being an integral steel casting eliminates the possibility of parts jarring loose as in the built-up type, thus reducing the inspection cost and making the maintenance charges negligible.

The methods of manufacture, together with the use of a uniform section of metal throughout, eliminates any

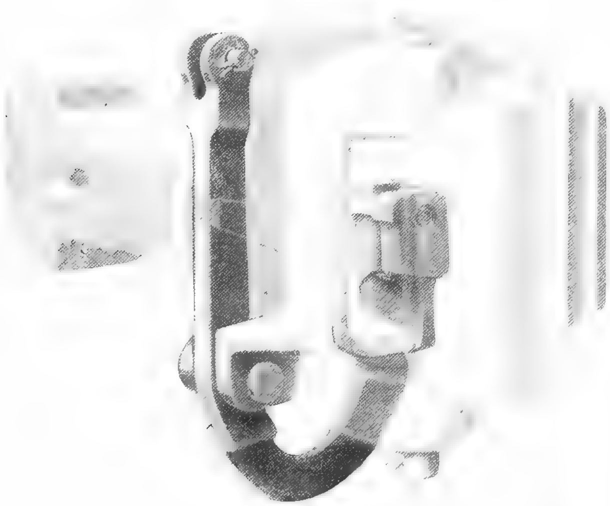
possibility of excessive shrinkage strains occurring and insures that all bolsters shipped will give satisfactory service.

Major Coupler

Description

There are many more Major Couplers in freight service than any other type. This coupler is made for either the top or underlift operation. The underlift coupler is the same coupler as the standard toplift except that the hole in the top of the coupler is omitted and the lock is lifted from below by a bell crank lever. This coupler is made with any style shank desired and is adaptable to any type of operating mechanism.

The Major Coupler is also made for passenger cars and engines, these couplers using the same lock, knuckle and pin as the freight car coupler.



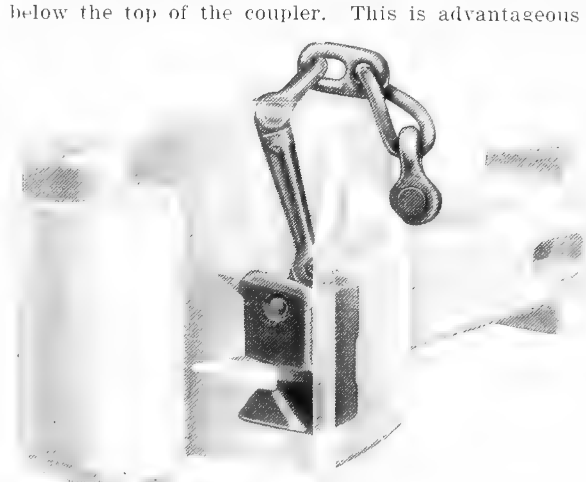
The Major Coupler is of the one-piece lock type, as distinguished from couplers having kickers or extra parts for opening the knuckle. The operation is as follows: The first raising of the lock disengages the knuckle; further raising puts the lock on the lock-set and further lifting of the lock throws the knuckle to full open position. When the operating lever is now allowed to fall to normal position, the lock rests on the upper surface of the knuckle tail and in position to positively lock the knuckle, whenever the knuckle is closed. The lock, which is simply a short block contained entirely within the coupler head, thus performs all the functions of lock, knuckle opener and lock-set.

The pivot pin is relieved of the heavy pulling strains and corresponding shoulders on the knuckle and coupler head take the buffing strains.

Advantages

The one-piece Major Lock, combining all functions, permits of the maximum strength for coupler head and knuckle and the greatest ease of operation. The lock being a short block entirely within the lock housing at all times, cannot bend, and when in locked position is always in compression only. In the design of this coupler the distribution of metal is such as to give a strong efficient coupler and yet keep within the M. C. B. dimensions.

In the underlift coupler the release rigging is entirely below the top of the coupler. This is advantageous on

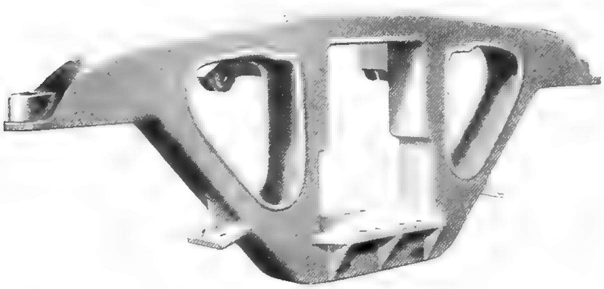


flat, end door automobile and ballast cars where top-lift rods are liable to damage by lading. The underlift type of coupler, on account of its closed top, is free from interference in operation from collection of dirt, snow, ice, etc. This type of operation also entirely eliminates any trouble with chains or clevises. The trainmen cannot operate it while between the cars, thus making it especially safe.

Buckeye Cast Steel Truck Frame

Description

The Buckeye Cast Steel Truck Frame is designed for use on heavy freight equipment. It is made in channel section which gives 100 per cent. more strength transversely, while having the same vertical strength and weight as the ordinary T-section frame. The sections are uniform throughout, thus insuring sound castings. The brake hangers and journal box tie bar supports are cast integral with the frame.



As illustrated, two designs of these frames are manufactured. One uses the bolted type journal box, while the other uses a special pedestal type box. The pedestal type frame has jaws at each end that engage with slots in the journal box, the weight of the frame being all that is required to hold the box in place in service. To keep the frames and boxes together in case of derailment, a safety bolt at the bottom of the jaw engages a lug cast on the box and effectually prevents their separation.

Advantages

The Buckeye Cast Steel Truck Side Frame conforms to M. C. B. requirements both as to limiting dimensions, weight and strength. This frame was tested by the M. C. B. Association (M. C. B. proceedings, Exhibit P, Test 43), and the results show that this frame has an ultimate strength, twice that of a similar capacity arch bar construction.

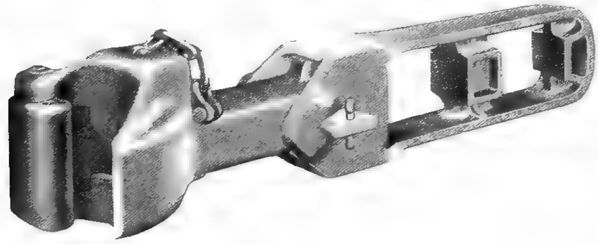
The one-piece construction greatly reduces the cost of inspection and repairs as there are no parts to wear or jar loose.

The use of the pedestal type truck permits easy replacing of the wheels. Removing one bolt in each journal box and jacking up the frame permits replacements without disturbing any other part of the truck.

Buckeye Cast Steel Coupler Yoke

Description

The Buckeye Cast Steel Coupler Yoke is a one-piece steel casting with a distribution of metal that gives uniform strength throughout. Being an integral casting, it entirely eliminates all troubles due to rivets, and this reduces to practically nothing the maintenance cost of the draft gear attachment. The coupler butt fits into a hooded head provided at the front end of the yoke and is held in place by a standard M. C. B. key.



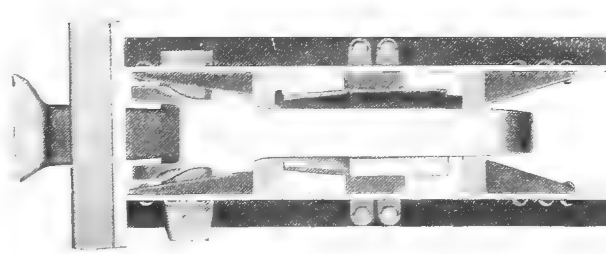
This coupler yoke is so designed that it permits the use of any type of spring or friction draft gear and of couplers with any size butt. The use of couplers with the smallest size butt reduces coupler cost.

Advantages

The key connection to the coupler is over 100 per cent. stronger than the riveted connection.

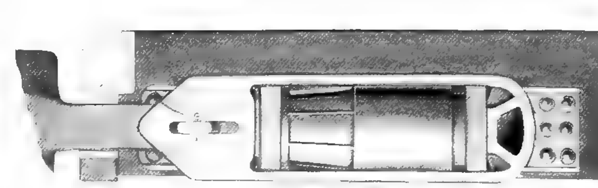
The connection to the coupler is flexible, allowing lateral and radial movement.

If a coupler is broken on the road, the key may be withdrawn and a new coupler applied in a very few



minutes, without disturbing the yoke or draft gear.

The use of this coupler yoke eliminates cutting cars out of the train to replace couplers.

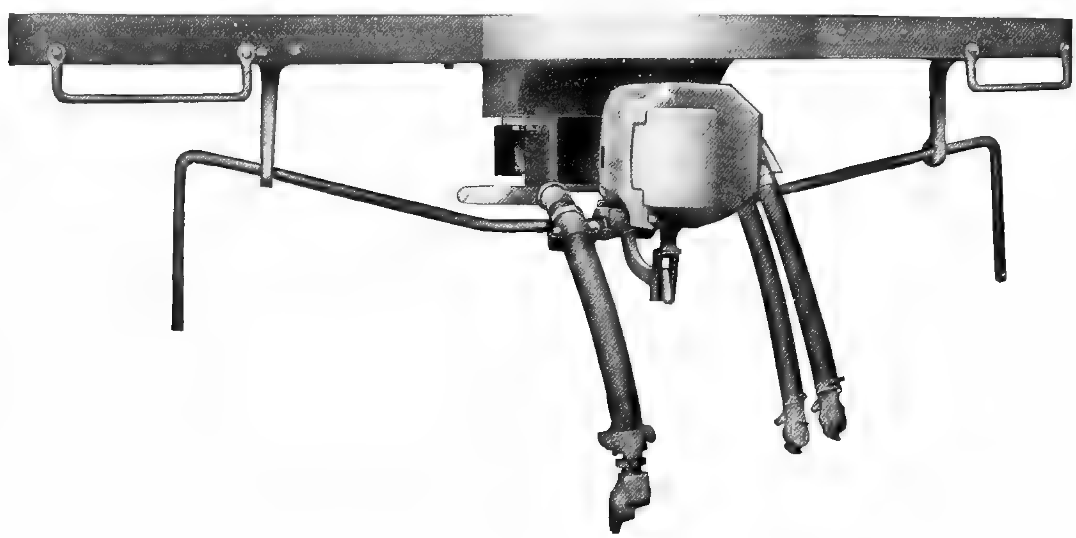


Sales Organization

This company also maintains sales offices at the following places: Chicago, 619 Railway Exchange; St. Paul, 817 Merchants Bank Building, and New York, 50 Church Street.

Couplers

This company was the original manufacturer of the M. C. B. type of coupler, and has manufactured and put in service many different designs of such couplers, following the evolution in railway equipment and requirements, embodying in the improved designs of couplers from time to time, as they have seemed desirable, new features and functions to keep them strictly up-to-date with service requirements and with the requirements of the M. C. B. Association and Safety Appliance Laws.



The latest types of couplers manufactured by this company embodying all the latest improvements are the Pitt couplers for passenger equipment and the Pitt and the Penn couplers for freight cars, locomotives and locomotive tenders.

The Pitt Passenger Equipment Coupler

This coupler was designed especially to meet the requirements of passenger service, and in it have been embodied all the developments for perfecting passenger couplers over a long period of years. It was designed to meet the most severe conditions of service on heavy steel passenger equipment cars, and is in service on thousands of such equipment. The experimental period of this type of coupler is now some years passed, and it has proven to be a thoroughly satisfactory and successful system.

Important Features

One of the important features of this equipment is its great flexibility of curvature. It is an important feature because it relieves side strains to the car and platforms in passing over curves and tangents and thereby increases the life of the car, as well as the life of the coupler equipment, and this flexibility of connection between the cars adds also to the smooth running of the train. This flexibility is accomplished in the Pitt equipment by a pivoted coupler head in connection with a center stem having wide lateral motion in the stirrup or carrying iron, both with spring controlled movement normally keeping them on center line.

In addition to the features of curvature described other important features of this equipment are its great strength, secured by having an extra heavy coupler head and knuckle, with wrought iron stems. The coupler is the gravity lock type, with knuckle-opener and all up-to-date features, complying fully with the recommendations and requirements of the M. C. B. Association and the provisions of the Safety Appliance Law.

This coupler equipment can be furnished with either overhead uncoupling rods operating from one or both sides of the car and from the platform; from one or both sides of the car without the platform cut; or with underneath uncoupling rods operating from either one or both sides of the car.

The underneath system of uncoupling levers, as shown by the illustration, is recommended as being the simplest and probably the most efficient design. These uncoupling rods can be applied to the coupler from both sides of the car as illustrated, or from one side, either right or left, if desired. The rods are suspended below the platform so as not to interfere with train pipes or other platform attachments. These uncoupling rods rotate in uncoupling the same as the uncoupling lever on freight cars.

This coupler has the lock-to-the-lock and knuckle-opener operating in the same manner as those functions in a freight coupler.

The lock-to-the-lock positively prevents any accidental uncoupling, and the knuckle-opener can be operated by the uncoupling rod to open the knuckle either from a fully closed position, or from any partially open position to the full range of its movement ready for the operation of coupling, without the trainman going between the ends of the cars.

Couplers

Requirements

The principal requirements in M. C. B. Freight Car, Locomotive and Tender Couplers are as follows: Automatic coupling, the mechanism being so designed as to couple and lock when the knuckle is closed by the impact of coupling; lock-to-the-lock, so that the lock cannot accidentally become uncoupled without operating the uncoupling lever; knuckle-opening, so that the knuckle may be fully opened ready for coupling by means of the uncoupling lever without the necessity of the trainman going between the cars to open the knuckle by hand.

It should be substantially constructed of the best material, simple in design, have as few parts as is consistent with effectively performing the functions above stated, meet with the M. C. B. Standards and recommendations, and all the requirements of the Safety Appliance Laws.

The Pitt Coupler The Penn Coupler for Freight Cars, Engines and Tenders

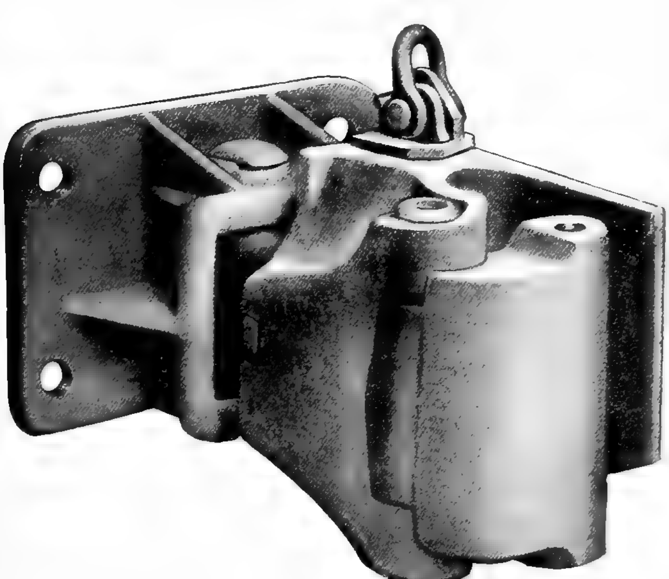
These couplers are our latest developments in M. C. B. couplers. They have all the up-to-date desirable features together with the simplicity of the early Janney type. They are made of a high quality acid open hearth steel thoroughly annealed, and designed to successfully withstand the severe usage of service.

They have all the functions recommended or required by the M. C. B. Association and Safety Appliance Laws, and are economical to maintain, automatic in operation, have a lock-set, a lock-to-the-lock and a knuckle-opener.

Lock-Set. Lock setting is accomplished by the locking block, when raised to the uncoupling position, resting on a seat, from which it is dislodged on the closing movement of the knuckle in the act of coupling.

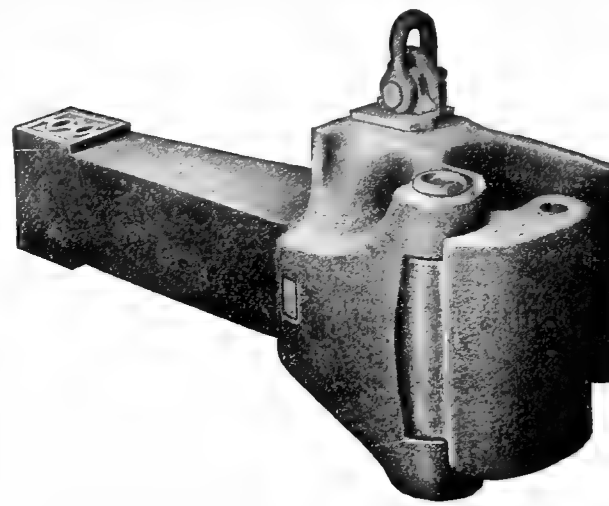
Lock-to-the-Lock. The locking pin cannot climb, being held in the locked position by a trigger which engages the under side of the top wall of the coupler head, thus preventing accidental uncoupling.

Knuckle-Opener. The knuckle-opener pushes the knuckle open to its fullest range of movement from a



fully closed position or from any partially open position, and its path of movement is such as to insure easy and complete opening of the knuckle.

These couplers are made in both the M. C. B. shank and pivot type. The shank type is suitable for use on freight cars and locomotive tenders in connection with any standard draft gear, while the pivot type is used with a coupler pocket on either locomotive tenders or front of engine. The coupler pockets made by this company are of simple and efficient design for use on either front or rear ends; the flanges are made to suit the individual requirements of the application. They are heavily ribbed and designed to stand the severest service. The material used is the same high quality acid open hearth steel as used in the manufacture of coup-



lers, carefully annealed, producing a casting of uniform quality and great strength.

Especial attention is called to the large area of the locking surface (practically five square inches) on the locking block and the knuckle of the Penn coupler, and to the fact that no portion of the locking block extends below the bottom wall of the coupler. The large area of the locking surface on the locking block and the knuckle insures durability.

Among the many desirable features of the Penn coupler is that of easy accessibility of parts, thus facilitating repairs. To remove the lock it is only necessary to take out the clevis pin cotter and lift out the trigger. After the locking block has been removed, the knuckle-opener can be lifted out through the opening in the top of the coupler. By this arrangement the necessity of first removing the knuckle pin and knuckle, in order to get at the locking block, is obviated. When the locking block is lifted by means of the chain on the uncoupling lever, it cannot come out, being prevented by the projecting lower end of the trigger.

With the knuckle open the locking block is held in such a position as to make coupling positive when the knuckle is closed.

The design and simplicity of these couplers reduces maintenance charges and keeps the equipment in service.

The quality of the material and the method of manufacture produces uniform metal of great strength.

Manufacturing Facilities

This company is one of the oldest and largest manufacturers of cast steel and malleable iron specialties for railroad work. The factory and equipment are modern in every respect, the latest devices tending to improve quality and increase production are employed, and the organization is composed of men especially skilled in their line. All work is carefully inspected and tested by this company to determine any defects and any product not meeting these tests is rejected. This method insures the durability and proper performance of all products.

Gould Car Specialties

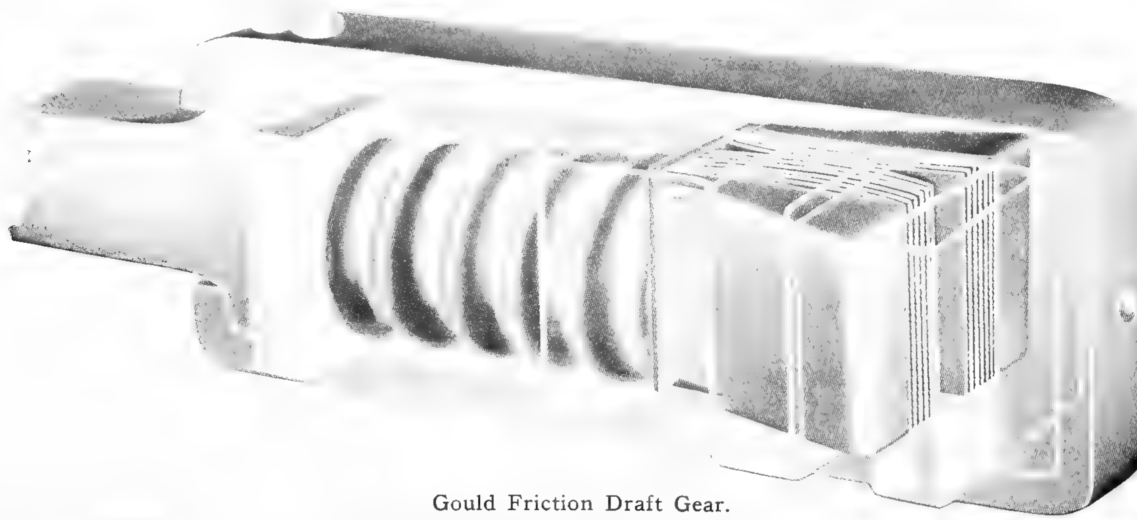
Body Bolster

The Gould Cast Steel Body Bolster for reinforcing wooden underframe cars is designed to use short steel draft sills and continuous steel center sills between the bolsters. It is cast in one piece and projecting brackets are provided to receive ends of draft and center sills.

Journal Boxes

The Gould Inset Lid Journal Box is provided with a lid with continuous beveled face which does not project beyond the mouth of the box and is dust proof.

The Gould Pinless Lid Journal Box is provided with lid interlocking on lug on the box and no lid pin is required. A coil type of spring is used. The ordinary MCB lid can be applied to this box. The Gould Coupler Company also furnishes the ordinary MCB Standard Journal Box in all styles.



Gould Friction Draft Gear.

Continuous Spring Buffer

The Gould Continuous Spring Buffer is a simple and effective buffer for passenger cars without platform, refrigerator, express or other cars used in passenger service. This buffer affords continuous passageway from car to car and may be used with ordinary freight type coupler and draft gear if desired.

Improved Friction Buffer

The Gould Improved Friction Buffer was designed for use with heavy modern steel equipment, is self contained and is easily applied and removed from cars. It provides a coupling up movement of 2½ inches and a buffing movement of 2½ inches with a capacity up to 150,000 lbs., which may be reduced to any desired point by removing leaf springs and substituting a shim plate. The illustrations show it applied to different types of cars.

Freight Coupler

All Gould Freight Couplers have positive, automatic lock sets and knuckle openers, and the knuckles are equipped with shoulders interlocking in the head to relieve the knuckle pins of injurious strains. It can be furnished with any length of head or style of shank and can be furnished side operative if required.

Passenger Coupler

The Gould Passenger Couplers are of improved design to suit modern heavy equipment. They have a positive bolt lock and bell crank knuckle opener and can be furnished to operate right and left at the bottom, right and left at the top, or from the side of coupler head as preferred by the customer. They are furnished with a great variety of shanks to suit different car conditions.

Carrier and Centering Device

The Gould Combination, Coupler Carrier and Centering Device is of new design. It will safely carry and centralize the heaviest coupler.

Steel Draft Sills or Passenger Car Platforms

The Gould Platform is made up of "Z" Bars extending from the end sills to or through the body bolster. It may be arranged to suit any style of body bolster, end sill, buffer, or draft gear. It is a valuable device for strengthening cars with wooden underframes.

Friction Draft Gear

The Gould Friction Draft Gear is of improved design and is of all steel construction. It consists of a casing, a heavy double coil release spring, a center follower, a pair of case hardened wedges and two groups of plate or leaf springs. In buffing or pulling these wedges are forced inward by inclined faces in the casing, thus compressing the leaf spring element. The function of the double coil spring is to return the release elements to its forward position and it is sufficiently heavy in design to do this under all conditions. Only one follower is required, the other being integral with the casing. The maximum capacity of the gear is 240,000 lbs. with a travel of 2½ inches. Leaf springs may be removed and shims substituted to reduce capacity or to compensate for wear. An important feature of this gear is the low recoil eliminating injury to the car from this source. It is designed for MCB pocket space of 24⅝ inches x 12⅞ inches x 9⅛ inches or for passenger service to suit 6½-inch yoke. Capacity of passenger gear, 150,000 lbs. with travel of 2½ inches.

Gould Z Type Truck Bolster

Gould "Z" Type Cast Steel Truck Bolster is so designed that maximum of vertical and transverse strength is obtained at moderate weight. Owing to the unique design a transverse strength of at least 75 per cent of the vertical is guaranteed.

Cast Steel Truck Side Frame

Gould Cast Steel Truck Side Frame is of the well known "T" section except that the beading around the openings in the frame has been widened, being the full width of the frame at the column and narrowing up as it approaches the ends. This adds greatly to the transverse strength and also provides additional vertical strength.

Vestibules

The Gould Vestibule Face Plate extends down over the buffer plate and is secured to it. The top of the plate is forced outward by push rods, which are bolted to the vestibule subframe at their lower ends and are connected at their upper ends to spring actuated plungers. T-Irons riveted to the legs of the Face Plate add to its stiffness.

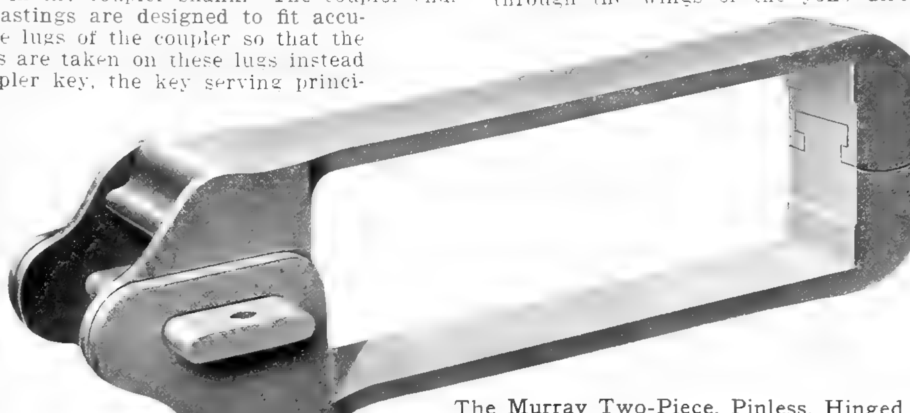
The Murray Keyoke

Pinless Interlocking Hinge

The Murray Yoke is adapted for use with any design of draft gear. It has a number of distinctive features that offer obvious advantages over any other yoke on the market. No simpler yoke was ever designed. It consists of two open hearth thoroughly annealed steel castings, jointed together at one end by a pinless interlocking hinge. The other end of the casting is provided with slots to take the standard 1⅛-inch by 5-inch coupler keys. When the yoke is in position the slots register with the standard slot of the same size in the coupler shank. The coupler ends of the yoke castings are designed to fit accurately over the lugs of the coupler so that the pulling strains are taken on these lugs instead of on the coupler key, the key serving principally to lock the yoke to the coupler. The Murray is the only yoke in which the gibs that engage the gibs on the coupler are supported by and cast integrally with the side wings of the yoke.

No Pull on Coupler Key

The Murray Yoke is the only key attachment on the market in which the load or pull is transmitted from the yoke direct to the coupler lugs, instead of being taken on the coupler key as is usually the case. This does away entirely with that constant source of trouble, the elongation of slots in the yoke and coupler, and eliminates almost entirely the wear on the key. The feature of pulling on the coupler lugs instead of on the key gives this design of yoke a great advantage. Where the pull is transmitted through the wings of the yoke direct to the coupler key, as in the old style yoke, it is practically impossible to secure sufficient bearing for the key in the wings or head of the yoke, consequently there is an excessive amount of wear on the key and in the slots.



The Murray Two-Piece, Pinless, Hinged Yoke.

Easy Removal and Replacement of Coupler

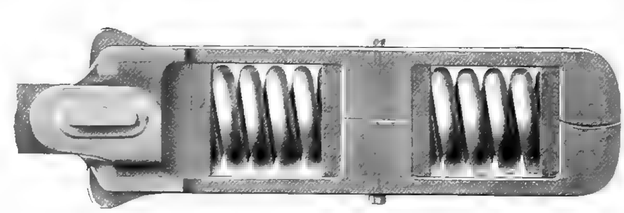
One of the most attractive features of the Murray Yoke is the ease with which the couplers may be removed or replaced in the cars. By simply removing the key the lower member of the yoke may be dropped or the upper member raised sufficiently to permit of sliding the coupler in or out of position. This is of special advantage at outlying points where there are no facilities for doing heavy work. Even in the line of road, providing a coupler is ready at hand, a coupler could be removed and a new one applied with but very little difficulty. It thus becomes of value from an operating as well as from a mechanical viewpoint.

No Slack Between Coupler and Draft Gear

In the old style yoke, where the pull is on the key, the metal in the bearing surfaces is overstressed. It is practically impossible to provide enough bearing area for the key in the head or wings of the yoke to keep the stresses within allowable limits. Consequently, in a short time the slots in both the coupler and the yoke become elongated, creating a slack between the coupler and the draft gear. In the Murray Yoke this trouble is entirely obviated by taking the pull on the coupler lugs instead of on the key. Taking the pull on the coupler lugs also prevents any tendency of the keys to tear out through the ends of the slots.

View Showing Keyoke Open.

The above illustration shows clearly the way in which the yoke operates. The hinged end of the upper arm of the yoke consists of a curved T-slot in which runs a curved T-section formed on the lower arm, the lips on the T holding the two arms together. It is substantial in construction and is easily operated.



Murray Keyoke Designed for Tandem Spring Gear.

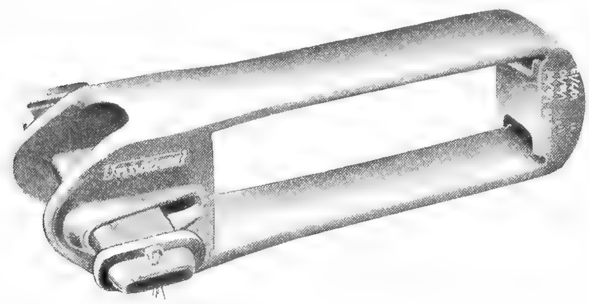
Strength of the Murray Yoke

The Murray Yoke is twice as strong as wrought iron yokes and stronger than any other cast steel yoke. From destruction tests it has been determined that Murray yokes made of material 1 in. by 5 in. fail at 474,400 lb., and that they fail in cross-section.

Wrought iron yokes made of 1½ in. by 5 in. material when tested to destruction fail at 245,000 lb.; that is, the rivets shear at 245,000 lb., and the gibs, which are simply bent in to engage the coupler lugs, break off at 254,000 lb.

Universal Yokes

The advent of steel underframe cars transferred the weak links in a car train from the draft sills to the yokes and couplers. Rivets used for securing yokes to drawbars have been a source of annoyance. To produce best results a rivet must hold tightly. The connection between yokes and couplers should be flexible. The result is, where a riveted connection has been used it has proved unsatisfactory, the rivets not only becoming loose and thus reducing efficiency, but there is frequent breakage with consequent delay in train service. A



Universal Keyed Yoke for Friction Type of Draft Gear.

strong and flexible connection that can be readily made is, therefore, more efficient and reliable.

Advantages in Design

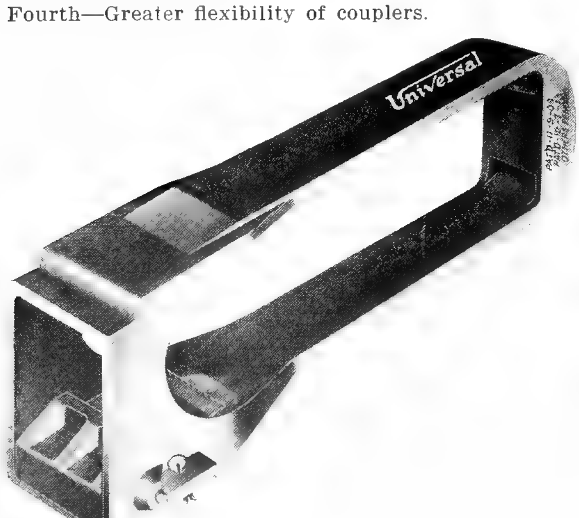
Universal yokes are designed with the view of:

First—Elimination of coupler rivets, blacksmith labor and the handling of couplers to and from shops.

Second—Permitting quick and economical exchange of couplers without disturbing yokes or draft gear.

Third—Providing greater strength than is possessed by ordinary wrot yokes.

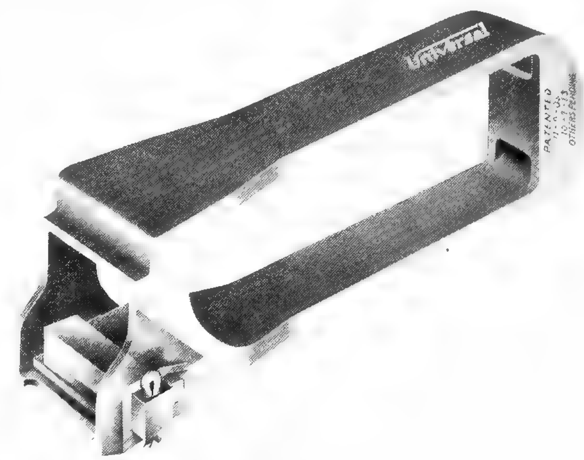
Fourth—Greater flexibility of couplers.



Universal Lock Yoke for Friction Type of Draft Gear.

Riveting yokes to couplers means that each coupler ready for service must have a yoke, and as there are 10 or more sizes and lengths of yokes, the investment in extra couplers and yokes is entirely out of proportion to the active service rendered.

By careful design and the use of first class, thoroughly heat-treated material, the Universal yokes are practically unbreakable, and therefore where used nearly all "break in twos" are almost invariably due to failure of couplers. It is conceded good practice to reduce to the minimum the classes and sizes used, thus resulting in economy of stock to be carried for repairs, and any device that will permit of this reduction should be considered with favor.



Universal Rivles Yoke for Friction Type of Draft Gear.

Economy Of Use

The Universal attachment for couplers means to the user:

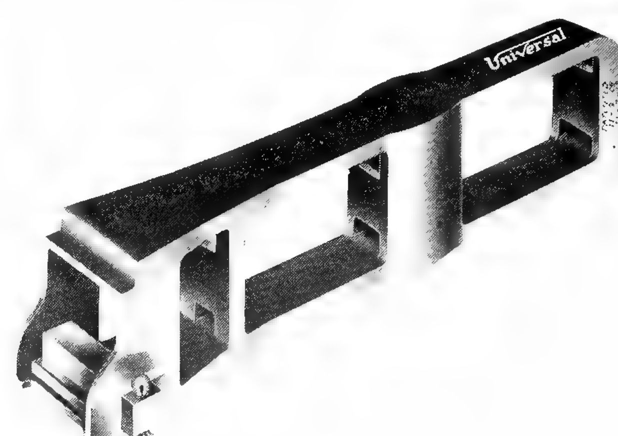
First—Practically no surplus yokes.

Second—Minimum supply of drawbars.

Third—Minimum expense and delay in applying couplers.

Fourth—Maximum service for cars.

With the exception of the tandem type of draft rigging requiring follower plate separators, the Universal yoke permits of backward movement of couplers, as in buff, without corresponding movement of yokes. This is a very important feature, as it lessens the wear of parts and permits the application of draft gear in otherwise prohibitive spaces.



Universal Rivles Yoke for Tandem Spring Draft Gear.

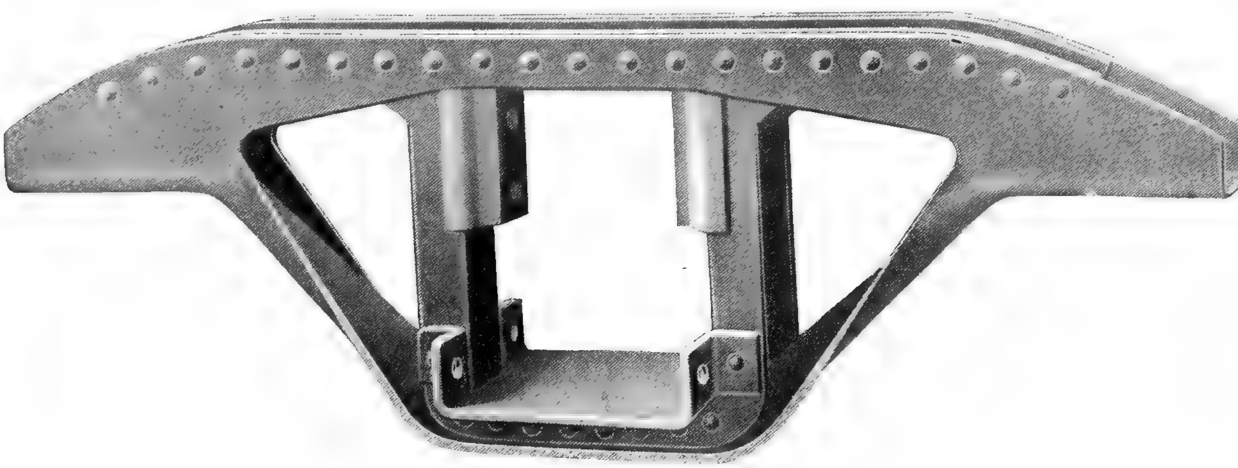
Types of Yokes

The Keyed type of yoke is the most popular, as the key passing through the sills provides an additional safety feature. The Lock and Rivles types may be used on old cars without changing construction. These types engage the gibs of the couplers and permit the use of couplers that are not key slotted, but in all cases are stronger than wrot yokes, free from rivets, and permit of quick and economical exchange of couplers without disturbing the draft gear or sending the car to the repair tracks.

Forsyth Forged Steel Truck Side Frame

Description

The Forsyth Forged Steel Truck Side Frame is designed to carry the steadily increasing loads demanded in freight service. It consists essentially of three members riveted together, the compression and tension members being pressed as an integral part, out of one piece of metal, the columns and spring seat support from another piece of metal, and the top channel stiffener out of a third piece of metal. Bolster wearing strips are riveted to the columns and a spring plank support is

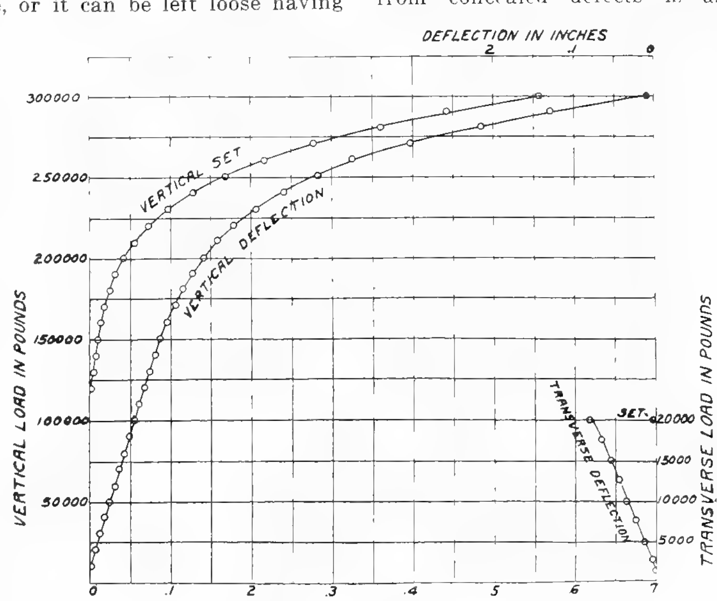


riveted to the bottom. All parts are pressed from open hearth steel of high tensile strength.

In the design of this truck frame special attention is given to securing uniform strength throughout, resulting in light weight with ample strength to properly support the loads imposed in service.

It is designed to use the bolted type journal box, supported in the same manner as on the arch bar frame. The spring plank can either be riveted to the side frame at the spring seat, thereby forming a rigid truck which cannot get out of square, or it can be left loose having an embossment on each end fitting into recesses in the spring seat, thus forming the so-called loose type of truck. Any standard bolster of the cast steel or built-up type may be used.

This truck frame is built in capacities for use under 40, 50 and 75-ton cars.



Requirements and Tests

The Forsyth Forged Steel Truck Frame meets all the M. C. B. standards and recommendations regarding limiting dimensions and strength.

The Forsyth Truck Frame, as used under a 50-ton car, was tested on an Olsen testing machine to determine its deflection under load and its ultimate strength.

The results of these tests, as indicated by a diagram, show the frame capable of supporting a vertical load of 125,000 lb. with a deflection of .072 inch and a permanent set of .005 inch. A transverse test showed the frame capable of standing 17,500 lb. with a deflection of .069 inch and no permanent set, 20,000 lb. being required before a permanent set was obtained and then only .004 inch. In course of development the frame was tested to obtain actual stresses existing at all points under design loads in order to have uniformity of strength throughout.

When tested to determine its ultimate strength it required 473,600 lb. vertical load before failure occurred.

Advantages

The Forsyth Forged Steel Truck Frame is practically a one-piece construction, as all parts are securely riveted together eliminating the possibility of the parts becoming loose due to vibration or wear, thus reducing the cost of inspection and maintenance over the built-up type of frame.

Being made of pressed steel a uniform metal free from concealed defects is assured, eliminating the possibility of failure.

Its design and method of construction gives uniform strength in all parts, all excess metal being eliminated. This results in light construction and makes a considerable saving in cost of hauling.

The bolster wearing strips and spring plank seat may be readily replaced when worn, thus increasing the useful life of the truck side frame.

Other Products

In addition to the Forsyth Forged Steel Truck Side Frame this company also manufactures the following railway specialties: Steel ties, continuous rail bases, guard rail braces, anti-creeping devices, spring plates, journal box lids and many other pressed as well as cast steel devices.

Scullin Cast Steel Truck Specialties

Cast Steel Pedestal Side Frames

The Scullin pedestal truck side frame, illustrated in Fig. 1, is of the I-section and is made of high grade open hearth cast steel. It is simple in design and properly proportioned, giving maximum strength and light weight. The uniform section facilitates manufacture and produces castings free from defects.

The jaws on each end of the frame engage with guides cast on the journal box. This construction, together with the weight of the car, securely holds the frame and journal boxes in their proper relationship when in normal service. A recess is provided in the frame at center top of journal box opening into which fits a lug cast on top of the Scullin journal box. Retaining bolts pass through the frame and the lugs, thus preventing the separation of journal boxes and frame in case of derailment.

In the spring plank seat is cored a concave recess, the center of which projects upward to engage with the hole in the spring plank, the arrangement closely resembling a truck center plate. This construction securely holds the truck member in proper relationship and at the same time permits flexibility in all directions without any undue strain being placed on any member. No rivets or bolts are used in assembling, the weight of the car holding the spring plank to its seat in the recess provided in the side frame. This feature permits quick assembly and by eliminating the rivets commonly used for joining the spring plank and side frame reduces the inspection and maintenance costs.

The frame is made entirely in one piece, the use of the pedestal box eliminating the journal box tie bars, and the brake hanger supports are cast integral with the frame.

The method of attaching the journal boxes decreases the cost and the time required in replacing wheels, as it is only necessary to remove two bolts, one from each journal box, and jack up the frame a sufficient height for the pedestal jaws to clear the journal box, in order to roll the wheels out.

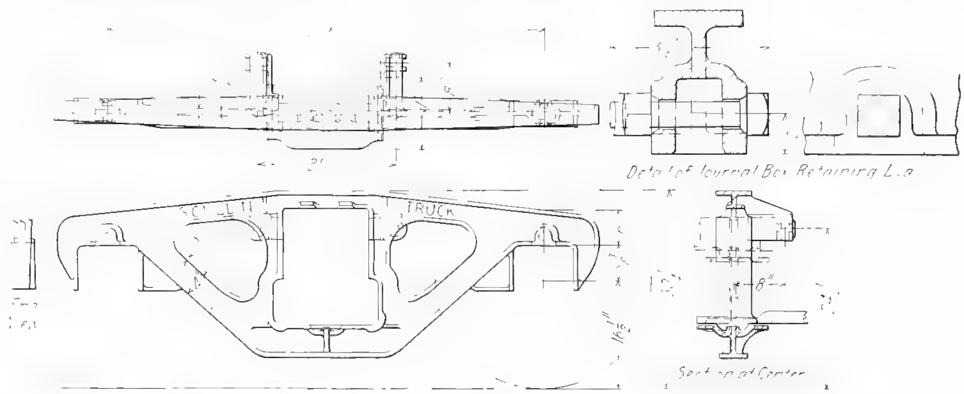


Fig. 1.

Another type of cast steel side frame is illustrated in Fig. 2. This frame is similar to the type shown in Fig. 1 except in the method of attaching the spring plank. In this construction a standard 13-in. car truck channel is used. At each end two plates are riveted across the underside of this channel, between which fits the spring seat of the side frame, the weight of the car holding the two members together. Lugs are cast at each end of the spring seat to center the spring plank longitudinally with the side frame. These lugs together with the plates on the underside of the spring plank tend to keep the truck square and at the same time permit flexibility in a vertical direction without causing any undue strain on any part of the truck.

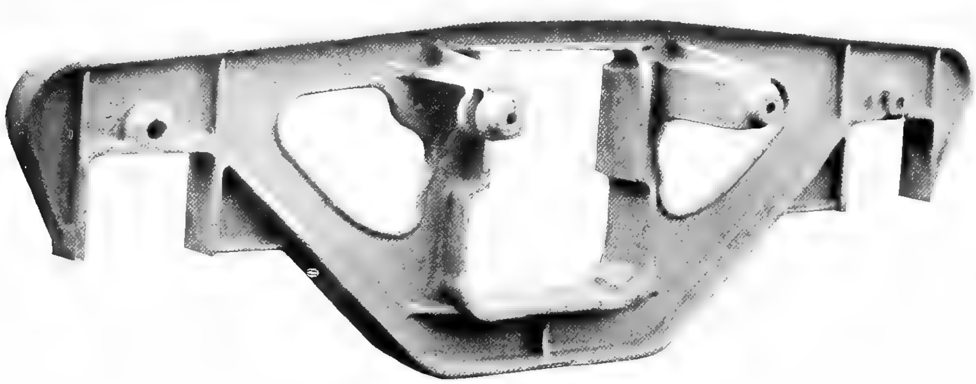


Fig. 2.

The method of attaching the spring plank permits of quick assembly and at the same time uses standard material. It is particularly valuable when it is necessary to dismantle the truck, as it does not necessitate tying up the car for any length of time. The general design and the method of attaching the brake hangers and journal boxes is the same with this truck as with the type shown in Fig. 1.

The cast steel side frame shown in Fig. 3 is similar

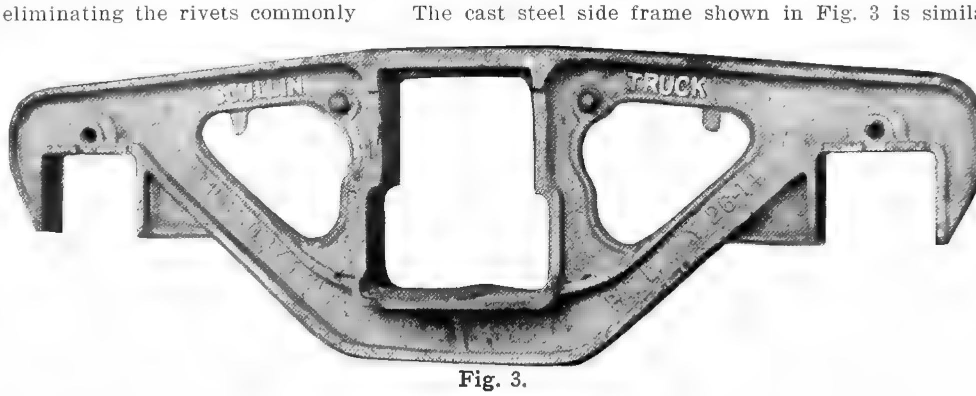


Fig. 3.

Scullin Cast Steel Truck Specialties

to the types previously described except in the design of the spring plank seat. This frame, as illustrated, is designed to use a spring plank composed of two angles. These angles are placed with their vertical legs bearing against and riveted to the vertical walls of the spring plank opening; their horizontal legs rivetted to spring seat. This construction furnishes a truck that will remain square while at the same time permitting considerable vertical flexibility without unduly straining any part. The method of attaching the journal boxes and brake hanger supports and the general design of the truck is the same as in the types previously described.

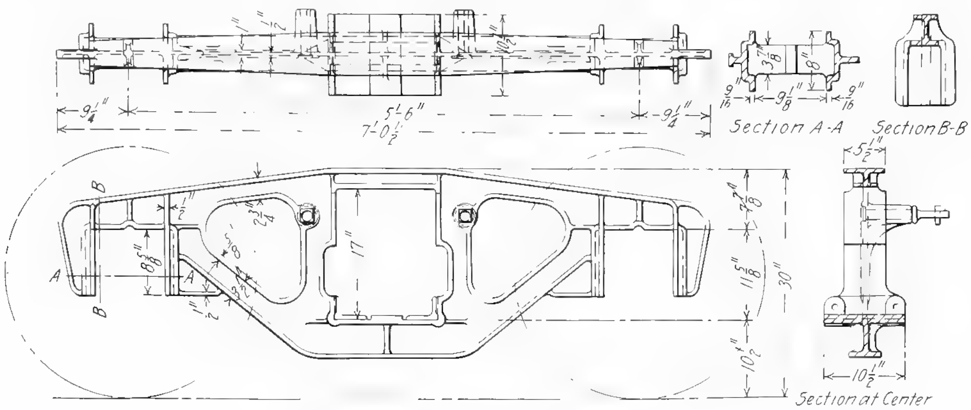


Fig. 4.

This frame is also designed to use the standard channel spring plank, in which event the projection in the center of the spring seat is omitted and the channel riveted directly to the spring seat.

A side frame, designed to use the standard M. C. B. passenger car journal box, is illustrated in Fig. 4. The jaws on this frame are cast close to size and make a good sliding fit with the slots in the standard journal box. They are cast in a channel section to provide a good bearing at each side of the slot and the top is also cored out at the center to make sure of a firm bearing. This feature holds the box square with the journal and eliminates all possibility of its getting out of line.

This frame can be furnished for any type of spring plank desired. The frame illustrated is designed to use the angle type of spring plank, but can be designed to use any of the spring planks previously described. It permits the use of standard M. C. B. passenger car journal boxes and makes it unnecessary to carry others especially for these trucks. It also has the advantage of the same ease of wheel replacement as the truck previously described.

A side frame with divided journal boxes is illustrated in Fig. 5. This frame has the upper half of each journal box cast integral with the frame and the lower half secured by four bolts, two on each side of the box, a tight joint being maintained between the sections by means of felt gaskets. The boxes are designed to use standard M. C. B. lids, wedges, brasses and dust guards. This type of frame permits exceptionally easy replacement of the wheels. The removal of four small bolts from the journal box releases the cellar, and jacking up of the frame a short distance permits the wheels to be rolled out.

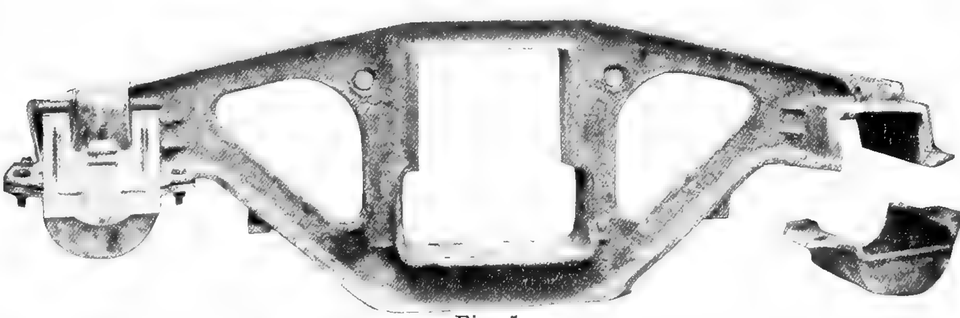


Fig. 5.

The frame illustrated is designed to use a standard channel spring plank riveted to the frame, but this type of frame can be modified to use any of the spring planks previously described.

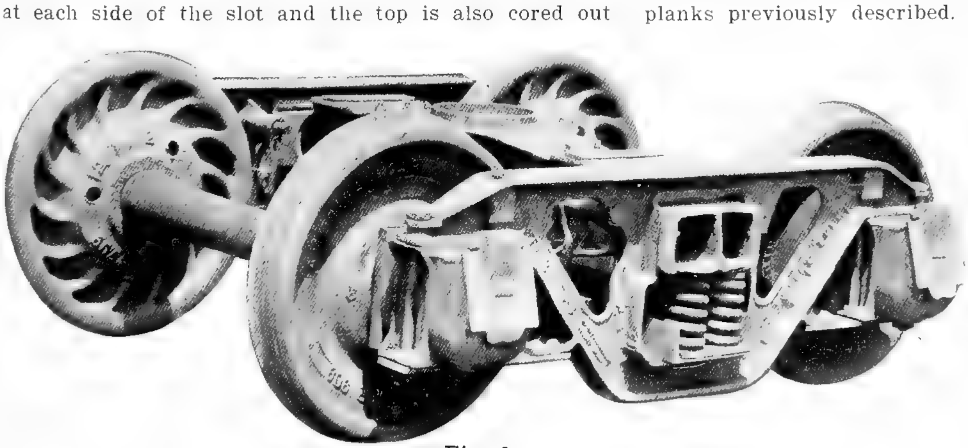


Fig. 6.

A Scullin cast steel side frame is also designed to replace the arch bar frames. This type, illustrated in Fig. 6, uses the standard bolted type M. C. B. journal box with the tie bar riveted to a lug cast integral with the side frame. This frame follows the same general design as the other types. The one illustrated is arranged for a channel spring plank riveted to the frame, but any of the previously described types of spring plank seats can be furnished. Standard parts are used throughout in the construction of trucks with this type of frame.

The different types of Scullin cast steel side frames

Scullin Cast Steel Truck Specialties

are built in any capacity required and are furnished with any type of brake beam hanger support. They fully comply with the M. C. B. requirements and recommendations as to weight, dimensions and deflection under load.

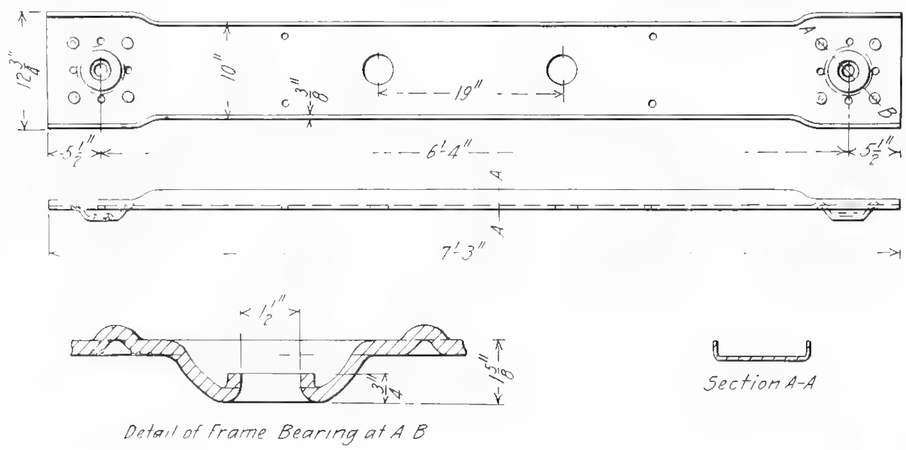


Fig. 7.

Scullin Journal Box

The Scullin journal box, illustrated in Fig. 8, is designed for use with the Scullin cast steel pedestal side frames. It has a lug cast on the top which fits into a recess cored in the side frame and secured by means of a bolt passing through the side frame and lug, which holds the journal boxes and frame together in case of derailment. These bolts carry no load in service and are therefore not subject to wear.

These journal boxes are of standard M. C. B. design with the exception of the lug cast on the top. They are made of either malleable iron or cast steel. The bolt is of special design, having a countersunk head and nut, and lock nut.

Advantages

Scullin cast steel side frames provide a one-piece construction which has many advantages over the built-up types It eliminates the multiplicity of parts and their heavy inspection and maintenance costs. It has greater strength and rigidity and therefore keeps the journal box in line with the journals, preventing the binding and pinching of the bearings and subsequent hot boxes due to too great deflection. It permits quicker replacement of the wheels, and therefore keeps the car in service a greater percentage of the time

Scullin Spring Plank

The Scullin equalized spring plank illustrated in Fig. 7 is simple in design and of ample strength to withstand the severe strains encountered in railroad service. It is made of an open hearth pressed steel channel, the ends of which are formed to engage the spring plank bearing cored in the side frame. The bearings on the spring plank are convex in shape with a hole in the center. This convex section fits in the corresponding concave section in the side frame and a vertical projection in the side frame engages the hole in the spring plank. The weight on the bolster securely holds the spring plank in place and the truck is relieved of any twisting or vertical stresses due to uneven or curved track. A combined equalized and articulated truck is thus obtained. This spring plank permits quick assembling and dismantling of the truck, no rivets or bolts being required to maintain the parts in their proper relationship. The method of application also decreases inspection and maintenance costs.

Fig. 8.

Scullin Truck Bolsters

The Scullin cast steel truck bolster, illustrated in Fig. 9, is designed for use under 40-ton freight cars. It is of I section, properly reinforced and well able to care for the vertical loading, side and end thrusts. Each end directly over the spring seat is of box form and is reinforced by the vertical counterweb. The center plate and side bearings are cast integral with the bolster. This bolster is designed to meet the M. C. B. requirements and recommendations as to weight, dimensions and deflection under load. The illustration merely shows the general design; any modifications will be made which are necessary to adapt the bolster to a particular application.

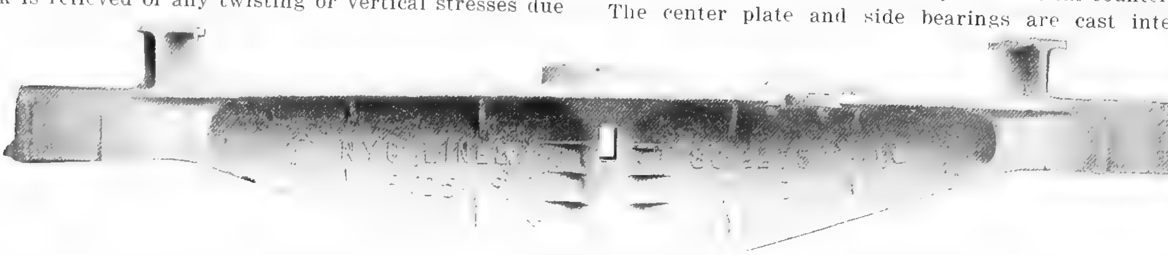


Fig. 9.

Scullin Cast Steel Truck Specialties

The bolster illustrated in Fig. 10 is designed for service under 50 to 55-ton cars. It is of the I-section with the center bearing cast integral. The side bearings are riveted to the bolster, the bolster having ground surfaces to receive them. This bolster has ample strength to care for the loads imposed upon it in service and is well designed to facilitate manufacture and insure perfect castings. The bolster is heavily reinforced at the center by a cylindrical section surrounding and supporting the center pin and also supporting the center bearing. The ends of the bolster directly over the springs are box shaped and are reinforced by the vertical center web. This bolster meets the requirements and recommendations of the M. C. B. Association both as to deflection under load, weight and dimensions. It may be modified in design to meet the requirements of any application.

This bolster is arranged to use channel center and draft sills for reinforcing the wooden underframe. Cored openings are provided through the web to permit the use of center sills continuous from end to end of the underframe, the bolster being secured to each sill by rivets. This application provides rigid construction well able to care for the buffing shocks and other strains received in service. It also permits easy construction, eliminates the multiplicity of parts and by providing continuous center sills relieves the rivets of buffing and pulling shocks.

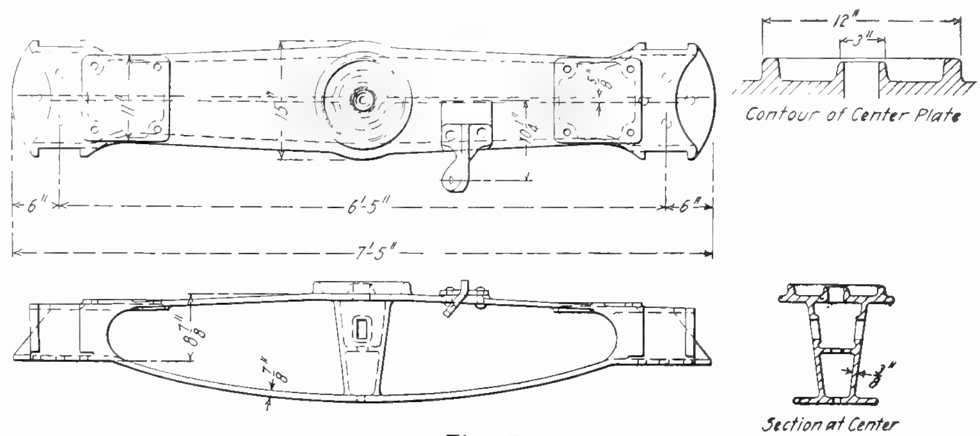


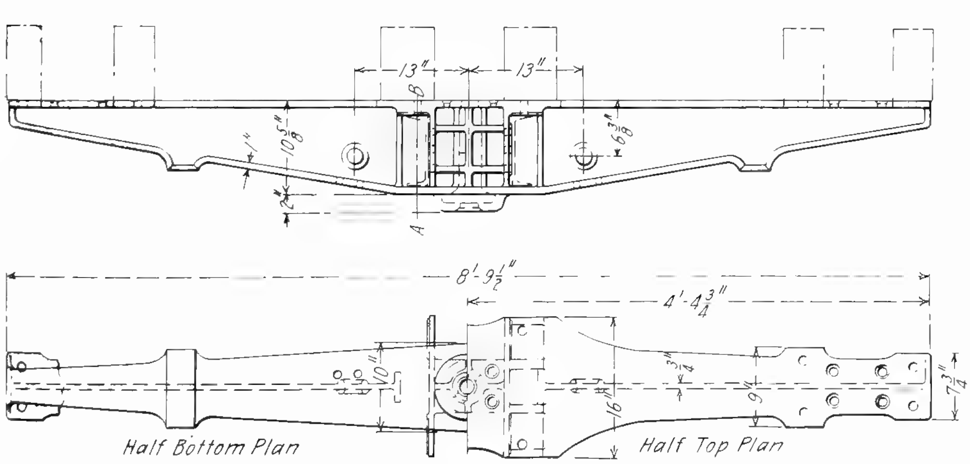
Fig. 10.

Scullin Body Bolster

The body bolster illustrated in Fig. 11 is especially adapted for reinforcing wooden underframe equipment. It is suitable for application to 40-ton cars, but a similar design can be furnished for heavier or lighter equipment and its construction may be modified to meet the conditions imposed by any type of underframe. It is of I-section carefully proportioned and is well able to withstand the strains imposed in service.

Advantages

Cast steel truck and body bolsters being made in one piece eliminate the multiplicity of parts found in the built-up types. They furnish a rigid construction that tends to keep all parts of the truck and underframe square. They reduce maintenance and inspection costs, as there is nothing to jar loose. They keep the car in service a greater percentage of the time as they eliminate necessity for repairs.



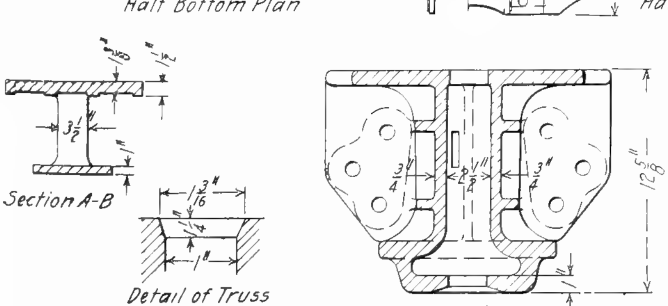


Fig. 11.

Manufacturing Facilities

Our foundries are equipped with the most modern appliances for the manufacture of large or small steel castings, and the latest and best shop practice is followed in their production. The engineering, designing and manufacturing departments are composed of men with long experience in steel foundry work. All castings are properly proportioned and throughly annealed, eliminating internal strains and insuring a uniform quality of material. Physical and chemical testing laboratories are maintained to determine the qualities and properties of the material entering into the manufacture of the various castings and the entire output is subject to rigid inspection. Definite standards as to quality of material and workmanship are maintained, insuring only perfect castings leaving the shop.

Barber Lateral Motion Truck Device

Description

This Lateral Motion Roller Truck Device is the original and only simple and reliable substitute for swing hanger truck. It is made in three styles:

Under light capacity cars, 30 to 40 tons, 2-roller device is used consisting of roller cap, 2 rollers, combination roller seat and spring cap.

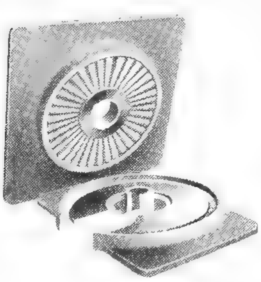
Under heavier capacity cars, 40 to 150 tons, 3-roller device is used consisting of roller cap, 3 rollers, combination roller seat and spring cap.

The interlocking caps and seats can be used under any capacity. This is illustrated below.

Advantages

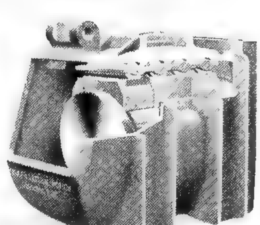
The lateral motion device relieves wear on the wheel flanges, rails, coupler knuckles and journal bearings. It also overcomes the tension strains on truck and car body. It greatly reduces train resistance and lessens possibility of derailment.

Barber Roller Bearing Center Plates



These roller bearing center plates can be applied to any type of truck and body bolster, and are suitable for all classes of both passenger and freight equipment. These plates lessen train resistance by allowing of free curvature and materially reduce the cause of derailments. Ample bearing surface is provided. Rollers are conical in form, made of drop forged steel and hardened. Top and bottom plates are made of either drop forged steel or cast steel as conditions require.

Barber Lateral Motion Journal Box

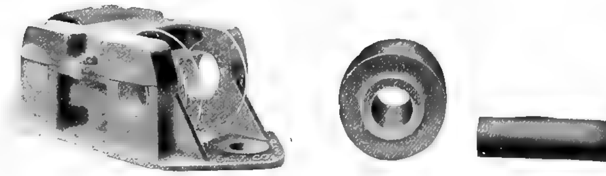


The Barber roller bearing lateral motion journal box can be applied to any truck and is interchangeable with standard box brass and wedge. It reduces the wear on the flanges and journal bearings and lessens the possibility of derailment. It is particularly desirable for the middle pair of wheels of six-wheel trucks, relieving the end thrust between brass and journal collar.

Barber Drop Down Brake Mast

This mast meets the U. S. safety appliance standard in its upright position and may be lowered to one side to give clear deck for loading, and in this position it is operative for holding the car on the siding. It is simple in design, durable and dependable.

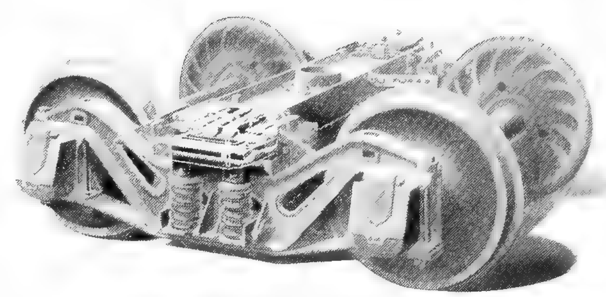
Barber Roller Side Bearings



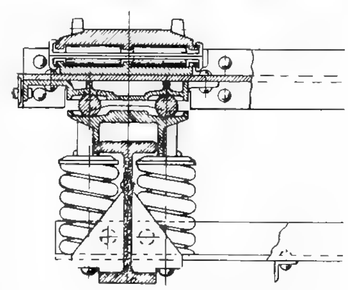
It is made with malleable iron housings, special hard iron steel bushed rollers and equipped with pins of rolled steel shafting case hardened. Height and layout of rivet holes are made to suit any requirements.

This bearing is suitable for both passenger and freight equipment. It is simple in design, efficient in use, inexpensive, unlimited in its scope of movement and is maintained at minimum cost.

Barber Double Action Roller Bearing Lateral and Radial Motion Truck



Description

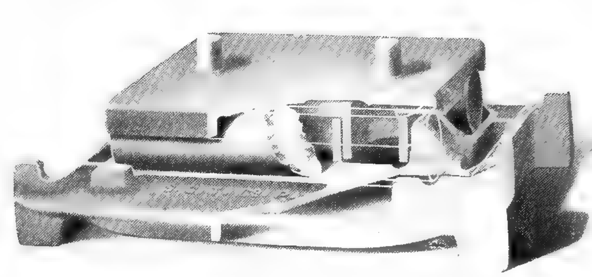


This truck is fitted with Barber Cast Steel Side Frames and Barber Lateral and Radial Roller Devices and is equipped with a rolled steel I beam bolster.

The Lateral and Radial Roller Truck is also made in arch bar Side Frame type with special interlocking columns.

The entire load is carried at four points of the car body directly on the centers of the truck side frames by Lateral and Radial Motion Rollers which allow for free curvature of the trucks. This type of truck is especially designed for heavy capacity cars, 70 tons or more, and no load is carried at the center of the truck bolsters.

Barber Interlocking Roller Cap and Seat for Barber Lateral Motion Truck Device



This type of roller is used on freight cars and is designed to lock the roller cap to the roller seat and relieve the wear on the truck columns.

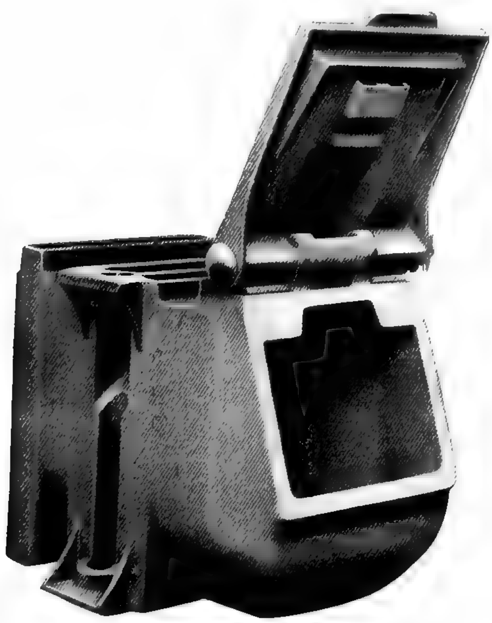
Buffalo Journal Box

Product

Malleable iron and steel castings for railroad purposes are manufactured by this company. The highest grade of raw material, years of experience, and the latest and most improved machinery combine to make the finished product the best of its kind.

Steel Castings

Modern shop equipment, skilled operators, and a well equipped laboratory insure a high grade and uniform quality of open hearth steel castings. The shop practice and the method of annealing, which has been developed at this plant, produce castings free from shrinkage and internal strains. A well equipped finishing department insures castings that are exceptionally straight and true to drawing dimensions.



Malleable Castings

The malleable iron produced by the Pratt & Letchworth Company is of a grade particularly adapted to railroad purposes. Long experience in manufacturing malleable castings for railroad service and the use of only the highest grade of raw materials have given this firm an enviable reputation for the quality of this product which is peculiarly suited to so many railroad purposes. Chemical and physical tests of every cast of iron insure in all castings a uniform material of the desired grade, while a modern, thoroughly equipped annealing department insures that every casting receives proper heat treatment.

The Buffalo Box

The Buffalo journal box, manufactured by this company, is made entirely of malleable iron. The design of both the box and the lid incorporates an adequate thickness of metal which gives ample strength and assures long life under all service conditions. For use on freight cars, malleable iron journal boxes and journal box lids are particularly well suited on account of their great strength and the resistance which malleable iron offers to corrosion.

The closing device on the Buffalo box is such that in case the lid is accidentally left open it will close and lock automatically from any position, due to the vibration of the moving trucks. There is no position in which the springs tend to press the lid open, as is the case with most journal boxes when the lid is left more than half way open. Two coiled springs, always under tension, hold the lid firmly in closed position, thus preventing all wear from lateral vibration and taking up automatically any wear in the pin holes. M. C. B. dimensions are maintained in hinge lug and lid so that in an emergency M. C. B. lid with flat spring may be applied. The coiled springs are made from a high grade of spring steel and the service strains never approach their elastic limit. This insures long life to the springs and positive performance of their functions.

The lid is carefully fitted to the box and maintains a tight joint at all times, thus preventing the entrance of dust or other foreign matter and insuring long life to the journal and bearing.

The box is carefully constructed and inspected. This insures alignment of the wedge and bearing and interchangeability with other standard boxes if necessary. This feature also reduces the liability of the bearings running hot and materially reduces the maintenance cost of journals and bearings.

The lid of the box is easily opened and will, therefore, receive proper inspection and lubrication; experience has demonstrated that this is not the case with boxes that are difficult of access.

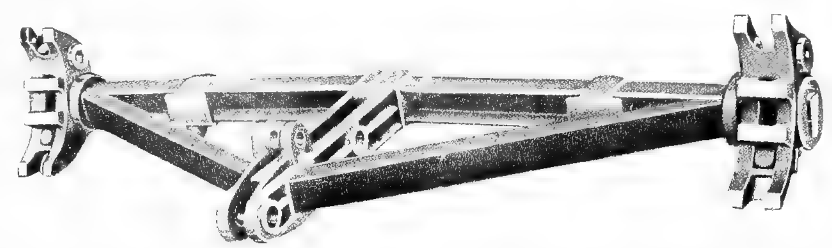
Other views of this box and lid showing in detail the operating mechanism are shown on page 582, figures 1030 and 1031 of the illustrated section.

The Buffalo box is made in all sizes for use in connection with arch bar or cast steel pedestal type side frames.

Huntoon Brake Beams—Perry and Joliet Side Bearings—Hartman Center Plates

Huntoon Brake Beams

The dominant feature of the construction of the Huntoon Brake Beam is the manner in which the two main truss members are secured together at their ends. There are no nuts to get loose and fall off and no threads to strip or rust. The tension bar is upset or enlarged at its ends to fit the inner face of the channel compression member and lies flatwise along the inside of the web of the channel at the brake heads. The ends of the tension bar terminate in continuous shoulders that fit squarely against the ends of the compression member, without the use of any loose parts or interposed blocks, giving a large area of direct contact, snugly filling the brake heads with solid metal and throwing the stresses in a direct plane with the compression bar.



The compression and tension members of the truss are made of open hearth steel—the compression member, a channel and the tension member, a rectangular bar. The strut and brake heads are of malleable iron of extra weight and quality. Comparative tests indicate that the Huntoon Brake Beam is the strongest beam per pound of metal ever made. The strut is one piece; there are no key slots and no riveting to weaken the strut or compression member. There are no pockets in the heads or beams to collect and hold moisture and cause rusting, which sometimes becomes a serious problem.

With the Huntoon Brake Beam it is impossible for the tension member to be cut by wheel flanges, which often occurs with many brake beams now in service. The interlocked ends make it impossible for the tension member to ever work loose. The brake heads are interchangeable, being the same for both ends.

All Huntoon Beams are made 25 per cent. in excess of rated capacity and are so guaranteed. Every beam is tested, on a specially constructed testing machine, up to a load slightly under their elastic limit, to insure against any possible flaws or defects in the materials. Before shipment every beam is carefully inspected and gaged to see that it fully meets all M. C. B. requirements as to dimensions and interchange.

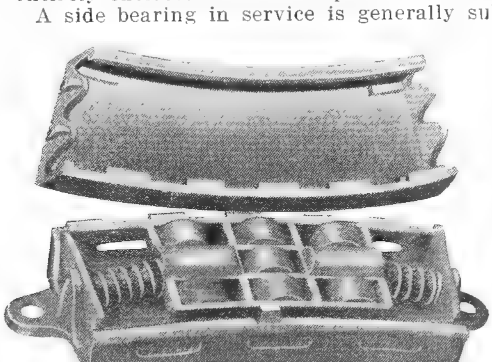
The brake head on the Huntoon Passenger Beam is automatically adjustable; it is always tight on the sleeve, never becoming loose to rattle and wear. All "chattering" and preliminary deflection are eliminated and the brake adjusts itself automatically to the contour of the wheel with the first application of the air.

The distribution of metal in the Hunton truss gives great vertical strength, a factor so much desired to prevent any buckling up or down. This construction secures a beam of maximum strength for given weight, both in the line of normal loads and vertically. The Huntoon Beam can be applied in the least possible space; it is durable and will stand the most severe service, because of its excess capacity. It is interchangeable with existing standards, and is uniform in dimensions and adaptable to all classes of equipment.

Perry Side Bearings

Perry Side Bearings have been in use now for more than fifteen years on the heaviest rolling stock built. It is a bearing that is practically frictionless at all times. The construction of the Perry Bearing is shown clearly in this illustration. This bearing when photographed had seen 700,000 miles of service, and showed practically no appreciable wear. The safety cover permits very free and independent movement of trucks. The majority of failures of side bearings are caused by dirt accumulating in the springs and arms and preventing their operation. The Perry Bearing is entirely enclosed and is dirt proof.

A side bearing in service is generally subjected to a constant pounding, which would cause balls to crush or indent the plate upon which they rest. On the rollers of the Perry Bearing the pounding has practically no effect. The coil springs cause the rollers to quickly "center" themselves and prevent any tendency of the rollers to wear flat or indent themselves in the bed.

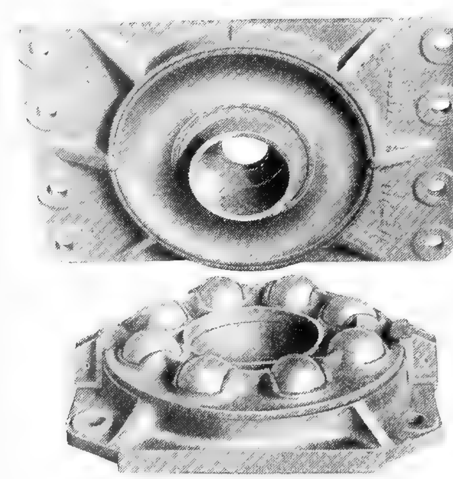


The rollers used are made of cold-drawn steel, on automatic machines, to 1-1000 of an inch accuracy. All materials are carefully inspected and tested before being used. All castings are provided with double test lugs to insure against poor anneal; after assembling every bearing is subjected to a test which practically precludes any possibility of imperfect bearings being shipped.

We also manufacture the Joliet Roller Side Bearings, with unlimited travel, for all classes of railroad equipment. See dictionary for illustrations and details

Hartman Center Plates

The Hartman Ball Type Center Plate contains eight steel balls, each ball operating in its own "pocket" or raceway. The raceway for the balls is inclined both ways from the center, and the weight of the car, urging the ball down the incline, produces a truck-centering feature in direct proportion to the load. Operating in a curved raceway, bearing is provided over two-thirds of the entire surface of each ball, which means that each ball has about 3 inches of bearing both above and below.



The balls are high-carbon steel, drop-forged heat-treated and hardened. The sizes are from 1½ inches to 2½ inches diameter, according to car capacity. Fifty-ton cars and over require the 2½-inch ball. This size ball will sustain a load, under point contact, of over 300,000 lb. each, without flattening 1/100 of an inch and without breaking.

The raceways are high carbon steel, drop-forgings, and are renewable. After five years' constant service these raceways have shown no appreciable wear. A malleable iron ball-spacer and retainer-ring make it impossible for the balls to work out of true or lose out. The bearing housing is made of malleable iron, thoroughly annealed.

Peacock Hand Brake

Description

The Peacock Hand Brake, illustrated in Fig. 1, consists of a malleable iron frame, a geared drum and shaft, and a pinion secured to the lower end of the brake shaft. The usual types of brake shaft, ratchet and pawl, and hand wheel are employed and are supported in the customary manner. The lower end of the brake shaft is forged square where it passes through the pinion, a cotter pin at the end securing it in position. Sufficient clearance is provided through the pinion so that finish is unnecessary.

The surface of the drum is provided with a shallow spiral groove, the bottom of which is over two inches in diameter. The upper portion of the drum is so designed that the center line of the chain follows a parabolic curve as the drum revolves. The end of the chain is attached at a point near the rim of the gear.

The chain is secured to the drum by a bolt, in double shear, which passes through a slotted hole. When in place the pull of the chain moves the bolt in the slot until its head occupies a pocket on the upper surface of the web, from which it cannot be directly removed. A cotter through a lug on the web of the gear prevents the head of the bolt from sliding out of the pocket should the pull of the chain be realeased. The drum revolves on a straight unfinished bar of cold rolled steel, the lower end of which rests in a pocket in the frame and is held from revolving by means of a cotter through the lower end of the bar and frame. The drum is bored out with ample clearance and is packed with graphite grease in order to prevent corrosion when the car is standing out of service.

Fig. 1.

Advantages

The brake has a gear ratio of 12 to 48 and with a force of 100 lb. exerted at the rim of a 16-in. brake wheel, produces a pull of 1,700 lb. on the chain. With properly designed levers it is equal to the air brake in braking power. This is more than four times the force exerted by the chain on the usual type of hand brake where the chain is wound around a 1½-in. drum at the lower end of the brake shaft.

The upper portion of the drum being of large size facilitates taking up the slack without loss of time or sacrifice of leverage where the effective application begins.

The lower portion of the drum over which the chain winds, when actually applying the brakes, is over two inches in diameter and eliminates the twisting and cutting of the chain caused by the small drum usually employed.

With the ordinary hand brake it is necessary for the brakeman to use a stick to obtain the necessary leverage to stop the car. The use of the Peacock Hand Brake dispenses with the stick and furnishes greater leverage, eliminating a feature that is dangerous to the life of the brakeman, not only while applying the brakes but also while boarding a moving car. In addition the car can be stopped more quickly and with greater certainty both as to space and spot and it reduces the number of smash-ups caused by cars striking together while moving at high speeds. This feature is of special value where hump yards are used in making up trains, materially decreasing the number of cars held for repairs and resulting in a large saving in the maintenance cost.

The brake mechanism fully complies with all the safety appliance laws.

Special Application

A special design of this type of brake mechanism as applied to blind end cars, is shown in Fig. 2. In this application an annular gear is cast in the brake drum, the gear on the brake shaft tranmitting motion to it through two idler gears. Ratchet teeth are also cast on the outside of the drum. The supporting frame bolts directly to the end of the car. The brake shaft extends through the end of the car, which permits a hand wheel to be applied both inside and outside, making it possible to operate the brakes within as well as outside of the car.

Application and Maintenance

The Peacock Hand Brake can be applied to any type of car, either old or new. It is built in a unit and bolts to the car. No changes are necessary to any part of the brake mechanism; the brakeshaft now on the car can be fitted to the pinion and the same chain attached to the drum. The teeth of the gears are of large pitch and will have a longer life than that of the car. This brake mechanism and application is shown in detail in the illustrated section of the text on pages 691 and 692, figures 1514 and 1517.

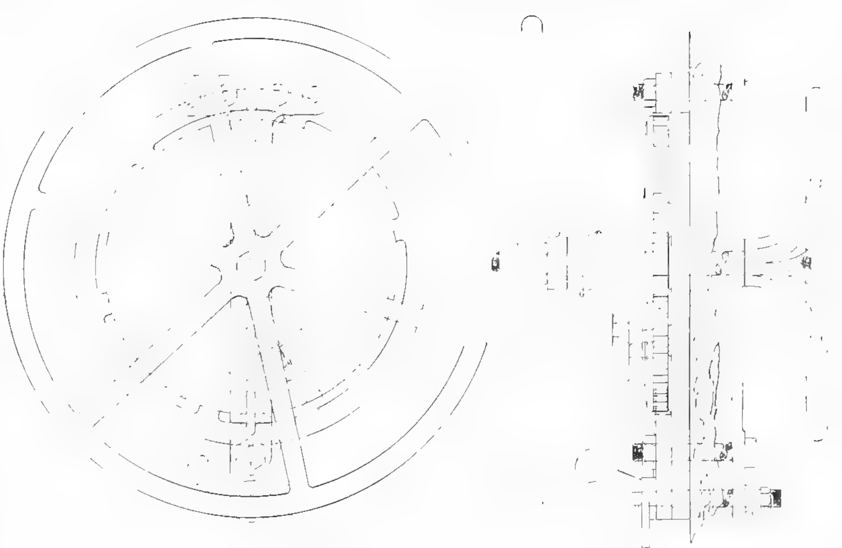


Fig. 2.

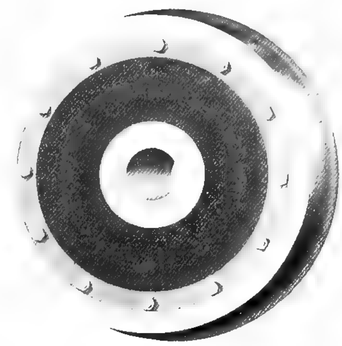
"Standard" Steel Car Specialties

Tires

"Standard" tires are made from open hearth steel ingots from which the porous portion is wholly eliminated, insuring homogeneity, solidity of the metal and a high factor of safety. The selection of the material is made with the greatest care, and systematic tests, both chemical and physical, are made of the output from all departments. The "Standard" brand is recognized as a mark of superior quality, establishing for the company the reputation of supplying material which is not excelled. The capacity of the Works has been increased until it is now sufficient to supply the entire requirements of the United States.

Steel Tired Wheels

All types of steel tired wheels are manufactured by this company, but we recommend the bolted type, as it can be retired in any railway shop without skilled labor or special machinery. The type of construction, as illustrated, was introduced by this company in 1902 and has been adopted by the M. C. B. and M. M. Association as the standard type of wheel tire fastening. Should the tire be worn beyond the safety limit and break, there is no danger of the tire coming away from the center. With the rolled steel center this wheel is the most economical and best wheel made. It has given universal satisfaction in severe, fast service where durability and a high factor of safety are the principal factors to be considered.



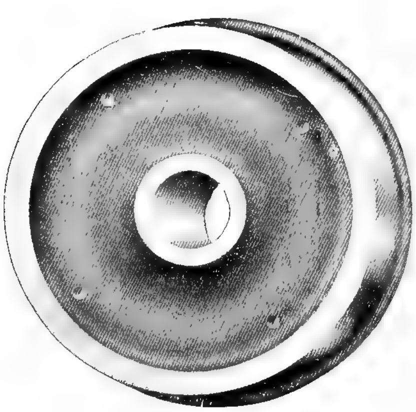
"Standard" Bolted Type Steel Tired Wheel.

Rolled Wheels

Rolled Wheels

Solid forged and rolled wheels were introduced into America in 1904, in which year we began their manufacture. They were offered as a substitute for cast iron chilled wheels, which had proved inadequate for modern service. Their success has been so marked that the demand for steel wheels to replace the cast iron wheels under all types of equipment, from the lightest to the heaviest, is constantly increasing.

The solid wheel is just as important as the steel tired wheel, each type standing for equal merit in the class of service for which it was designed.

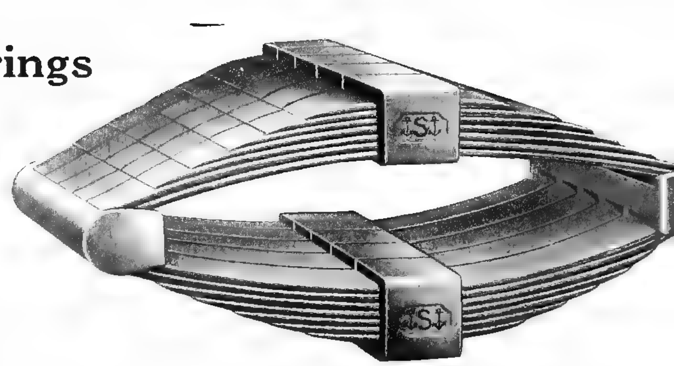


"Standard" Rolled Wheel.

Springs

Springs

Great care is used in the selection of the material and systematic tests are made of the work of each department to insure uniform high quality, thoroughly equipped chemical and physical laboratories being maintained for this purpose. "Standard" springs are especially designed for the service and conditions under which they operate. This feature, together with the quality of the material and the workmanship, produces a spring



"Standard" Elliptic Spring.

"Standard" Steel Car Specialties

Springs—(*Concluded*)

that has long life and will give satisfaction in the most trying service.

All "Standard" full elliptic springs are constructed with "block ends" and sectional type unless they are specially ordered with the "scroll ends."

The coil spring is used in groups and is made in single, double or triple coils.

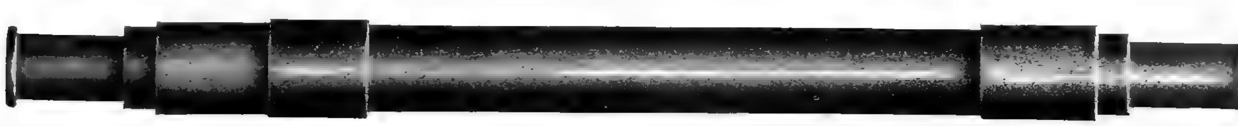
The manufacturing facilities and equipment of this company are unsurpassed. Our mills are equipped with the most modern machinery and automatically regulated furnaces which maintain the proper temperature for the making of spring steel. This, together with long experience, insures the highest grade product obtainable.

"Standard"
Nest of Coil Springs.

Axles

Axles

It is essential that axles shall be of material best adapted to insure both durability and wearing qualities. Experience has shown the constituent composition required to give these results and all blooms used for the manufacture of axles must conform to rigid specification. All axles are hammered throughout from the blooms and are subjected to the most rigid inspection by men trained in this work. Axles of any design or weight, either special or M. C. B. standard, can be furnished to meet the requirements of any practical specification.



"Standard" Axle.

Products and Sales Organization

Products and Sales Organization

The "Standard" brand on your material is an assurance of eventual economy. It insures long, safe and efficient service with low inspection and maintenance costs.

In addition to the specialties previously described we also manufacture rolled steel gear blanks, rolled steel rings, steel crusher-rolls and shells, steel pipe flanges, steel and iron forgings and steel and malleable iron castings.

The home office of this company is located at Philadelphia, Pa., and the plant at Burnham, Mifflin County, Pa. Branch offices are also maintained in the following cities: New York, N. Y.; Richmond, Va.; St. Louis, Mo.; Chicago, Ill.; Portland, Ore.; City of Mexico, Mex.; San Francisco, Cal.; Pittsburgh, Pa., and London, Eng.

LOCK "DS" NUT

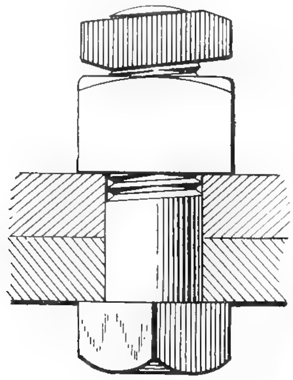


Fig. 1.

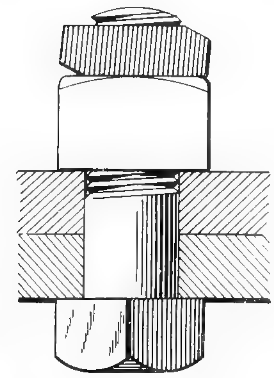
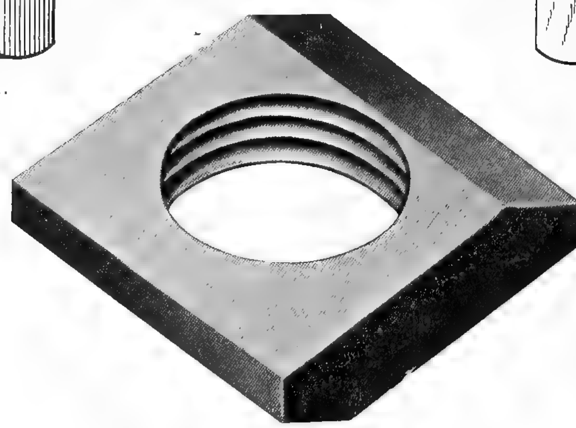


Fig. 2.



HOLDING "DS" NUT

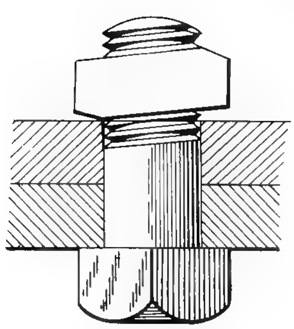


Fig. 3.

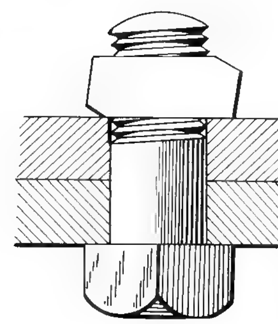


Fig. 4.

Description

The "DS" Nut is manufactured in two types—a Lock Nut and Holding Nut. The same principle is followed in the design of both types. The Lock Nut is designed for use with a common nut while the Holding Nut, *being made thicker and heavier*, replaces both the common Nut and the Lock Nut at the same time securely locks itself on the bolt when tightened up to the work. *Both types are made in either the square or hexagon shapes.*

The "DS" Nuts are tapped with U. S. Standard threads.

"DS" Lock Nut

Figure 1 shows the "DS" lock nut on the bolt before it is seated. It is tapped with U. S. Standard threads and is therefore a *finger fit* on the bolt requiring the use of a wrench only after it comes in contact with the common nut.

Figure 2 shows its position on the bolt after it has been wrenched down flat. *In this position it is securely locked on the bolt and to the common nut.*

Advantages

The "DS" Lock Nuts and Holding Nuts are *fool proof.* They may be applied with either side up or down. They can be used over and over again indefinitely without injury to either the bolt or nut threads and without impairing their locking efficiency. *Being a finger fit on the bolt the cost of application is no greater than that of a common nut.*

"DS" Holding Nut

Figure 3 clearly shows the position of the "DS" Holding Nut on the bolt before it is seated, while Figure 4 shows the holding nut wrenched down flat against any solid abutment.

The "DS" Holding Nuts are made in sizes from $\frac{3}{8}$-in. to $\frac{3}{4}$-in., inclusive. They are used wherever safety demands a nut that will positively stay tight, such as on car roofs, siding, door tracks, running boards, etc. *They eliminate the necessity of using two nuts*—a common nut and a lock nut—*and also permit the use of shorter bolts, resulting in a large saving in the labor and material costs.*

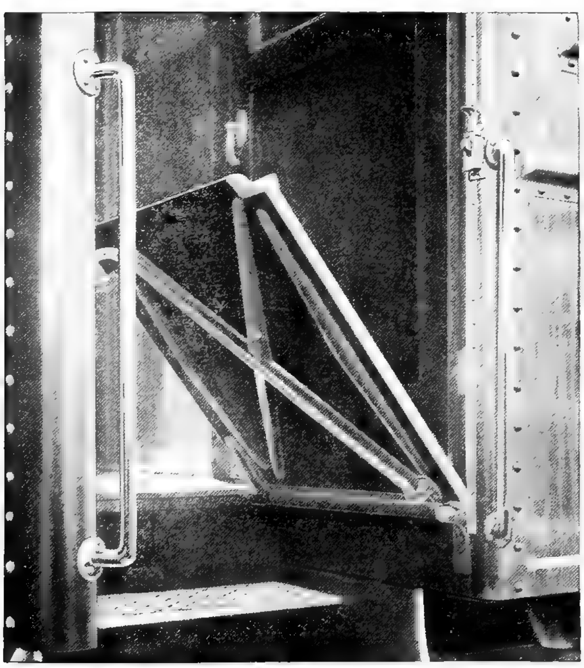
Car Specialties

Flexolith Composition Flooring

Flexolith Composition Flooring makes an ideal flooring for passenger coaches. It is laid in a plastic form over the top of a wood or steel flooring. Flexolith flooring is sanitary, absolutely fireproof, practically non-absorbent and may be easily cleaned by flushing with a hose and mopping dry. It has high wear-resisting properties, service tests having shown that it will outwear several ordinary wood floors. It is standard on a majority of the largest railroad systems. See Fig. 1706, page 723.

Trap Door and Lifting Device

The National Steel Trap Door is a one-piece steel door heavily ribbed on its under side to provide maximum strength, with light weight, to support the heaviest load. The counterbalance is a spiral spring easily adjusted to lift the door to any desired position when unlatched. Three styles of trap doors are furnished, one for use on cars at elevated station platforms, one for surface platforms and one for interurban cars.



Illustrations showing the application of this device to railway coaches is shown above and in the illustrated sections on pages 433 and 531, Figs. 549, 550 and 882.

Resisto Insulation

Resisto Insulation is a felt composition coated with a special preparation that makes it fire and waterproof as well as an exceptionally good non-conductor of heat. It has an ample factor of flexibility, permitting bending around curved surfaces of large or small radius without injury. It is made in thicknesses of ¼ inch and ½ inch and in any size required. For steel passenger equipment this insulation is particularly adapted, but it is also advantageously used on refrigerator cars. Application of this material is shown in the illustrated section on page 700, Fig. 1583.

National Standard Roofing

National Standard Roofing is made up of a special fabric treated under a process which makes each fibre waterproof and mildew resistant. This treatment acts as a preservative to the fabric and neutralizes the harmful influence of the oil in the paint. Not over two coats of paint are needed and paraffin and white lead treatment is unnecessary. For passenger car work two weights and widths are recommended, namely "AA" 36 in. wide for lower decks and "CC" 84 in. wide for upper decks. For interurban and electric service the "FF" grade is recommended. However, other widths ranging from 24 in. to 128 in. can be furnished on order. This material is shown in the illustrated section on page 545, Fig. 922A.

Imperial Car Window Screens

The Imperial Car Window Screens are made of a bronze or steel frame covered with fine mesh copper wire cloth, which is held in the frame by retaining beads that can be easily removed from the frame grooves when necessary to renew the cloth. The slides on which the screen operates are fastened to the window stops and allow the sash to be raised to its full height. When not in use or when necessary to clean the windows, the screen may be pushed to the top of the slides, where it is automatically held out of the way.

Metallic Car Sheathing

Metallic Steel Car Sheathing is adaptable to both steel and wooden passenger cars. It makes a better appearance than the plain sheet, having no rivets exposed and is more easily kept clean. Metallic Steel Sheathing provides cellular air-chamber insulation, which prevents the car interior being affected by extremes in outside temperature. Cars sheathed with this material are not as expensive to maintain as other types, as our sheathing is furnished with two coats of paint baked on, which eliminates the possibility of paint chipping off and the metal rusting, which is a serious trouble with the flat sheets, also our sheathing can easily be renewed in sections when necessary. Illustrations of this sheathing, as applied to both steel and wooden cars, are shown on page 703, Fig. 1592.

Perfection Sash Balance

The Perfection Sash Balance is designed to raise or lower the window sash to any desired position with but little effort on the part of the passenger. It prevents the sash from falling and makes injury to the passenger's hands or arms impossible. The mechanism is simple in design and durable in service. The rollers are provided with tapered worms at each end. These worms engage with the sash cables and are so graduated as to give maximum lifting effort in starting to raise the window. This sash balance may be applied to either new or old equipment without necessitating any change from standard construction.

Another type of sash balance manufactured by this company is shown on page 757, Figs. 1902-1903, of the illustrated section.

Eclipse Deck Sash Ratchet

The ratchet is made of hardened bronze to give the best possible wearing surface, and permits the deck-sash to be opened to an angle of 60 deg., with two intermediate positions or stops for giving the desired amount of ventilation. It is simple and positive in operation and is substantial and durable in service. This ratchet is shown in the illustrated section on page 757, Fig. 1903.

Sales Organization

The main offices of this company are located at 30 Church St., New York City. Branch offices are maintained at each of the following cities: 454 Peoples Gas Building, Chicago, Ill.; 1201 Virginia Railway and Power Building, Richmond, Va.; 797 Monadnock Building, San Francisco, Calif.; 902 McGill Building, Montreal, Que.

This company is also Eastern sales agent for Acme Supply Company, of Chicago, whose products are described on the two following pages.

Car Appliances

Acme Simplex T-Iron Diaphragm

The Acme Simplex T-iron diaphragm is made in various designs and sizes. It is a sectional T-iron diaphragm made with U-shaped folds of double width belting, thus preventing the permanent accumulation of cinders. The diaphragm folds are fastened together by a continuous T-iron arch which acts as the outside binding and also as a truss, preventing sagging of the top and distortion at the bottom. The top of the diaphragm is made of asbestos woven fireproof belting material. The overlapping corners of the arch are made with resilient joints, comprising three sections each, which are sewed only part way across, leaving a short section free to operate with the expansion and contraction of the diaphragm corner.

The diaphragm has a sectional or detachable foot which consists of a 24-in. piece of belting, waterproofed on both sides and running crosswise, see illustration.

Acme Steel Diaphragm

Fireproof, weatherproof, durable. The most practical and simple in construction.

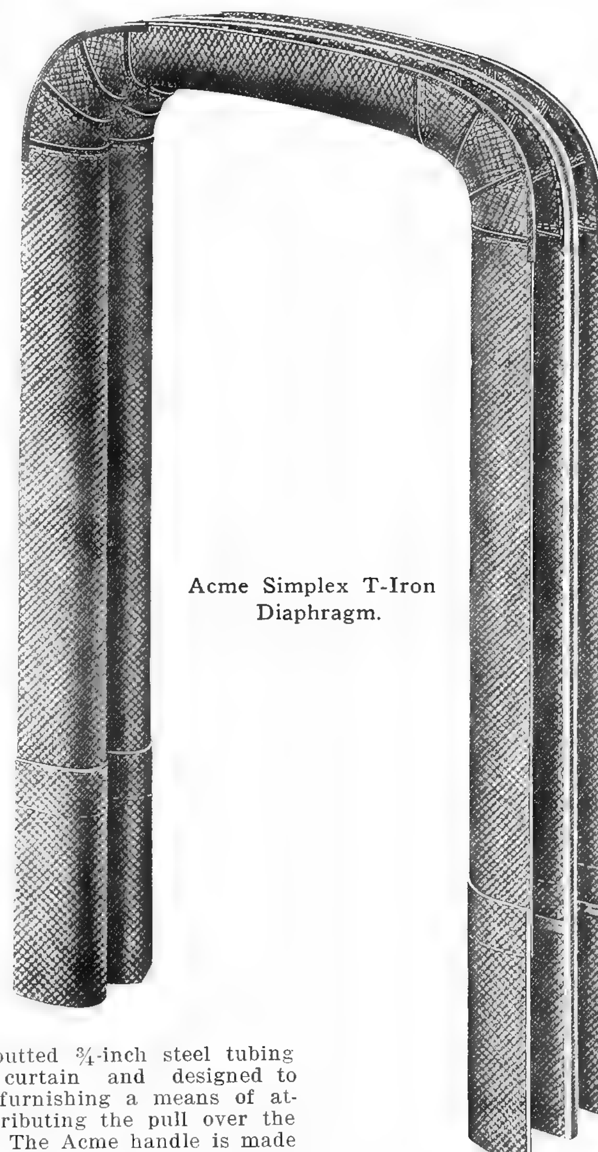
Acme Diaphragm Attachment

By the removal of four cotter pins the joint between the arch and the leg permits swinging the diaphragm away from the car so that repairs may be easily made.

Acme Vestibule Curtain Fixtures

The Acme vestibule curtain fixtures consist essentially of a roller, pullrod, handle, hook and shield. The roller is made of brazed steel tubing and the pivot pin seats are steel stampings. The curtain is attached to the roller by brass snap buttons which will release before sufficient tension is placed on the curtain to injure it. The pullrod is a piece of butted $\frac{3}{4}$-inch steel tubing inserted in a hem in the curtain and designed to keep the curtain straight, furnishing a means of attaching the handle and distributing the pull over the whole width of the curtain. The Acme handle is made in various designs. The Acme hooks are designed to engage the handle holding the curtain extended and are made of brass with fibre inserts, which greatly prolong the life of both the hook and handle, as the fibre inserts can be renewed when worn.

For steel cars a curtain casing is provided to form a part of the curtain pocket which otherwise would be formed by the post itself. This casing is secured to the post by a bracket and carries supports for the revolving shield. The latter is made of pressed steel and is provided at each end with malleable castings having trunnions slightly off center, thus fitting tightly to the shield when in a closed position. These castings also support the roller. The shield is locked into place by a spring lock bolt in the upper bracket, and may be readily opened, to operate the curtain, by releasing the spring bolt.



Acme Simplex T-Iron Diaphragm.

Kass Safety Step Tread

The Kass safety step treads are made of metal. By perforating the surface and bulging the metal outward around each hole a surface is presented which absolutely prevents slipping and offers great resistance to wear.

Acme Safety Step Box

The Acme safety step box is for assisting passengers in stepping from the car steps to the station platform. It is made entirely of pressed steel and has a Kass safety step top.

Chanarch Steel Flooring

Chanarch steel flooring is a specially formed plate of steel of sufficient strength to support the floor load as well as to securely anchor the composition in place. There are alternate channels and arches, the latter designed to carry the maximum load for a given weight of metal; the narrow channels are so arranged as to securely anchor the composition and at the same time use a minimum amount of it.

Regal Revolving Shade Box

The Regal revolving shade box is designed to eliminate the necessity of removing the shade box or other parts of the car finish to gain access to the shade roller. It consists of a casing with a revolving shield, which carries the shade roller brackets. To remove the shade it is only necessary to revolve the shield a quarter turn, which gives free access to the roller and also turns the roller brackets downward, making removal easy.

Gosso Sanitary Beds

The Gosso sanitary bed is comfortable, simple in construction and light in weight. It consists of two sheets of canvas supported on a metal frame and hung by four chains from the ceiling of the car. Springs are used at each corner of the frames which are attached to the suspension chains. The suspension chains reach to the floor and are attached to it by hooks, preventing the beds from swinging. This construction furnishes a double deck bunk that is durable, easily moved, economical in use and sanitary.

Steel Doors

Each side of the Acme vestibule and body end door is pressed from one piece of steel and the two pieces are welded to steel channels, forming the complete door. Two styles of baggage doors are furnished. The Faultless has a panelling effect while the Peerless resembles the car sheathing. The

Car Appliances

construction is practically the same as the body end door. Steel doors give longer service than wood, cost less to maintain, are fireproof, lighter in weight and permit of any finish to match the other parts of the car.

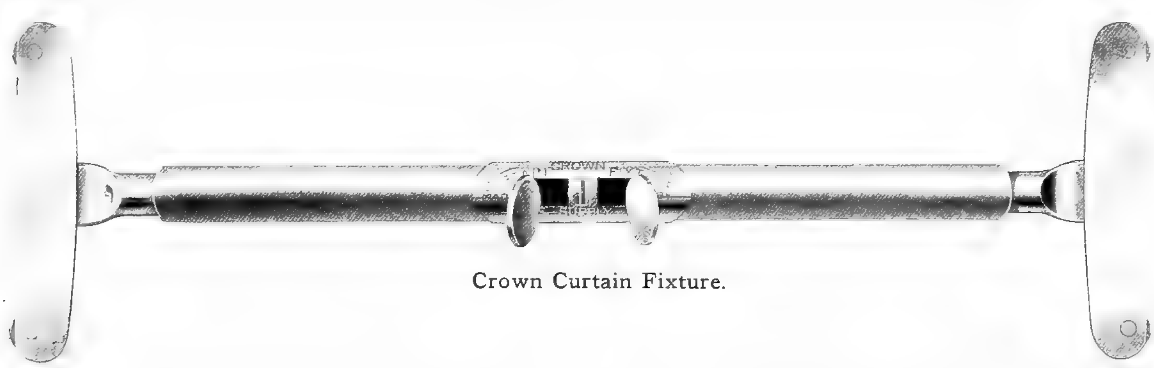
Acme Duplex Weather Proof Windows

The Acme weatherproofing for car windows is simple and efficient. The meeting rail weather proofing consists of a weather strip of plush, metal bound, bearing against the top rail of the sash in such a way that a tight joint is maintained. The sides of the sash are fitted with brass weather stripping which overlaps a steel outside stop attached to the window post. The brass weather strip is held in close continuous contact with the outside stop by four compression springs attached to the sash as shown in the illustration.

The sill weather proofing is a double lipped, pure rubber strip, reinforced with metal and attached to the bottom of the sash in such a way as to make a continuous double contact across the sill. The inside lip is designed to take the weight of the sash, thereby relieving the outside lip from pressure which might cause it to take a permanent set. See illustration.

Acme Curtain Fixtures

Three types of curtain fixtures are manufactured, the Crown and the Gem and Acme protected groove. The principle of operation is the same in the case of the first two mentioned, the difference being in the size of the head. The fixture consists of a rod passing through a hem in the bottom of the curtain. A pinch handle is provided at the center, which operates a brass head at each end. These heads carry small wheels at the top and bottom and a friction shoe at the center, the latter being held against the bottom of the groove in the casing by a spring in the fixture rod sufficiently strong to securely hold the curtain. The brass wheels in each head are set so as not to extend out as far as the friction shoe when the curtain is in a horizontal position. It, however, due to carelessness or improper handling the curtain, should be moved on one side only, throwing the fixture out of horizontal, one of the wheels on each side will be placed in contact with the curtain groove and as the friction shoe will then be released, the curtain returns to horizontal and the friction shoe again engages the bottom of the groove. See illustration.



Crown Curtain Fixture.

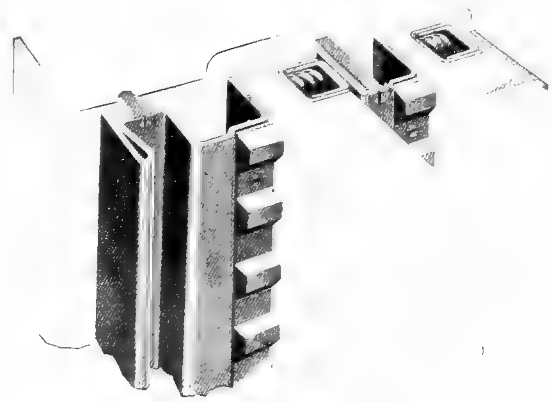
The Acme protected groove has a flanged shoe bearing against the metal strip with sufficient friction to prevent creeping; it is also impossible to tilt or jam this type of curtain fixture. It can be operated without the use of pinch handles and from any point along the bottom of the curtain.

Acme Steel Shapes and Mouldings

Acme drawn steel mouldings and shapes are made in a great variety of sizes and styles both for outside and inside steel car work. They are furnished either plain or painted to match or imitate any kind of wood.

Acme Brass Sash

The Acme brass sash has many advantages over either wooden or steel sash. Its design is such as to make possible a sash of narrow cross section, thus permitting greater light area for the same opening. It is light in weight, neat in appearance and does not require painting to prevent deterioration. For reglazing, it is only necessary to remove two screws, one at each side stile at the upper corners of the sash; the top rail can then be removed and the new glass set in.



Acme Duplex Weather Proof Window.

Acme Sash Lock

The Acme No. 3 sash lock is for use with an invisible rack located in the groove in which the sash slides. It locks the sash by means of a lever extending through the sash frame, engaging with the rack, and is released by a bell crank lever operated by a thumb pressure exerted on a projection of the bell crank which extends outward from the sash. The Acme type C sash lock is designed for application to the face of the sash in connection with a rack located on the window stops. A projection on the lever engages the rack and holds the window in fixed position. It is operated by a thumb lever, which, when depressed, withdraws lock bolt crank, releasing the sash.

The Acme friction lock consists of a plate held against the window stop by two springs. By depressing a thumb lever the tension of the spring is removed and the window released.

Acme Steel Freight Car Ladder

The Acme all-steel car ladder is made of pressed steel and consists of two continuous stiles, the required number of treads and four straps fitted on the ends of the stiles for attaching to the car. It is fastened to the car by four bolts, one at each corner. These ladders are light in weight, durable and are shipped assembled. They comply with the requirements of the U. S. Safety Appliance rules.

Acme Anti-Pinch Door Shield

The Acme Anti-Pinch Door Shield positively prevents injuries to passengers' hands from being caught between door jam and door, eliminating damage claims.

Trap Doors and Fixtures

Requirements

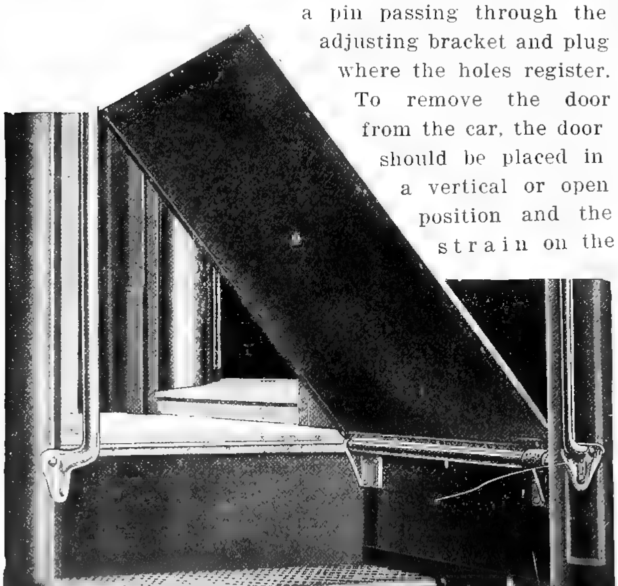
The surface of the trap door should be smooth and unbroken to facilitate cleaning, especially on the under side. This is particularly important if the trap doors open after the vestibule doors. All parts should be easily accessible so that adjustments or repairs may be made without the necessity of going beneath the car or removing the platform floor. The door should lock down securely and yet open quickly and easily.

Description

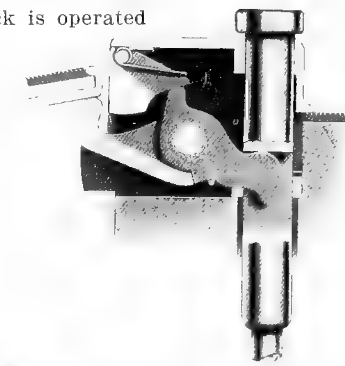
The trap door proper consists of a 3/16 in. plate reinforced around three edges with a steel binding of a design suitable for the various thicknesses of floor covering.

The hinge member, which contains the flat torsional spring bars, extends across the rear of the door plate, and reinforces it at this point. A combination support bar and binding is provided to extend along the edge of the platform floor and end sill, the door resting on this when in a closed position. The lock can be placed at any point on the end sill, but preferably near the center of the opening.

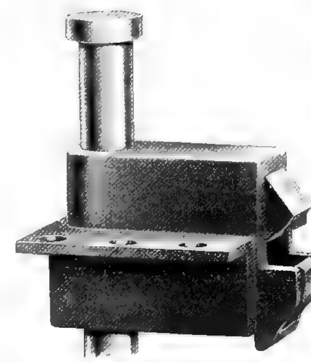
The door hinge is formed from a separate piece of metal and securely riveted to the door. It contains the flat adjusting springs, which are used to balance and raise the door. The adjusting plug passes through the bracket and into the end of the hinge member of the door, also engaging the flat springs and forming the bearing at this point. The brackets are secured to the end sill of the car either by screws or, in the case of steel cars, by rivets. The adjusting plug is provided with a series of holes arranged in such a manner that a number of adjustments may be secured. The purpose of the springs is to balance the door and this is accomplished by placing a slight torsional strain on the springs, when the door is in a vertical or open position. When the proper torsion on the spring is secured it is held by means of a pin passing through the adjusting bracket and plug where the holes register. To remove the door from the car, the door should be placed in a vertical or open position and the strain on the torsional bars relieved. The pin may then be readily removed and the adjusting plug pulled out far enough to permit the door being taken down. It is unnecessary to remove the brackets, a feature which is especially desirable for steel cars, as it permits the brackets being attached to the car body by rivets instead of fastening them with machine screws or bolts, which are liable to work loose in service.



The trap door lock holds the door in a closed position by a latch which projects over the top edge of the door. This lock is operated by a downward pressure of the foot on the foot pin, withdrawing the latch and allowing the door to raise. If the door should stick for any reason and thus be prevented from raising, a starting lever is brought into action which comes in contact with the bottom of the door and forces it to open a sufficient distance to insure its opening automatically.



Cross section of type H lock, with latch released and starting lever in action.



Type H trap door lock.

Several designs of the trap doors are made to meet individual requirements; the principle of their operation is, however, the same in all cases.

For subway and elevated cars an additional feature is provided which permits the door to slide outward a sufficient distance to meet the station platform.

Advantage

The use of a metal door furnishes a smooth, unbroken surface that is easily cleaned, and is light yet strong. It will not swell and bind or work out of shape and, therefore, will always maintain a proper fit.

The hinge construction permits easy application to any type of car construction, either wood or all steel, and makes it possible to balance the door in either a fully open or partially closed position. The door may be removed quickly and easily for repairs and all adjustments may be made without going beneath the car or disturbing any other part.

This type of lock insures the door opening easily and positively, and eliminates the possibility of injuring the hands in opening it. Hand holes are unnecessary in either the door or sill in this type of construction.

There are few parts to the door and operating mechanism and these are all made of metal and are of simple design thus insuring long life and low maintenance costs.

Window Fixtures

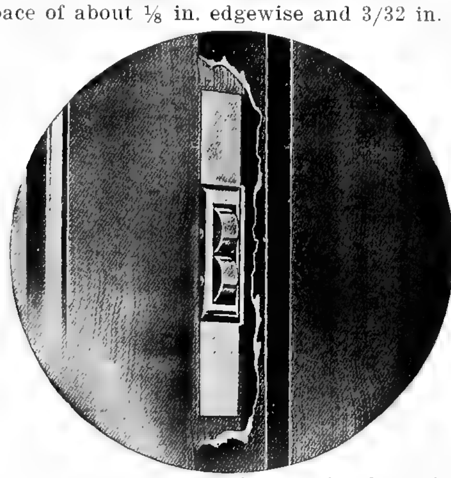
Requirements

A window fixture should hold the sash securely and positively locked in any position, making it impossible for the sash to fall; it should prevent rattle, and should hold the sash, when closed, in such a way as to exclude all outside air and dust from the interior of the car. The sash should open and close easily at all times and be free from the the binding caused by shrinking or swelling, if of wood, or contraction or expansion, if of steel. The sash should always be held tightly against the outer stops giving a tight joint on the outside, the point necessary to exclude dust and air from the car.

Edwards' Window Fixtures

Many different designs of window fixtures are manufactured by this company. They resolve themselves, however, into two distinct types, the balanced sash and the unbalanced. All the other designs are modifications of the same principles, developed to meet the varying conditions of service.

The sash is applied to the window frame with a clearance space of about ⅛ in. edgewise and 3/32 in. between



Spring Actuated Roller Bearing Device for Eliminating Vibration of Sash.

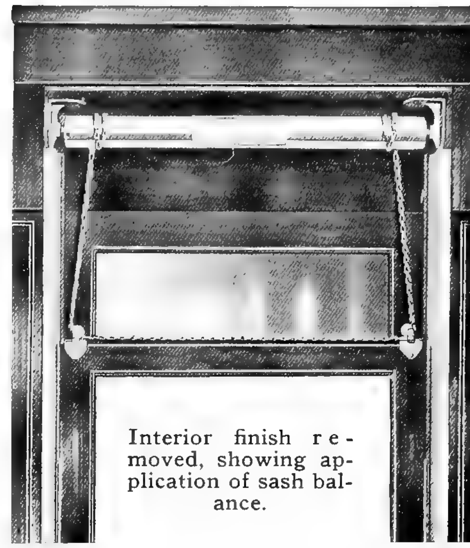
face of sash and stop casings. At each side of the window in the unbalanced type, a corrugated metal bar is fastened to the front edge of the stop casings. Near the bottom corners of the sash a combined lock and sash tightening device is placed, having a rocker shaft lever, operated by a finger latch extension, and controlling an extending arm designed to contact with the corrugated bar, thereby forcing the sash against the outside stops at the bottom with a self-adjusting pressure which always maintains a tight joint, regardless of the expansion or contraction of the sash. The stop bars have notches throughout their entire length, designed to receive the bolts, locking the sash in any position. The top of the sash is held tightly against the outside stop by two compression rollers attached to the two upper corners of the sash, so placed as to bear against the edges of the inside stop casings. With thin sash, when preferred, these rollers may be attached to the inside casings to bear against the sash.

This construction holds the sash firmly against the outer stops at all four corners with a self-adjusting pressure, rendering the sash at all times tight and free from rattle yet easy of operation, and free from binding in the guideways under varying conditions.

In operating the sash the lock lever is released by the compression of two small levers between the thumb and finger, which releases the sash and permits it to be readily raised or lowered by hand; the pressure of the compression rollers at the top always remains the same.

Balanced Type

In the balanced type of sash the window is raised by a roller sash balance. The sash is connected to the roller by a chain arranged to draw at an angle, and not overlap



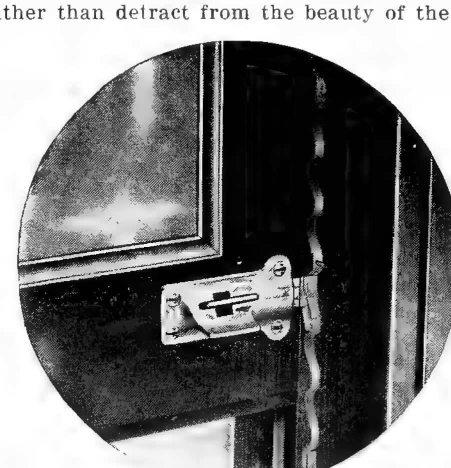
Interior finish removed, showing application of sash balance.

in winding on the roller, when raising or lowering the sash. This chain is attached to the sash by two chain attachment devices placed on top of the sash at each corner around which a continuous chain passes. This construction causes an even pull on each side of the sash.

The sash balance is supported in plain brackets, so located that the pull of roller will be in a perpendicular line from the point of attachment to the sash. The roller brackets have extending flanges designed to receive the sash when raised to its limit, and the sash is provided with rubber buffers placed to strike against the bracket flanges. In this design the balance should be adjusted to slightly underbalance the sash.

Advantages

Edwards' window fixtures with top, bottom and side weather-stripping, keep the window dust and draft proof at all times. They permit the sash to be applied a loose fit, insuring easy operation at all times. They present a pleasing appearance and add rather than detract from the beauty of the car.



No. 13-0 Sash Lock—Phanton View of Stop Bar in Operative Position.

If desired they may be entirely hidden with the exception of the finger latches.

They automatically allow for shrinkage and swelling of wooden sash due to weather conditions and expansion and contraction of steel sash.

They can be applied to either old or new equipment.

The roller balance can be adjusted from the outside without removal or marring of the finish.

Railroad Specialties

Q & C Ray Snow Flanger

The Q & C Ray snow flanger, illustrated in Fig. 1, is built for application to the car truck. It is designed to remove a light fall of snow and also scrape off any snow and ice from the rails. It consists of two plates of sheet steel supported by brackets, these brackets being secured to the truck frame. The two plates push the snow to the outside of the rails, the top edge of the upper plate being curved downward to keep the snow from climbing over it and packing on the truck. The lower plate is slotted for the rail head which it effectually clears of snow and ice.

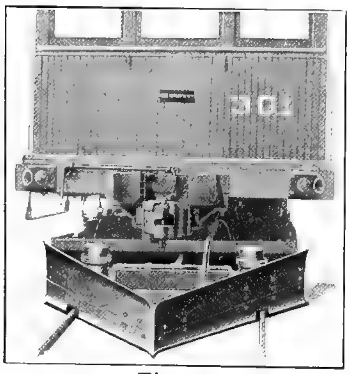


Fig. 1.

The Q & C Ray snow flanger can be made to take a considerable depth of snow, eliminating in many cases the necessity for the use of snow plows and other heavy snow fighting equipment.

Q & C Fewings Car & Locomotive Replacer

The Fewings replacer, illustrated in Fig. 2, is regularly made of annealed open hearth cast steel, but when specified manganese steel can be furnished. It is made for use on any size and weight of rail.

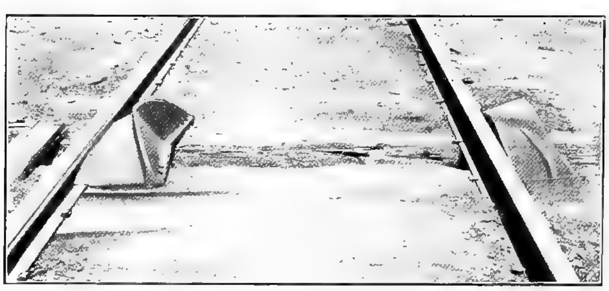


Fig. 2.

The outside contour forms a perfect arch which is heavily reinforced by ribbing on the under side. This construction gives exceptional strength and by proper metal distribution the weight has been kept low. It is provided with ribs to guide the wheels on to the rail, and with ample caulks to hold the replacer in position. Spike holes are also provided for use in emergencies.

Q & C Skid Shoe

The Q & C skid shoes, illustrated in Fig. 3, are made of open hearth cast steel. They are used as an emergency tool for skidding defective cars that cannot be rolled

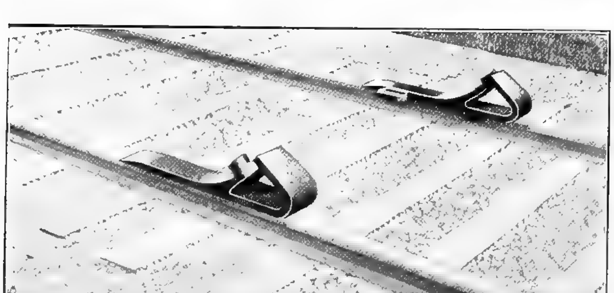


Fig. 3.

on their own wheels to side tracks and also as a buffer or brake to stop runaway cars at the foot of inclines or on terminal tracks.

Q&C Gilman-Brown Emergency Knuckle

The Gilman-Brown emergency knuckle, illustrated in Fig. 4, is designed to fit any M. C. B. coupler in general use. It is made of high grade of open hearth cast steel and is sufficiently strong to pull the heaviest train. It is light in weight and convenient to handle. It is used to make emergency repairs to defective couplers

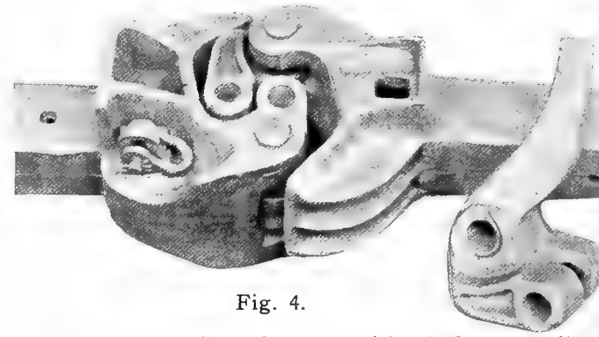


Fig. 4.

and permits coupling the cars without the necessity of chaining up. It makes a normal coupling as close and strong as if made between two uninjured couplers, and permits safely coupling the air line without the use or dummy hose. It saves time in mending break-on-twos and thus avoids traffic delays. With this knuckle it is possible to make a coupling when one pin lug is broken off.

Edman Refrigerator Car Door

The Edman refrigerator car door is a one-piece flush door, suspended on hangers and rollers and is opened by sliding to one side. Revolving side flaps are pivoted at each side by means of which the door is forced into place and securely held.

This door can be opened or closed at high platforms as only 6 in. clearance is required. It is lighter than

Fig. 5.

double doors and provided with tighter joints. It cannot fly open and side swipe platforms or cars on adjoining tracks. It can be easily applied to either old or new equipment and costs less to maintain than the double hinged type.

Q & C Ajax Diaphragm

Ajax diaphragms are made to fit all types of car vestibules. They are made of heavy fabric reinforced at the corners and in the arch by galvanized spring steel, securely anchored within the folds of the diaphragm, a construction which eliminates weaknesses at these points. A fire and waterproofed hood is also provided as an integral part of the diaphragm and is so designed as to form an apex at the top, readily shedding water and cinders.

Fig. 6.

Pantasote and Agasote

Pantasote

Pantasote is a substitute for leather, and is extensively used for seat coverings and window curtains in passenger cars.

Pantasote is a coated fabric, the gum used for coating purposes being absolutely waterproof, and not affected by climatic changes; it will not harden and crack with age.

For seat coverings, Pantasote is not readily distinguishable from leather. It is flexible, and will not crack under any conditions of service. It is lighter in weight than leather and costs about one-quarter as much as leather. Twenty years' of service have demonstrated the fact that Pantasote is the best substitute for leather on the market. It is more sanitary than plush or rattan, as it presents a smooth surface and will not collect and hold dust.

The coated side of Pantasote car curtains is next to the window or weather. Being sunproof and weatherproof, the coated side acts as a protection to the inside of the curtain, allowing the use of many different fabrics, from cotton to silk damask, on the inside. The material being light in weight and flexible permits easy operation in rolling and unrolling on the curtain roller. Pantasote coating never becomes hard; therefore, the material is always soft and pliable, which is an important factor.

Agasote

Agasote is a fibre product, made under great pressure, homogeneous in its composition, waterproof and not affected by climatic conditions. It is extensively used for interior trim work on steel passenger cars as headlinings, wainscotings, etc. Being of a wood fibre composition, it has high insulation properties and acts in a dual capacity as an insulator against heat and cold, as well as for interior trim purposes. Agasote will permit of the finest finish, either in a solid color, decorated, or to imitate the grain of any kind of wood.

This company maintains an extensive sales organization, with sales offices at 11 Broadway, New York City; People's Gas Building, Chicago, Ill.; and 797 Monadnock Building, San Francisco, Cal.

Interior of Steel Car on the New York, Westchester & Boston Railroad.

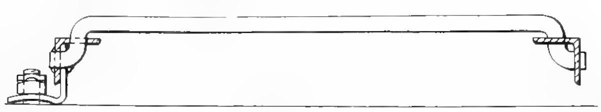
Wine Steel Car Ladder

Description

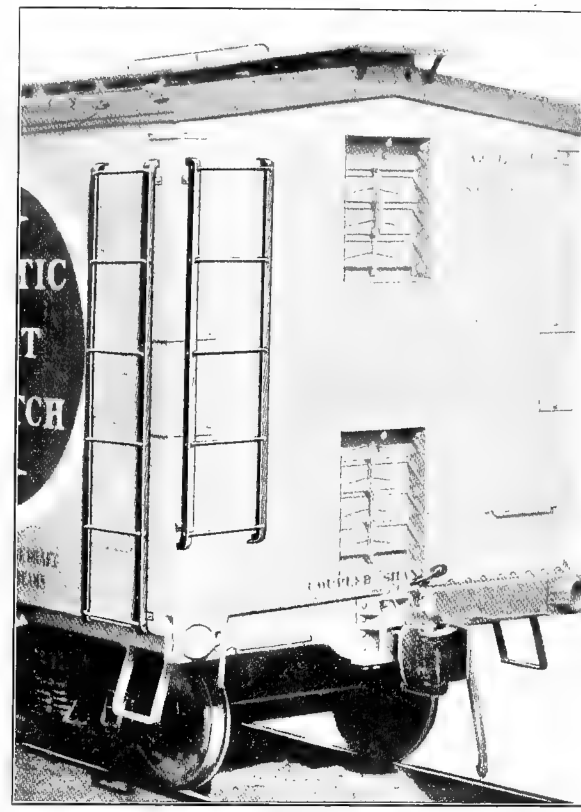
The Wine steel freight car ladder consists of two angle iron stiles and sufficient round iron treads, properly spaced, to make the ladder the necessary length.

The stiles are secured to the car by two brackets riveted to each stile and bolted to the car. These brackets are made of strips of sheet steel, bent at right angles, one leg being riveted to the angle iron stile and the other bent to a curved section and bolted to the car. This curve in the bracket insures the ladder being tight against the side of the car.

Each of the angle iron stiles has two holes for each step, one in each leg. The stiles are turned over at the top to bear against the car. The bottom end may be left open, or malleable iron brackets may be used as a support, if desired. The use of the malleable iron bracket dispenses with the lower stile bracket and improves the appearance of the ladder.



The ladder rungs are made of ⅝-in. round iron bent as shown in the illustrations in such a way as to enter the two holes in each stile angle and be securely held therein without other fastening when the ladder is secured to the car.



Advantages

This ladder may be easily and quickly applied to any type of car; four bolts are all that are necessary to hold it rigidly in place.

It can be easily repaired, the removal of two bolts being all that is necessary to remove one or all treads. The ladder can be removed and replaced without entering the car.

It is specially adapted to outside metal frame cars as the number of fastening points are only four, and these may be located at any convenient point near the four corners of the ladder.

The treads are clamped in two holes in each angle which prevents turning and keeps them tight.

There are very few parts to the ladder and the rungs are attached without rivets or bolts. There are only four rivets and four bolts to the entire ladder.

There are no protruding nuts or bolts to catch the clothing of the trainmen and the ladder is amply strong to carry the load.

The ladder, being made of steel, has a long life, and, except in case of accident, the maintenance cost will be practically nothing.

The Wine ladder may be readily applied to either old or new equipment.

On account of its simplicity the applied cost of the Wine ladder is less than that of either the grab iron or wood stile ladder.

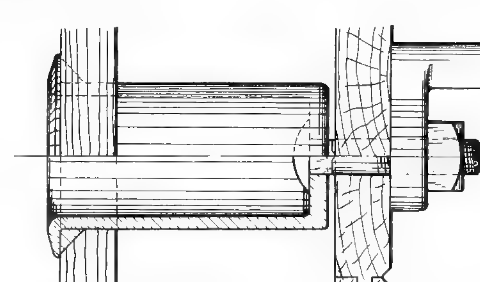
It conforms in every way to the U. S. Safety Appliance standards.

Wine Socket Washer

Description

The Wine socket washer is designed to take the place of cripple blocks in applying handholds or attaching other devices to the side of the car. It is cylindrical in shape with the end next to the car lining open. The other end is closed except for a square opening the size of the shoulder of the bolt for which it is designed. The open end is flared over and ribbed so as to have a bearing on the car siding and prevent turning. It is made in various lengths to suit different car constructions and for use with ⅝-in. or ½-in. bolts.

In application a washer a trifle shorter than the distance between the siding and the lining is used.



Advantages

The use of this washer transmits the load to both siding and lining. Less time is consumed in its application and in old equipment it saves both material and labor as it eliminates the tearing down necessary when cripple blocks are used.

It facilitates repairs, thus reducing the time cars are held on the repair track.

Wine Ventilating Shutter

Description

The Wine ventilating shutter is designed for ventilating box and fruit cars and at the same time keeping them weather tight and burglar proof. It is bolted securely to the car framing at the end or side of the car.

The ventilator is made in two types, one for ventilating purposes only, the other to permit a larger opening when loading cars with lumber or other long material. The two types are interchangeable and are both made of standard parts.

The entire ventilator is made of malleable iron, is simple in design, and consists of few parts. The frame is made of two side pieces and five cross pieces securely riveted together, forming a rigid construction. U-brackets are cast integral with the side pieces of the frame, forming supports for carrying the shutters. A lug is cast on each end of each of the four shutters. These lugs fit into the "U" supports forming a hinge joint which carries the weight of the shutters and permits limited rotation about this point. The shutters are so designed that when closed they completely fill the openings between the cross pieces and are so shaped that when they open they obstruct direct passage through the ventilator, preventing the entrance of rain, sleet or snow regardless of whether they are in open or closed position.

The shutters are connected together and operated by a shutter bar, which is attached to the shutters by cotter pins and limits the downward or open travel of the shutters, the frame providing a closing stop. When the shutters are either fully opened or fully closed the center of gravity is beyond the center of the hinge lug so that the weight of the shutter prevents it changing its position. In the open position the connecting bar holds the shutters sufficiently close to the cross pieces to prevent their removal without disconnecting the bar. If, however, it is desirable to remove the shutters it can readily be done by simply disconnecting four cotter pins, releasing the bar and then lifting out the shutters.

The over-all dimensions of the standard ventilator are 24 in. by 30 in., but any size may be furnished. The total weight of the standard size is 120 lbs.

Advantages

The Wine ventilating shutter, being made entirely of malleable iron, is practically indestructible. The shutters cannot be lost out; except in case of accident, there is nothing to break or wear, making the maintenance cost practically nothing.

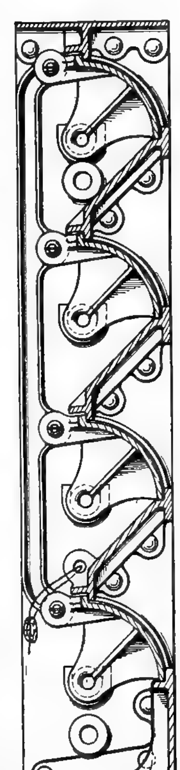
While permitting ample open space to properly ventilate the car, perfect security of the lading is assured. The space between the shutters is not large enough for even a small boy to squeeze through and removing the shutters does not increase the size of the opening.

The shutters are easily operated and may be depended upon to remain in either open or closed position when set. Provision is also made for sealing in either position when desired.

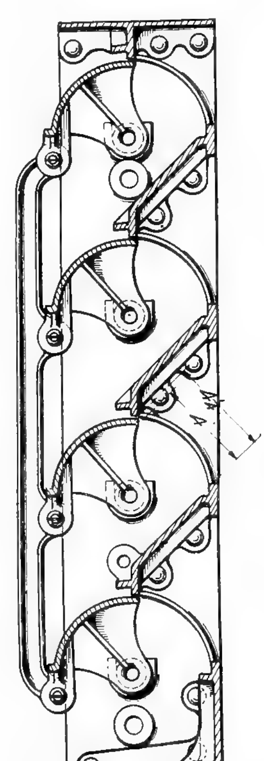
The heavy rigid construction of the ventilator frame and the three cross bars add strength to the car frame.

The use of the ventilator in no way interferes with the Safety Appliance standards, and can be applied readily to either old or new equipment.

It is lower in first cost and maintenance than the ventilating door, takes less time and labor to apply and when scrapped has a considerably higher value, making an efficient, economical ventilator.



Section—Closed.

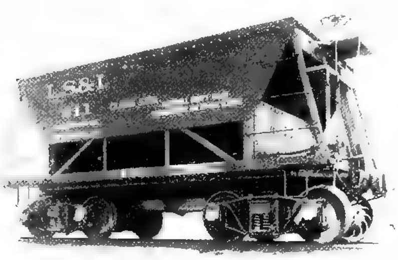


Section—Open.

Efficient Dump Cars for Every Kind of Service

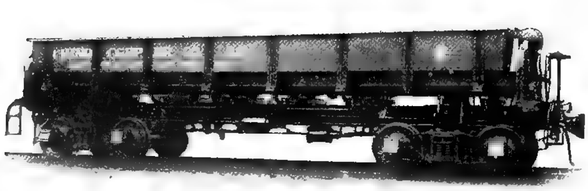
Designs

Clark Dump Cars dump *all* the load; are easily operated by one man by hand; are quickest in operation. In addition, the cars have a number of distinctively novel features rendering them highly efficient. The material is all dumped by having such a high angle of slope over which the load slides that it cannot stick, and by eliminating sharp angles or valleys entirely. One man can easily operate any of the cars, as the principle of balance is employed whereby the moving parts of the dumping mechanism are raised slightly by the load as it is dumped, leaving them in a position where they will close automatically as soon as they are relieved of the load. This same principle of balance, requiring a minimum of effort for operation, produces very quick action of all the parts and makes them the quickest dump cars manufactured.



Ore Car.

Hopper Car.



Extension Side Dump Car.

All cars of Clark Car Company design are built in strict conformance to M. C. B. rules and recommended practice and to the orders of the Interstate Commerce Commission. This makes them acceptable for interchange under load by all the railroads of the country.

Ore Cars

Ore Cars are standard 24 ft. length, having 55 degree slopes, and octagonal hopper lines produced by special corner construction which practically eliminates the valleys. They have a single hopper opening of 45 sq. ft. clear and are of 100,000 lbs. M. C. B. capacity. The doors move bodily away from the hopper opening and are balanced to close when the load is out of the car. One man can dump the entire load and close and lock the doors in *seven seconds*. The doors are locked by a single latch located in the middle of the door and so cannot get out of line and make a leaky car. All door bearings are readily accessible for inspection.

Hopper Cars

This type of car is built in various capacities. The doors may be transverse or longitudinal. Longitudinal doors may be center dump, side dump, or convertible side and center dump. One, two, or more hoppers can be provided as required by service conditions. The doors are balanced as in other classes of Clark Cars, so that the size of the hopper opening is not dependent on the strength of a man, but can be made of any size best suited to the local uses of the car. The slopes are all of very high angle so that all the load will dump without the use of bars to loosen it from the hopper. A 200,000 lb. M. C. B. car with longitudinal side dump doors makes an ideal car for handling furnace flue dust or ashes.

Extension Side Dump Cars

This car takes its name from the novel manner in which the side of the car operates when dumping. Unlike any other side dump car, the side or door turns out and down as the body of the car is dumped, forming an extended chute over which the load slides. This protects the trucks and track from back fill and throws the load well out from the side of the car. When dumping to fill with this car, the tracks need be moved only about one-third as often as with older designs of the same type. The balanced design of the body and doors permits of one man dumping the entire load by hand to either side. The effort required is about the same as is required to set the hand brakes, and the entire operation of dumping and returning to closed and locked position can be accomplished in less than half a minute. An air dumping device is also provided for this type of car, so that a train of them can be dumped simultaneously from the locomotive. When thus equipped the time required for a complete cycle of operation is about ten seconds. The cars are built in sizes ranging from 16 cu. yds. level full to 30 cu. yds. level full and from 40,000 to 120,000 lbs. M. C. B. capacity. When not used in dump service, this car will operate in any service in which a standard gondola car can be used. It is an ideal car for handling waste material to a dump, for maintenance of way with or without a ditcher, or for handling overburden in open cut mining.

The Gilman-Taylor Car

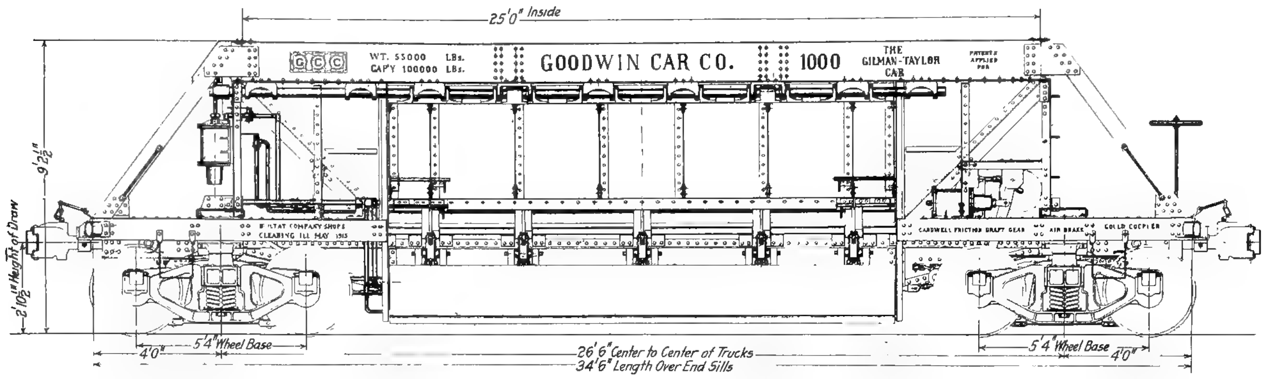
Description

The Gilman-Taylor car is a standard gage, all-steel dump, ballast and construction car, of large capacity, designed to carry, discharge and distribute every kind of material—rock, waste or ballast—in connection with railroad construction, trestle filling, embankment work, double tracking or maintenance of way. It is the outcome of sixteen years of constant and practical experience with gravity dump and ballast cars in actual service on standard gage lines.

It has a carrying capacity exceeding 100,000 lb., a cubic capacity exceeding 30 cubic yards; its general dimensions are shown on the drawings. The load carrying and conveying surfaces have an abrupt pitch of 45 degrees throughout. At the will of the operator the load is discharged by gravity all to one side, all to the other side, half to either side, or all through the center to the middle of the track. The simple, positive and effective supporting, tripping and replacing mechanism is clearly shown in sections on page 506, figure 794, of this dictionary.

The air dumping mechanism is all above the platform on one end of the car; the air operating brake appliances are above the platform on the other end, thus making it absolutely unnecessary for an operator to get underneath the car.

Safety, efficiency and simplicity are the paramount claims for the Gilman-Taylor car.



Other features exclusively incidental to this car are:

Closeness of apron to rail prevents load flowing inward while being dumped.

Position of apron in center ballasting makes flooding of rail impossible.

All air dumping, air replacing, and air brake cylinders and parts are standard and quickly replaceable on any railway line.

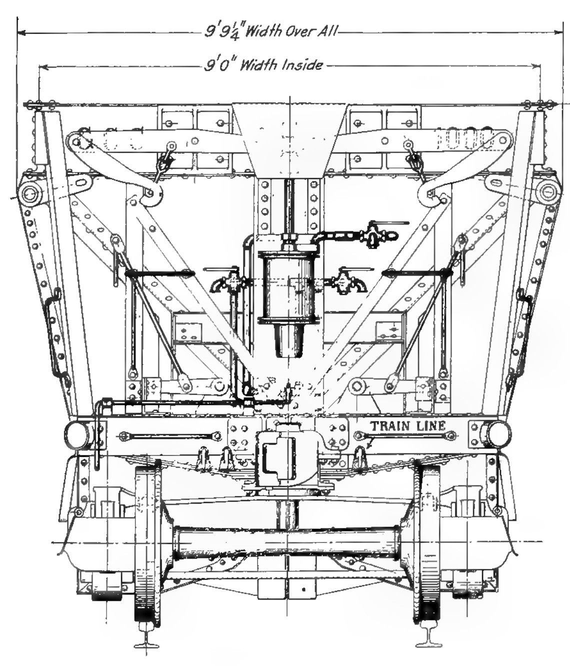
One man can dump and replace this car in thirty seconds.

All cars in a train of Gilman-Taylor cars can be dumped simultaneously by opening a single air cock on any car in any part of the train; one man only is needed to discharge the entire train.

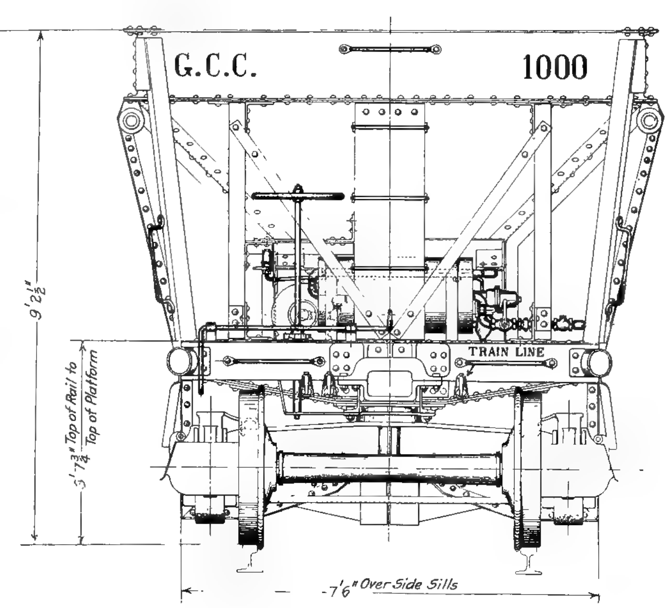
Any standard 100,000 lb. capacity truck can be used under this car.

By substitution of a motor-driven truck and the installation of a controller on its end platform, this car, without further change, is convertible to construction or general service work on any standard gage electrically operated railway line.

Photograph of this car is shown on page 224, figure 68, of the text pages.



OPERATING END ELEVATION



BRAKE END ELEVATION

Construction and Special Features

In construction all M. C. B. standards are observed; all Interstate Commerce Commission's rules for safety appliances are complied with and all operating parts are "fool-proof."

Shop Equipment—Electrical

Power Equipment

The General Electric Company manufactures Curtis Steam Turbines in sizes ranging from 7 to 50,000 kilowatts, which are admirably adapted for installation in electric generating stations, and for supplying light and power to office buildings, shops, mills, industrial plants, etc. Their operation is characterized by a minimum of vibration and noise; are very compact, requiring minimum floor space, headroom and attention. The exhaust steam is free from oil and may be used for heating.

These turbines can be furnished for either condensing or non-condensing systems, high or low and mixed pressures or superheated steam. The line of small Curtis Turbines consist of 7, 10, 15, 25, 35, 75, 100 and 300 kilowatt direct current and 100, 200 and 300 kilowatt alternating current sets. Full description of the principle, construction and representative installations will be furnished on request for bulletins numbered 42010, 42201, 4883 and 4705-E.

Steam Engine Generating Sets are made for small plants, and for lighting construction operations in isolated places, requiring 100 kilowatts or less. These sets are designed to meet the severe conditions of marine work, which demand light, compact and durable sets of close regulation and quiet operation. They are used extensively for both power and lighting service.

For isolated plants requiring power and lighting service the General Electric Company makes an Internal Combustion Engine Generating Set built in units of 5, 10 and 25 kilowatt capacity. These engines are designed to use commercial motor gasoline as fuel and they can be operated on natural gas of 1100 B.T.U. These units consist of an efficient electric generator direct-connected to a high-grade gasoline engine; both designed and built by this Company for operation together, thereby giving complete units necessarily superior to the usual type of belted or assembled combinations.

The standard voltage of these sets is 125 volts direct current, but any other standard commercial voltage can be supplied. Alternating current units can be furnished in 10 and 25 kilowatt sizes. Bulletin number 4707, covering this type of generating set in detail, will be sent upon request.

The General Electric Company manufactures belt driven direct current generators in capacity from a fraction of a horse-power to 300 kilowatt unit, in standard voltages. Alternating generators are designed for various frequencies, voltages and phases from 7½ to 550 kilowatts. Detailed information covering these generators will be found in bulletins.

Motors and Control

A few of the motor equipments used in railway shops are given below.

RI Single Phase Induction Motors—RI single phase repulsion induction motors can be furnished in ¼ to 15 horse-power sizes for constant speed or from ¼ to 7½ horse-power for varying or adjustable speed operation for 60 cycles. Small motors for 40 and 25 cycles can be furnished.

Constant speed RI motors are suitable for operating all machines demanding acceleration under full or overload torque, such as air compressors, refrigerating machines, pumps, etc.

Varying speed RI motors are designed for machinery whose operation demands certain speed regulation against approximately constant torque. These motors can be often used on lighting circuits where the heavy starting currents of other types of motors preclude their use. Will stand a 50 per cent overload momentarily, and will start and accelerate a load having 2½ times full load torque (Bulletin 41507).

Control of RI Motors—Constant speed RI motors can be thrown directly on line yet in many cases the in-rush of current will be objectionable and the CR 1025 resistance starter is recommended, which will reduce the starting current approximately to 1½ times the normal current. Low voltage release is a part of control. Remote control can be furnished if desired. Information for same on request.

CR 6053 and CR 6054 Brush shifting controllers are recommended for use with varying speed RI motors.

Form K Polyphase Induction Motors—Form K is a polyphase induction motor having a skeleton frame. These motors range from ¼ to 750 horse-power. Standard ratings: 110 volts, ¼ to 15 horse-power; 220 volts, ¼ to 100 horse-power; 440 and 550 volts, ¼ to 750 horse-power; and 2200 volts, 20 to 750 horse-power. Adaptable for driving all classes of machines requiring constant speed. They are extremely simple, have great overload capacity and a high power factor. Bulletin 41302.

High speed form K induction motors ranging from ¾ horse-power, 3600 RPM, to 300 horse-power, 1800 RPM, for direct connection can be furnished. These are especially adapted for pump service.

Form K Multi-Speed Induction Motor for 60 cycle, 3 phase service only. Standard low voltages can be furnished to 12 horse-power at 4 constant speeds, 1800, 1200, 900, 600 RPM. Constant horse-power motors are suitable for machine tools, etc., and constant torque motors for operating fans, blowers, printing presses, etc.

Control Form K Motor—Many of the smaller sizes of squirrel cage induction motor can be thrown directly on line and motor starting switches CR 1038 and CR 1031 are recommended.

The CR 1038 switch is a quick make and break, single-throw switch and is provided with time limit protective plugs which guard the motor against overload. This switch is limited in capacity to 3 horse-power, 110, 440 and 550 volts, and 5 horse-power, 220 volts. Leaflet Y-711.

The CR 1031 switch is a four-pole, double-throw switch, arranged with a low voltage release and time limit overload relays. This switch is recommended for use with motors up to 7½ horse-power on standard voltages. Bulletin 48302A. Both types combine all the necessary safety features for protecting the operator.

CR 1034 compensators are recommended for type K or squirrel cage induction motors. They consist of inductive windings arranged with suitable taps and switch immersed in an oil tank.

Each compensator is equipped with low voltage release. Can in addition be furnished with fuses or overload relays. They are ruggedly constructed and all parts are enclosed protecting them from mechanical injury. Leaflet 68304.

For remote or automatic control of form K or squirrel cage induction motors CR 2361 automatic compensators are recommended. They are particularly adapted for use with motors driving centrifugal and reciprocating pumps, air compressors, fans, blowers, punch presses, belt conveyors, shears, line shafting, woodworking machinery, etc., when starting and stopping should be automatic. Low voltage release is an inherent feature and overload relays can be furnished if desired. Accessories for remote control such as CR 2931 Float Switch, CR 2920 Pressure Governor, or CR 2925 Pressure Switch can be supplied. Bulletin 48405.

RC Type Motors—RC type of motor with commutating poles may be classed as the universal direct current motor. It is especially designed to meet the majority of conditions required of motors. Can be furnished for constant speed either shunt wound for conditions requiring close speed regulation, compound wound for conditions demanding heavy starting torque or where violent power fluctuations occur, or series wound where load either requires fixed values or may be made subject to automatic or manual control.

All RC motors will be shipped for floor installation. May be readily arranged for wall or ceiling suspension. Can be equipped with special belt tightener.

Ratings for open, semi-closed self or separately ventilated types from ½ to 150 horse-power, 115, 230 and 550 volts. Bulletin No. 41013.

Control for RC Motor—CR 1000 dial type rheostat is recommended for ordinary starting service of RC motors. Bulletin 48303. Where service is more severe CR 3100 drum controller should be used. This type is described under control for motor MD. Both the rheostat and drum controller can be supplied for reversing or non-reversing service.

Where it is desired to start motor automatically or from remote points there are several types of self starters that can be used. Counter EMF self starters such as CR 2301-2-3-5 automatically close the line circuit through starting resistance then automatically short circuit the resistance when the counter EMF has reached a predetermined value. The current limiting type of self starter CR 2201-2-3 and 4 close the line circuit through starting resistance then automatically cut out each step as the current falls to a predetermined value. Accessories can be supplied such as CR 2931 float switch, CR 2920 pressure governor, CR 2925 pressure switch, etc. Bulletin covering accessories—48405.

RLC adjustable speed, commutating pole motors have been designed for machine tool and similar service where wide spread variation and adjustment of speed independent of load is required. The maximum starting or running torque with full field is 225 per cent and they will stand a momentary overload with full field of 75 to 100 per cent. Made for direct current only in voltages of 230 and 550 and in ranges from 2 to 50 horsepower. Speed adjustment 2 to 1, 3 to 1, or 4 to 1, to meet requirements. Bulletin No. A4130.

Control for RLC Motor—CR 1200 dial speed regulator is recommended for light service. This regulator contains starting resistance which will allow a 2-1, 3-1 or 4-1 speed variation by weakening shunt field of motor.

Where service is severe CR 3105 drum type of controller is recommended. On smaller sizes the armature and field resistance is mounted on back of controller, while on larger sizes field resistance is mounted this way and the armature resistance mounted as a separate unit. In case low voltage or overload protection are required CR 5070 panel is recommended.

Many special equipments are built to fit special machine operations. The Reversing Planer Drive and the Car Wheel Lathe Drive are two examples of special interest to railway men. Complete information will be furnished on request.

Portable Air Compressors

The small G. E. Reciprocating Compressors, such as are used to supply air brakes on electric street cars, are particularly applicable for blowing out machinery in industrial plants. These compressors are built with either induction motors or direct current motors of any commercial frequency or voltage. The motor and compressors are so designed and built as to form one unit. The compressors have two horizontal cylinders, single action, single stage, geared between cranks by herringbone gear. The lubrication of all bearings is entirely automatic and abundant, being carried up by the gear to distributing panels which supply all bearings. Electrical design of the motors is best suited to the purpose because it is not limited by the gear centers. No separate gear case is required as all gearing is contained in the compressor frame.

These compressors are furnished either as portable sets or as stationary equipments complete with automatic pressure governor, reservoir, line switch and fuses and pressure gauge.

Arc Welding Apparatus

A valuable adjunct to the equipment of foundries, railroad shops and repair shops. Can be used for joining and building up metals, repairing old machines or altering new ones. The G-E arc welding apparatus accomplishes this class of work economically and quickly. Made in two types, the portable in 200, 300 and 400 ampere sizes, and the stationary type, of 200 amperes and up. Bulletin 48905.

Wires and Cables

Wires and Cables are manufactured by the General Electric Company in varieties suitable for all purposes. This product includes cable with weather-proof, flame-proof rubber (National Electric Code and better grades), paper, varnished cambric, or asbestos insulation, and with all special finishes.

Three types of Rubber Insulation have been standardized: Red Core, Tricoat and 30 Per Cent Para (Black or White Core). In addition, this company is prepared to manufacture special types and grades of rubber-insulated conductors to meet unusual conditions.

Railroad Fans

The G-E railroad fan possesses many notable characteristics among which may be mentioned silent running, dignified and graceful lines, strong construction and adaptability to prevailing conditions of service.

These fans are provided with universal adjustments by which the current of air may be adjusted to any direction. The liberal size of all mechanical and electrical parts is convincing evidence of durability. The yoke casting of malleable iron is supported by a steel stud affording great rigidity and increasing the safety factor to a high degree.

The 12-inch fan is well adapted to parlor cars. It has a field of usefulness also in private cars, sleepers, diners, day coaches, etc.

It is readily removed from the car. Furnished for 30 and 60 volt direct current operation and may be wound for any popular voltage.

Equipments for Electric Cars

The G-E Ventilated Railway Motor, Sprague G-E Multiple unit control and G-E Air brake equipments are well known. The railway department makes a specialty of co-operating with car builders and purchasers of this class of equipment.

Sales Organization

Sales offices of the General Electric Company are located in the following cities: Atlanta, Ga., Baltimore, Md., Birmingham, Ala., Boston, Mass., Buffalo, N. Y., Butte, Mont., Charleston, W. Va., Charlotte, N. C., Chattanooga, Tenn., Chicago, Ill., Cincinnati, Ohio, Cleveland, Ohio, Columbus, Ohio, Dayton, Ohio, Denver, Colo., Detroit, Mich., Elmira, N. Y., Erie, Pa., Fort Wayne, Ind., Fort Wayne Electric Works; Hartford, Conn., Indianapolis, Ind., Jacksonville, Fla., Joplin, Mo., Kansas City, Mo., Knoxville, Tenn., Los Angeles, Cal., Louisville, Ky., Memphis, Tenn., Milwaukee, Wis., Minneapolis, Minn., Nashville, Tenn., New Haven, Conn., New Orleans, La., New York, N. Y., 30 Church Street; Niagara Falls, N. Y., Omaha, Neb., Philadelphia, Pa., Pittsburgh, Pa., Portland, Ore., Providence, R. I., Richmond, Va., Rochester, N. Y., Salt Lake City, Utah, San Francisco, Cal., Schenectady, N. Y., Seattle, Wash., Spokane, Wash., Springfield, Mass., St. Louis, Mo., Syracuse, N. Y., Toledo, Ohio, Washington, D. C., Youngstown, Ohio.

For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.): Dallas, Tex., 1701 North Market street; Houston, Tex., Third and Washington streets; El Paso, Tex., 500 San Francisco street; Oklahoma City, Okla., Insurance Building.

For all Canadian business refer to Canadian General Electric Co., Ltd., Toronto, Ont.

Foreign Offices: Argentina: Buenos Aires; Australasia: Adelaide, Auckland, Brisbane, Dunedin, Melbourne, Perth, Sydney; Brazil: Rio de Janeiro, Sao; Paulo; Chili: Iquique, Santiago, Valparaiso; China: Canton, Hongkong, Pekin, Shanghai; Columbia: Barranquilla; Costa Rica: San Jose; Cuba: Havana; England: London; India: Calcutta; Japan: Moji, Osaka, Tokyo, Yokohama; Korea: Seoul; Manchuria: Dairen; Mexico: Mexico City, Guadalajara; Peru: Lima; Philippine Islands: Manila; Porto Rico: San Juan; South Africa: Capetown, Johannesburg.

Walkover Pressed Steel Car Seats

Description

The "Walkover" is our latest design in car seats. It combines great strength and durability with extremely light weight. The pedestals and all metal parts are pressed steel. The pressed steel construction makes a neat and compact design, occupying less room than the average car seat. This makes more comfortable riding for the passenger.

The seats can be reversed as fast as the trainman can walk through the car, the only effort necessary being a slight push on the back of the seat.

The operating mechanism is extremely simple and safe.

A foot-rest is located beneath the seat which reverses automatically, and provides more foot space and ample room for placing luggage under the seat.

Types of Seats

The "through line" car seat is manufactured with various styles of aisle arm rests and upholstery covering. For steel cars the entire seat frame is made of steel. This seat is unsurpassed for easy riding and bodily comfort.

The suburban car seat is a modification of the "through line" seat, and can also be upholstered in any material specified. A car equipped with these seats makes a very pleasing appearance, clear cut, comfortable and roomy.

"Walkover" seats are also made for electric cars, economizing space and combining luxury and practicability in all installations.

Chair Car Seats

Revolving chairs with the pedestal base are for use in parlor cars. These are of various types, including upright and reclining chairs. The upright chairs are designed to give maximum comfort to the occupant. The cushion is deeply upholstered and roomy, while the back is high and restful. The angle of the back and cushion of the reclining chair may be adjusted at will by the occupant. It is deeply upholstered and presents a luxurious appearance.

Weight and Durability

The weight of the Pressed Steel Walkover Seat is approximately 12 to 20 lbs. less than the weight of older types.

The quality of the material, the rigid construction, the workmanship, the few parts and the simple design all tend to make a most durable seat.

The reversing mechanism is extremely simple. It cannot get out of adjustment and will not wear out. The pedestals are made of pressed steel and are practically indestructible. They set well under the seat away from the aisle, and make the marring of the finish from contact with passengers' feet impossible.

Standard Walkover Steel Seat and Integral Window Steel Finish, Exhibited at the Master Car Builders' Convention, of 1915, at Atlantic City.

Special care is given to see that all workmanship is perfect. The seats and all their parts are subjected to rigid inspections before and after they are assembled, only first-class product being permitted to leave the factory.

Manufacturing and Engineering Facilities

This company is one of the largest manufacturers of car seats and pressed steel specialties. The factory in its equipment of fine machinery and special tools is not equalled in the industry. The experience of many years, aided by the splendid factory accommodations, modern facilities and an organization composed of specialists, result in the highest standard of finished product. Our engineers, experts in steel car work, are at all times ready to co-operate with the representatives of railway companies when considering new equipment.

Special attention is directed to the fact that the lessening of the dead weight by many hundreds of pounds per car—over old methods, secured by the use of Pressed Steel Walkover Seats, results in a considerable saving per car, per year, in the cost of hauling.

Interior Steel Finish and Trim

Specialties

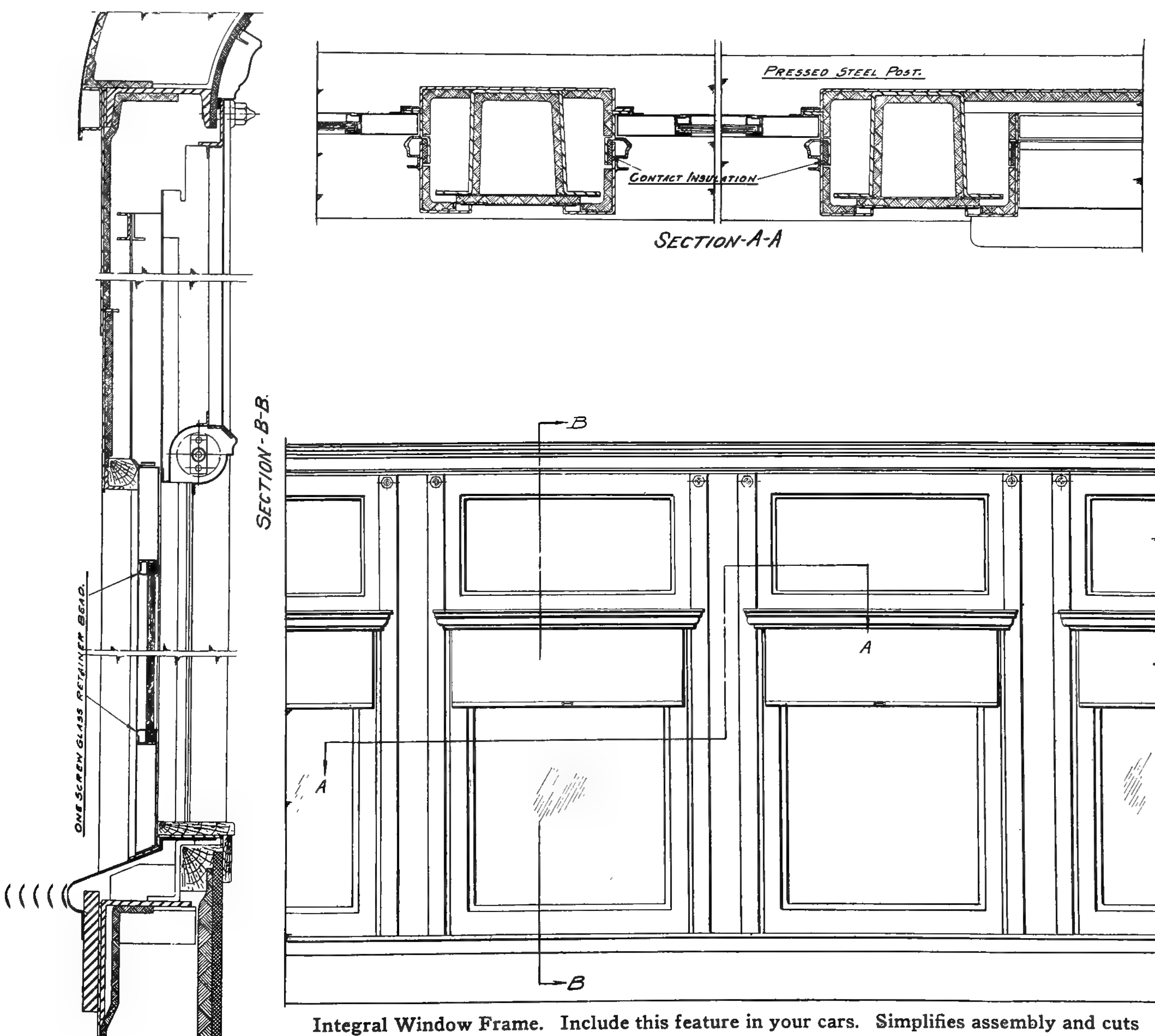
This company manufactures every practical design of steel interior finish suitable for all steel railway cars. All metal trim, mouldings, doors, etc., are manufactured from carefully selected sheet steel. A perfected "process welded equipment" lends lightness, strength, durability and beauty to our products. Mouldings are cold drawn through hardened rolls, from special bright finish coil steel, producing sharp, graceful outlines.

After final assembly all material is carefully cleaned and treated with an elastic rust-proof primer, which is baked on in an even temperature. Metal trim is furnished either primed, ready for graining, or completely grained and finished.

Integral Window Frame

A unique and distinctive feature of our interior trim is the Patent Integral Window Frame. It is a complete unit in itself; light, yet strong, and with all operating parts in perfect alignment; absolutely interchangeable, neat and artistic in appearance, and easily erected. The nature of its construction and application compensates for any irregularity in the window-spacing of the car frame, and makes possible thorough insulation against heat and cold. Owing to the ease with which it can be erected or removed, the cost of repairs to car frame and insulation is greatly reduced.

Hale and Kilburn output includes everything in steel for the modern Steel Passenger Car—Doors, Sash, Seats and Interior Finish. The superiority of design, construction and materials offered by this manufactory will convince the most critical observer that its product is absolutely dependable under the most severe conditions of service possible. Our designs are at your command.



Integral Window Frame. Include this feature in your cars. Simplifies assembly and cuts down erection expense. No change in present post construction necessary.

ALPHABETICAL INDEX TO ADVERTISERS.

BUYERS' CLASSIFIED DIRECTORY

FOR the immediate convenience of the users of this Dictionary, a very complete classification of supplies used in car building and maintenance appears on this and the following pages. It includes not only the names of the manufacturers represented in the Catalogue and Advertising Sections but also their page numbers and the figure numbers in all sections of the Dictionary.

ACETYLENE.

Commercial Acetylene Railway Light & Signal Co.
Catalogue Section p. 985.

AIR SIGNAL APPARATUS.

Westinghouse Air Brake Co.
Page 1058; also Figs. 1345, 1410.

AXLES.

Russel Wheel & Foundry Co.
Page 1042.

Standard Steel Works Co.
Catalogue Section pp. 1004-5.

U. S. Metal & Mfg. Co.
Page 1049.

BAGGAGE RACKS.

Adams & Westlake Co.
Page 1051; also Figs. 1848, 1850.

Dayton Mfg. Co.
Page 1053; also Figs. 1852 to 1858.

Howard & Co., James L.
Page 1052; also Figs. 1849, 1851.

BATTERIES, STORAGE.

Consolidated Ry. Elec. Ltg. & Equip. Co.
Catalogue Section pp. 982-83.

Electric Storage Battery Co.
Catalogue Section p. 984; also Figs. 2504 to 2509; 2511.

Gould Storage Battery Co.
Page 1060; also Figs. 2486, 2487.

BATTERY CHARGING DEVICES.

General Electric Co.
Catalogue Section pp. 1018-19.

BEARINGS, JOURNAL.

Haskell & Barker Car Co., Inc.
Page 1036.

BEARINGS, SIDE AND CENTER.

American Steel Foundries.
Catalogue Section pp. 986-87; also Figs. 1101-1106.

Chicago Railway Equipment Co.
Page 1047; also Figs. 1110-1127.

Joliet Railway Supply Co.
Page 1002; also Figs. 1079, 1089, 1090.

Miner, W. H.
Page 1031; also Figs. 1076, 1077, 1086, 1087.

National Malleable Castings Co.
Page 1044.

Standard Car Truck Co.
Catalogue Section p. 1000; also Figs. 1078, 1080, 1088; 1096 to 1098.

BEARINGS, SIDE AND CENTER—Continued.

Union Draft Gear Co.
Page 1045; also Figs. 1107-1109.

Woods & Co., Edwin S.
Page 1048; also Figs. 1082, 1083; 1091 to 1095.

BELL AND SIGNAL CORD.

Dayton Mfg. Co.
Page 1053.

Railway Supply & Curtain Co.
Page 1052.

BELL CORD COUPLING.

Dayton Mfg. Co.
Page 1053.

BELTING, AXLE.

Consolidated Ry. Elec. Ltg. & Equip. Co.
Catalogue Section pp. 982-83.

Electric Storage Battery Co.
Catalogue Section p. 984.

Gould Storage Battery Co.
Page 1060.

Safety Car Heating & Lighting Co.
Catalogue Section pp. 978 to 981.

BENDING MACHINERY.

Niles-Bement-Pond Co.
Page 1065.

BOLSTERS.

American Car & Foundry Co.
Page 1032; also Figs. 494, 1128.

American Steel Foundries.
Catalogue Section pp. 986-87; also Figs. 483; 485 to 488; 490, 491; 495 to 497; 500; 1129 to 1134; 1163, 1164.

Bettendorf Co.
Page 1043; also Figs. 499, 1135, 1160.

Buckeye Steel Castings Co.
Catalogue Section pp. 988-89; also Figs. 1149 to 1152; 1155 to 1158.

Chicago Railway Equipment Co.
Page 1047; also Figs. 493, 498, 503, 1137, 1138.

Commonwealth Steel Co.
Page 1049; also Figs. 489, 492, 501, 502; 504 to 508; 1153, 1167, 1168.

Gould Coupler Co.
Catalogue Section p. 992; Figs. 484, 1148.

Haskell & Barker Car Co., Inc.
Page 1036.

Pressed Steel Car Co.
Page 1038; also Fig. 1144.

Russel Wheel & Foundry Co.
Page 1042; also Figs. 1145 to 1147.

BOLSTERS—Continued.

Scullin Steel Co.
Catalogue Section pp. 996 to 999; also Figs. 1140, 1141, 1159.

U. S. Metal & Mfg. Co.
Page 1049; also Fig. 1136

BOLT FASTENERS.

American Nut & Bolt Fastener Co.
Page 1056.

BOLTS.

(See Nuts and Bolts.)

BOXES, STEP.

Acme Supply Co.
Catalogue Section pp. 1008-09; also Fig. 569.

Transportation Utilities Co.
Catalogue Section p. 1007.

BRAKE BEAMS.

American Steel Foundries.
Catalogue Section pp. 986-87; also Figs. 1224 to 1233; 1293.

Buffalo Brake Beam Co.
Page 1046; also Figs. 1234 to 1239.

Chicago Railway Equipment Co.
Page 1047; also Figs. 1263 to 1292.

Haskell & Barker Car Co., Inc.
Page 1036.

Joliet Railway Supply Co.
Catalogue Section p. 1002; also Figs. 1240, 1241.

National Malleable Castings Co.
Page 1044.

Pressed Steel Car Co.
Page 1038.

BRAKE EQUIPMENT, AIR AND HAND.

American Brake Co.
Page 1057; also Figs. 1508, 1509.

Chicago Railway Equipment Co.
Page 1047; also Figs. 1510, 1512.

Gould Coupler Co.
Catalogue Section p. 992; also Fig. 1511.

McCord & Co.
Page 1068; also Fig. 1485.

National Brake Co., Inc.
Catalogue Section p. 1003; also Figs. 1514, 1517.

National Malleable Castings Co.
Page 1044; also Figs. 1497 to 1503; 1531 to 1543.

Pressed Steel Car Co.
Page 1038; also Fig. 1544.

BRAKE EQUIPMENT, AIR AND HAND—Continued.

Standard Car Truck Co.
Catalogue Section p. 1000; also Fig. 1522.

Westinghouse Air Brake Co.
Page 1058; also Figs. 1345 to 1444.

Westinghouse Traction Brake Co.
Page 1059.

BRAKE GEAR AND DETAILS.

American Brake Co.
Page 1057; also Fig. 1334.

American Steel Foundries.
Catalogue Section pp. 986-87; also Fig. 1327.

Buffalo Brake Beam Co.
Page 1046; also Fig. 1318.

Camel Co.
Page 1063.

Chicago Railway Equipment Co.
Page 1047; also Figs. 1329 to 1332; 1335 to 1337.

National Malleable Castings Co.
Page 1044; also Figs. 1304 to 1317; 1319.

Schaefer Equipment Co.
Page 1046.

BRAKE GEAR, CLASP.

American Brake Co.
Page 1057; also Fig. 1334.

Chicago Railway Equipment Co.
Page 1047; also Figs. 1329-1330.

BRAKE HANDLES, WHEELS AND STAFFS.

Adams & Westlake Co.
Page 1051; also Fig. 625.

Camel Co.
Page 1063; also Fig. 482.

Dayton Mfg. Co.
Page 1053; also Fig. 623.

National Brake Co., Inc.
Catalogue Section p. 1003.

National Malleable Castings Co.
Page 1044; also Figs. 1533; 1535 to 1537; 1540 to 1543.

Standard Car Truck Co.
Catalogue Section p. 1000; also Fig. 1522.

U. S. Metal & Mfg. Co.
Page 1049; also Fig. 1524.

BRAKE HEADS.

American Steel Foundries.
Catalogue Section pp. 986-87; also Figs. 1290, 1291.

Chicago Railway Equipment Co.
Page 1047; also Figs. 1292 to 1298.

Joliet Railway Supply Co.
Catalogue Section p. 1002; also Fig. 1328.

National Malleable Castings Co.
Page 1044.

BRAKE MECHANISM, HAND.

National Brake Co., Inc.
Catalogue Section p. 1003; also Figs. 1514, 1517.

National Malleable Castings Co.
Page 1044; also Figs. 1531 to 1543.

Pressed Steel Car Co.
Page 1038; also Fig. 1544.

Standard Car Truck Co.
Catalogue Section p. 1000; also Fig. 1522.

U. S. Metal & Mfg. Co.
Page 1049; also Fig. 1524.

BRAKE SHOES.

American Brake Shoe & Foundry Co.
Page 1046; also Figs. 1343, 1344.

Barney & Smith Car Co.
Page 1033.

BRAKE SHOE KEYS.

American Brake Shoe & Foundry Co.
Page 1046.

Barney & Smith Car Co.
Page 1033.

National Malleable Castings Co.
Page 1044.

BRAKE SLACK ADJUSTERS.

American Brake Co.
Page 1057; also Figs. 1508, 1509.

Chicago Railway Equipment Co.
Page 1047; also Figs. 1510, 1512.

Gould Coupler Co.
Catalogue Section p. 992; also Fig. 1511.

National Malleable Castings Co.
Page 1044.

Standard Coupler Co.
Page 1048.

BRAKES, AIR.

American Brake Co.
Page 1057.

General Electric Co.
Catalogue Section pp. 1018-19; also Figs. 1468 to 1474.

Westinghouse Air Brake Co.
Page 1058; 644 to 674; including Figs. 1345 to 1444 inclusive.

Westinghouse Traction Brake Co.
Page 1059; (See also Westinghouse Air Brake Co.)

BRAKES, ELECTRO-PNEUMATIC.

Westinghouse Traction Brake Co.
Page 1059.

BUFFERS AND PLATFORMS.

Commonwealth Steel Co.
Page 1049; also Figs. 505, 506, 509.

Gould Coupler Co.
Catalogue Section p. 992; also Figs. 508; 523 to 526.

McConway & Torley Co.
Catalogue Section pp. 990-91; also Fig. 527.

Miner, W. H.
Page 1031; also Figs. 513, 514.

Standard Coupler Co.
Page 1048; also Figs. 515 to 520.

CABLES, ELECTRIC.

General Electric Co.
Catalogue Section pp. 1018-19.

Kerite Insulated Wire & Cable Co.
Page 1061.

CAR BODY AND FRAMING DETAILS.

American Car & Foundry Co.
Page 1032; also Figs. 457, 458, 463, 464.

Commonwealth Steel Co.
Page 1049; also Figs. 469 to 471; 476.

Middletown Car Co.
Page 1041; also Fig. 455.

Pressed Steel Car Co.
Page 1038; also Fig. 466.

Western Steel Car & Foundry Co.
Page 1039; also Fig. 456.

CAR DETAILS, BOX.

Camel Co.
Page 1063; also Figs. 477, 482.

CAR DOORS, FREIGHT.

Camel Co.
Page 1063.

Chicago Car Door Co.
Page 1063.

Q & C Co.
Catalogue Section p. 1012.

Ralston Steel Car Co.
Page 1040.

CAR DOORS, PASSENGER.

Acme Supply Co.
Catalogue Section pp. 1008-09.

Hale & Kilburn Co.
Catalogue Section pp. 1020-21.

Transportation Utilities Co.
Catalogue Section p. 1007.

CAR HEATING.

Chicago Car Heating Co.
Page 1048; also Figs. 2237 to 2263.

CAR LIGHTING.

Adams & Westlake Co.
Page 1051; also Figs. 2397 to 2420; 2640 to 2654; 2668 to 2671.

Commercial Acetylene Ry. Light & Signal Co., Inc.
Catalogue Section p. 985; also Figs. 2385 to 2396.

Consolidated Ry Elec. Ltg. & Equip. Co.
Catalogue Section pp. 982-83; also Figs. 2456 to 2468.

Dayton Mfg. Co.
Page 1053; also Figs. 2421 to 2426; 2655 to 2660; 2665 to 2667.

Electric Storage Battery Co.
Catalogue Section p. 984; also Figs. 2504 to 2509; 2511 to 2517.

General Electric Co.
Catalogue Section p. 1018-19; also Figs. 2469, 2470.

Gould Coupler Co.
Page 1060; also Figs. 2471 to 2487.

Gould Storage Battery Co.
Page 1060; (See Gould Coupler Co. figure numbers).

Safety Car Heating & Lighting Co.
Catalogue Section pp. 978-81; also pp. 813 to 826, including 2298 to 2382 inclusive; also Figs. 2436 to 2450; p. 857 to 861, including Figs. 2518 to 2639 inclusive.

CARLINES.

Camel Co.
Page 1063; also Fig. 914.

Haskell & Barker Car Co., Inc.
Page 1036.

Pressed Steel Car Co.
Page 1038.

CAR SEATS.

Barney & Smith Car Co.
Page 1033; also Figs. 1688 to 1691; 1693.

Brill Co., The J. G.
Page 1034.

Dayton Mfg. Co.
Page 1053.

Hale & Kilburn Co.
Catalogue Section pp. 1020-21; also Figs. 1644; 1646 to 1671.

CAR SEATS—Continued.

Heywood Brothers & Wakefield Co.
Page 1050; also Figs. 1678 to 1680.

Pressed Steel Car Co.
Page 1038; also Fig. 1674.

Scarritt-Comstock Furniture Corp.
Page 1050; also Figs. 1699 to 1705.

Walker Co., Inc., Sheridan A.
Page 1050; also Figs. 1672 to 1674.

CAR TRIMMINGS.

Acme Supply Co.
Catalogue Section pp. 1008-09.

Adams & Westlake Co.
Page 1051.

Brill Co., The J. G.
Page 1034.

Dayton Mfg. Co.
Page 1053.

Howard & Co., James L.
Page 1052.

McCord Mfg. Co.
Page 1054.

Railway Supply & Curtain Co.
Page 1052.

Transportation Utilities Co.
Catalogue Section p. 1007.

CARS AND ACCESSORIES, MOTOR (PASSENGER).

General Electric Co.
Catalogue Section pp. 1018-19; also Figs. 871 to 876; 2700 to 2733; 2736.

CARS, BALLAST.

(See Cars, Freight.)

CARS, CONTRACTING.

(See Cars, Freight.)

CARS, FREIGHT.

American Car & Foundry Co.
Page 1032; also Figs. 8, 12, 14, 20, 25, 30, 33, 35, 39, 48, 57, 58, 72, 73, 79, 86, 90, 100, 105, 106, 110, 112, 114, 119, 121, 196, 271, 277, 278, 283, 284, 299, 300, 322, 323, 336A, 338, 342, 344, 345, 353, 354, 364.

Barney & Smith Car Co.
Page 1033; also Figs. 21 to 23; 71, 102, 287, 288, 292, 293.

Bettendorf Co.
Page 1043; also Figs. 3 to 6; 55, 76, 80, 317, 318.

Brill Co., The J. G.
Page 1034; also Figs. 99, 103, 104.

Clark Car Co.
Catalogue Section p. 1016; also Figs. 28, 40, 60, 304, 305, 313.

Enterprise Railway Equipment Co.
Page 1035; also Figs. 297, 298, 312, 324, 325, 329.

Fowler Car Co.
Page 1042; also Figs. 11, 272.

Goodwin Car Co.
Catalogue Section p. 1017; also Figs. 63, 68.

Greenville Steel Car Co.
Page 1040.

Harlan & Hollingsworth Corp.
Page 1042; also Fig. 101.

Haskell & Barker Car Co., Inc.
Page 1036; also Figs. 18, 92, 94.

Laconia Car Co.
Page 1037; also Figs. 91, 111.

CARS, FREIGHT—Continued.

Middletown Car Co.
Page 1041.

Mt. Vernon Car Mfg. Co.
Page 1040.

Pressed Steel Car Co.
Page 1038; also Figs. 16, 24, 26, 29, 32, 37, 52, 53, 56, 75, 82, 89, 107, 108, 285, 286, 309, 351, 352.

Ralston Steel Car Co.
Page 1040; also Figs. 28, 40, 69, 93, 314.

Refrigerator Heater & Ventilator Car Co.
Page 1044; also Fig. 113.

Russel Wheel & Foundry Co.
Page 1042.

Standard Steel Car Co.
Page 1041; also Figs. 38, 290, 294, 295, 331, 332.

Western Steel Car & Foundry Co.
Page 1039; also Figs. 9, 10, 13, 15, 17, 19, 41, 77, 267, 268, 281, 282, 289.

Youngstown Steel Car Co.
Page 1044.

CARS, GAS-ELECTRIC.

General Electric Co.
Catalogue Section pp. 1018-19; also Fig. 194.

CARS, LOGGING.

(See Cars, Freight.)

CARS, PASSENGER.

American Car & Foundry Co.
Page 1032; also Figs. 126, 127, 129, 132, 145, 148, 149, 151; 153 to 155; 169, 174, 186, 187, 220, 225, 234, 391, 392, 393.

Barney & Smith Car Co.
Page 1033; also Figs. 124, 125, 133, 134, 156, 157, 167; 175 to 182; 224, 404.

Brill Co., The J. G.
Page 1034.

Harlan & Hollingsworth Corp.
Page 1042; also Figs. 130, 131, 138, 139, 144, 158, 159, 221; 372 to 374; 381 to 383; 394.

Laconia Car Co.
Page 1037; also Figs. 135.

Middletown Car Co.
Page 1041.

Pressed Steel Car Co.
Page 1038; also Figs. 140, 141, 146, 147, 184; 375 to 377.

Standard Steel Car Co.
Page 1041; also Figs. 195, 408.

CARS, REFRIGERATION, HEATING AND VENTILATING.

American Car & Foundry Co.
Page 1032; also Fig. 913.

Refrigerator Heater & Ventilator Car Co.
Page 1068; also Figs. 113; 905 to 908.

Union Fibre Co.
Page 1062; also Fig. 889 to 895.

Wine Railway Appliance Co.
Catalogue Section pp. 1014-15; also Figs. 909 to 911.

CARS, REPAIRED AND REBUILT.

American Car & Foundry Co.
Page 1032.

Greenville Steel Car Co.
Page 1043.

Haskell & Barker Car Co., Inc.
Page 1036.

CARS REPAIRED AND REBUILT—Continued.

Laconia Car Co.
Page 1037.

Pressed Steel Car Co.
Page 1038.

Ralston Steel Car Co.
Page 1040.

Standard Steel Car Co.
Page 1041.

Western Steel Car & Foundry Co.
Page 1039.

Youngstown Steel Car Co.
Page 1044.

CASTINGS.

(See Forgings and Castings.)

CASTINGS, BRASS AND BRONZE.

Barney & Smith Car Co.
Page 1033.

Dayton Mfg. Co.
Page 1053.

Howard & Co., James L.
Page 1052.

McCord Mfg. Co.
Page 1054.

CENTER PINS.

Miner, W. H.
Page 1031.

CENTER PLATES.

Joliet Railway Supply Co.
Catalogue Section p. 1002.

Pressed Steel Car Co.
Page 1038.

Standard Car Truck Co.
Catalogue Section p. 1000.

Woods & Co., Edwin S.
Page 1048.

CENTER SILLS.

Miner, W. H.
Page 1031.

CENTERING MACHINES, AXLE.

Niles-Bement-Pond Co.
Page 1065.

CHAIRS, DINING AND PARLOR.

(See Car Seats.)

CLAMPS, FLANGING.

Niles-Bement-Pond Co.
Page 1065.

CLOSETS, FLUSH OR DRY.

(See Hoppers, Flush or Dry.)

COCKS, BRAKE AND SIGNAL.

Westinghouse Air Brake Co.
Page 1058.

COMPRESSORS, AIR BRAKE.

General Electric Co.
Catalogue Section pp. 1018-19; also Figs. 1469, 1470.

Westinghouse Air Brake Co.
Page 1058; also Figs. 1404 to 1406; 1411, 1412, 1420, 1423.

Westinghouse Traction Brake Co.
Page 1059.

CONNECTORS, AUTOMATIC.

Westinghouse Air Brake Co.
Page 1058; also Fig. 1475.

Westinghouse Traction Brake Co.
Page 1059.

COTTER PINS.

Columbia Nut & Bolt Co., Inc.
Page 1054.

COUPLERS, CAR.

American Steel Foundries.
Catalogue Section pp. 986-87; also Figs. 626 to 627; 656.

Buckeye Steel Castings Co.
Catalogue Section pp. 988-89; also Figs 631 to 635.

Gould Coupler Co.
Catalogue Section p. 992; also Figs. 651, 652, 655, 657, 658.

McConway & Torley Co.
Catalogue Section pp. 990-91; also Figs. 648 to 650; 659 to 664.

National Malleable Castings Co.
Catalogue Section p. 1044; also Figs. 640 647; 665 to 667.

Standard Coupler Co.
Page 1048; also Figs. 639, 668.

Westinghouse Air Brake Co.
Page 1058; also Fig. 1475.

Westinghouse Traction Brake Co.
Page 1059.

COUPLINGS, HOSE AND STEAM.

Camel Co.
Page 1063.

Chicago Car Heating Co.
Page 1048.

National Malleable Castings Co.
Page 1044; also Figs. 1501 to 1503; 2077.

Westinghouse Air Brake Co.
Page 1058; also Figs. 1388, 1389, 1392, 1393, 1396, 1442, 1443.

CRANES.

Niles-Bement-Pond Co.
Page 1065.

CRANES, BATTERY TRUCK.

General Electric Co.
Catalogue Section pp. 1018-19.

CURTAINS, CAR.

Acme Supply Co.
Catalogue Section pp. 1008-09.

Barney & Smith Car Co.
Page 1033.

Curtain Supply Co.
Page 1052.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11.

Railway Supply & Curtain Co.
Page 1052.

Transportation Utilities Co
Catalogue Section p. 1007.

CURTAIN FIXTURES.

Acme Supply Co.
Catalogue Section pp. 1008-09; also Fig. 1976.

Barney & Smith Car Co.
Page 1033.

Curtain Supply Co.
Page 1052; also Figs. 1981; 1983 to 1989.

Dayton Mfg. Co.
Page 1053; also Figs. 1921 to 1923.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11.

Railway Supply & Curtain Co.
Page 1052; also Figs. 1991 to 1997; 2000, 2002.

Transportation Utilities Co.
Catalogue Section p. 1007.

CURTAIN MATERIAL.

Barney & Smith Car Co.
Page 1033.

Curtain Supply Co.
Page 1052.

Pantasote Co.
Catalogue Section p. 1013.

Q & C Co.
Catalogue Section p. 1012.

Railway Supply & Curtain Co.
Page 1052.

CUTTERS, MILLING.

Pratt & Whitney Co.
Page 1064.

DERAILERS.

Q & C Co.
Catalogue Section p. 1012.

DIAPHRAGMS, VESTIBULE.

Acme Supply Co.
Catalogue Section pp. 1008-09.

Curtain Supply Co.
Page 1052.

Q & C Co.
Catalogue Section p. 1012.

Transportation Utilities Co.
Catalogue Section p. 1007.

DIES.

Pratt & Whitney Co.
Page 1064.

DIRT COLLECTORS, CENTRIFUGAL (AIR BRAKE SYSTEMS).

Westinghouse Air Brake Co.
Page 1058.

DOORS AND FIXTURES, FREIGHT CAR.

American Car & Foundry Co.
Page 1032; also Fig. 841.

Camel Co.
Page 1063; also Figs, 796 to 800.

Chicago Car Door Co.
Page 1063; also Figs. 812, 836.

Haskell & Barker Car Co., Inc.
Page 1036.

Jones Car Door Co.
Page 1063; also Fig. 843.

Miner, W. H.
Page 1031; also Fig. 813.

National Malleable Castings Co.
Page 1044; also Figs. 821 to 826.

Ralston Steel Car Co.
Page 1040; also Fig. 819.

Transportation Utilities Co.
Catalogue Section p. 1007; also Fig. 815

Western Steel Car & Foundry Co.
Page 1039; also Fig. 810.

DOORS AND FIXTURES, PASSENGER CAR.

Acme Supply Co.
Catalogue Section pp. 1008-09; also Figs. 855 to 863.

Adams & Westlake Co.
Page 1051; also Fig. 877.

Camel Co.
Page 1063; also Fig. 482.

Dayton Mfg. Co.
Page 1053; also Fig. 874.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11.

Hale & Kilburn Co.
Catalogue Section pp. 1020-21; also Figs. 848, 851, 852.

DOORS AND FIXTURES, PASSENGER CAR —Continued.

Howard & Co., James L.
Page 1052; also Figs. 850, 873.

National Malleable Castings Co.
Page 1044.

Railway Supply & Curtain Co.
Page 1052; also Fig. 872.

Transportation Utilities Co.
Catalogue Section p. 1007.

DRAFT GEARS AND ATTACHMENTS.

American Steel Foundries.
Catalogue Section pp. 1086-87; also Figs. 679 to 682.

Bettendorf Co.
Page 1043; also Fig. 678.

Buckeye Steel Castings Co.
Catalogue Section pp. 988-89; also Figs. 701 to 706.

Commonwealth Steel Co.
Page 1049; also Figs. 671 to 674; 676, 709; 714 to 717.

Gould Coupler Co.
Catalogue Section p. 992; also Figs. 687, 692; 742 to 745.

Haskell & Barker Car Co., Inc.
Page 1036.

Keyoke Railway Equipment Co.
Catalogue Section p. 993; also Figs. 719 to 722.

McCord & Co.
Page 1068; also Figs. 730 to 732.

Miner, W. H.
Page 1031; also Figs. 688; 698 to 700; 733 to 737.

National Malleable Castings Co.
Page 1044; also Figs. 693 to 697.

Standard Coupler Co.
Page 1048; also Figs. 764 to 767.

Union Draft Gear Co.
Page 1045; also Figs. 770 to 773.

Universal Draft Gear Attachment Co.
Catalogue Section p. 994; also Figs. 686; 710 to 713; 759 to 763.

Westinghouse Air Brake Co.
Page 1058; also Figs. 753 to 758.

DRAWBAR ATTACHMENTS.

Universal Draft Gear Attachment Co.
Page 1045.

DRAWBAR CENTERING DEVICE.

Miner, W. H.
Page 1031.

National Malleable Castings Co.
Page 1044.

DRILLS.

Pratt & Whitney Co.
Page 1064.

DUMPING APPARATUS, CAR.

Bettendorf Co.
Page 1043; also Fig. 792.

Enterprise Railway Equipment Co.
Page 1035.

Goodwin Car Co.
Catalogue Section p. 1017; also Fig. 794.

Pressed Steel Car Co.
Page 1038; also Figs. 790, 791.

Standard Steel Car Co.
Page 1041; also Figs. 786 to 788.

U. S. Metal & Mfg. Co.
Page 1049; also Figs. 789, 789A, 793.

DYNAMOS.

General Electric Co.
Catalogue Section pp. 1018-19.

ELECTRIC APPARATUS AND SUPPLIES.

General Electric Co.
Catalogue Section pp. 1018-19.

ENAMELS.

U. S. Metal & Mfg. Co.
Page 1049.

ENGINEERS, INSPECTING AND TESTING

Hunt & Co., Robert W.
Page 1062.

FANS, ELECTRIC.

General Electric Co.
Catalogue Section pp. 1018-19.

Safety Car Heating & Lighting Co.
Catalogue Section pp. 978-81; also Figs. 2276, 2277.

FLANGERS, SNOW.

Q & C Co.
Catalogue Section p. 1012.

FLOORING, CAR.

Acme Supply Co.
Catalogue Section pp. 1008-09; also Fig. 1707.

Transportation Utilities Co.
Catalogue Section p. 1007.

FORGINGS AND CASTINGS.

Allegheny Steel Co.
Catalogue Section p. 995.

American Brake Co.
Page 1057.

American Brake Shoe & Foundry Co.
Page 1046.

American Car & Foundry Co.
Page 1032.

American Steel Foundries.
Catalogue Section pp. 986-87.

Barney & Smith Car Co.
Page 1033.

Buffalo Brake Beam Co.
Page 1046.

Commonwealth Steel Co.
Page 1049.

Dayton Mfg. Co.
Page 1053.

Forged Steel Wheel Co.
Page 1041.

Gould Coupler Co.
Catalogue Section p. 992.

Greenville Steel Car Co.
Page 1040.

Haskell & Barker Car Co., Inc.
Page 1036.

Laconia Car Co.
Page 1037.

McConway & Torley Co.
Catalogue Section pp. 990-91.

Mt. Vernon Car Mfg. Co.
Page 1040.

National Malleable Castings Co.
Page 1044.

Pratt & Letchworth Co.
Catalogue Section p. 1001.

Pressed Steel Car Co.
Page 1038.

Ralston Steel Car Co.
Page 1040.

FORGINGS AND CASTINGS—Continued.

Russel Wheel & Foundry Co.
Page 1042.

Standard Steel Car Co.
Page 1041.

Standard Steel Works Co.
Catalogue Section pp. 1004-05.

Youngstown Steel Car Co.
Page 1044.

FURNACES, ELECTRIC.

General Electric Co.
Catalogue Section pp. 1018-19.

GAGES, PRESSURE.

Chicago Car Heating Co.
Page 1048.

Safety Car Heating & Lighting Co.
Catalogue Section pp. 978-81; also Fig. 2300.

Westinghouse Air Brake Co.
Page 1058; also Fig. 1444.

GAGES, STANDARD MEASURING.

Pratt & Whitney Co.
Page 1064.

GASKETS.

McCord Mfg. Co.
Page 1054.

GEAR BLANKS, ROLLED STEEL.

Standard Steel Works Co.
Catalogue Section pp. 1004-05.

GENERATORS, CAR LIGHTING.

Consolidated Ry. Elec. Ltg. & Equip. Co.
Catalogue Section pp. 982-83; also Figs. 2461, 2463, 2465, 2468.

Electric Storage Battery Co.
Catalogue Section p. 984; also Figs. 2512, 2516.

General Electric Co.
Catalogue Section pp. 1018-19; also Figs. 2469, 2470.

Gould Coupler Co.
Page 1060; also Figs. 2471 to 2473; 2476, 2477, 2481, 2482.

Gould Storage Battery Co.
Page 1060; (see Gould Coupler Co., figure numbers.)

Safety Car Heating & Lighting Co.
Catalogue Section pp. 978-81; also Figs. 2439; 2445 to 2447.

HAMMERS, STEAM.

Niles-Bement-Pond Co.
Page 1065.

HARDWARE, CAR.

Adams & Westlake Co.
Page 1051; also Figs. 1604, 1605, 1607, 1609, 1612, 1615, 1619; 1621 to 1624; 1626, 1628; 1632 to 1634; 1637, 1642, 1645; 1804 to 1808; 1810, 1812, 1813, 1827, 1828; 1832 to 1834; 1836, 2003, 2005, 2007, 2008; 2014 to 2016; 2021, 2027, 2031, 2032, 2034; 2039 to 2040; 2043.

Dayton Mfg. Co.
Page 1053; also Figs. 1602, 1606, 1608, 1613, 1614; 1616 to 1618; 1620, 1622, 1624, 1625, 1627, 1629, 1631, 1635, 1636, 1638, 1640, 1641, 1643, 1815, 1818, 1820, 1821, 1824, 1825, 1830, 1831, 1835, 1837, 1839, 1841; 2003 to 2006; 2011, 2016; 2022 to 2027; 2033; 2035 to 2037; 2041.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010, 1011.

Howard & Co., James L.
Page 1052; also Figs. 1611, 1615, 1816, 1817, 1826, 1829, 2003.

HEADLIGHTS.

Commercial Acetylene Ry. Light & Signal Co., Inc.
Catalogue Section p. 985.

Dayton Mfg. Co.
Page 1053.

General Electric Co.
Catalogue Section pp. 1018-19.

Safety Car Heating & Lighting Co.
Catalogue Section pp. 978-81.

HEAD LININGS, CAR.

Barney & Smith Car Co.
Page 1033.

Pantasote Co.
Catalogue Section p. 1013.

HEATERS, EMERGENCY.

Chicago Car Heating Co.
Page 1048.

HOISTS.

General Electric Co.
Catalogue Section pp. 1018-19.

HOOKS, WRECKING.

National Malleable Castings Co.
Page 1044; also Fig. 2787.

HOPPERS, FLUSH OR DRY.

Adams & Westlake Co.
Page 1051; also Figs. 1790, 1791.

Dayton Mfg. Co.
Page 1053; also Fig. 1793.

Duner Co.
Page 1050; also Figs. 1779 to 1781; 1784.

Howard & Co., James L.
Page 1052; also Fig. 1789.

Railway Supply & Curtain Co.
Page 1052; also Fig. 1785.

HOSE PROTECTORS.

McCord & Co.
Page 1068; also Fig. 1485.

Q & C Co.
Catalogue Section p. 1012.

HYDRAULIC MACHINERY.

Niles-Bement-Pond Co.
Page 1065.

INSPECTING AND TESTING LABORATORIES.

Hunt & Co., Robert W.
Page 1062.

INSTRUMENTS, ELECTRIC MEASURING.

Consolidated Ry. Elec. Ltg. & Equip. Co.
Catalogue Section pp. 982-83; also Figs. 2460, 2463, 2464.

General Electric Co.
Catalogue Section pp. 1018-19.

INSULATION, FREIGHT AND PASSENGER CARS.

Miner, W. H.
Page 1031.

Transportation Utilities Co.
Catalogue Section p. 1007; also Fig. 1583.

Union Fibre Co.
Page 1062.

U. S. Metal & Mfg. Co.
Page 1049.

INTERIOR TRIM.

Acme Supply Co.
Catalogue Section pp. 1008-09.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11.

Hale & Kilburn Co.
Catalogue Section pp. 1020-21; also Figs. 1588, 1596, 1597.

Transportation Utilities Co.
Catalogue Section p. 1007.

INTERLOCKING LINK LADDER.

(See Ladders, Freight Car.)

JACKS.

U. S. Metal & Mfg. Co.
Page 1049.

JOURNAL BOXES AND DETAILS.

Brill Co., The J. G.
Page 1034.

Buckeye Steel Castings Co.
Catalogue Section p. 1055; also Fig. 1032.

Chicago Railway Equipment Co.
Page 1047; also Figs. 1024, 1025.

Gould Coupler Co.
Catalogue Section p. 992; also Fig. 1045.

Haskell & Barker Car Co., Inc.
Catalogue Section p. 1036.

McCord & Co.
Page 1068; also Figs. 1052 to 1061A.

National Malleable Castings Co.
Page 1044; also Figs. 1035 to 1041.

Pratt & Letchworth Co.
Catalogue Section p. 1001; also Figs. 1030, 1031.

Scullin Steel Co.
Catalogue Section pp. 996-99; also Fig. 1062.

Standard Car Truck Co.
Catalogue Section p. 1000; also Fig. 1070.

JOURNAL BOX WEDGES.

McCord & Co.
Page 1068; also Fig. 1057.

National Malleable Castings Co.
Page 1044; also Fig. 1042.

KNUCKLES, EMERGENCY.

Q & C Co.
Catalogue Section p. 1012; also Fig. 638.

LABORATORIES, CHEMICAL AND TESTING.

Hunt & Co., Robert W.
Page 1062.

LADDERS, FREIGHT CAR.

Acme Supply Co.
Catalogue Section pp. 1008-09; also Fig. 961.

Transportation Utilities Co.
Catalogue Section p. 1007.

Wine Railway Appliance Co.
Catalogue Section pp. 1014-15; also Figs. 911, 952, 953.

LAMPS AND LANTERNS.

Adams & Westlake Co.
Page 1051; also Figs. 2049; 2069 to 2072.

Dayton Mfg. Co.
Page 1053.

General Electric Co.
Catalogue Section pp. 1018-19.

Howard & Co., James L.
Page 1052.

LAMP JACKS, CAR.

Dayton Mfg. Co.
Page 1053.

Globe Ventilator Co.
Page 1062.

LATHES.

Niles-Bement-Pond Co.
Page 1065.

Pratt & Whitney Co.
Page 1064.

LAVATORY SUPPLIES.

Adams & Westlake Co.
Page 1051; also Figs. 1726 to 1734; 1736, 1738, 1740, 1744, 1745, 1749, 1750, 1760, 1761, 1764.

Dayton Mfg. Co.
Page 1053; also Figs. 1724, 1725, 1737, 1739; 1741 to 1743; 1746, 1751, 1753, 1770.

Howard & Co., James L.
Page 1052; also Figs. 1735, 1747, 1748, 1752, 1768.

Railway Supply & Curtain Co.
Page 1052; also Figs. 1765, 1767.

LOCK NUTS.

American Nut & Bolt Fastener Co.
Page 1056.

Boss Nut Co.
Page 1056; also Fig. 1563.

Columbia Nut & Bolt Co., Inc.
Page 1054; also Figs. 1560, 1561.

Standard Safety Nut Corp.
Catalogue Section p. 1006; also Fig. 1577A.

U. S. Metal & Mfg. Co.
Page 1049.

MACHINE TOOLS.

Niles-Bement-Pond Co.
Page 1065.

Pratt & Whitney Co.
Page 1064.

MACHINES, BORING, DRILLING & TURNING.

Niles-Bement-Pond Co.
Page 1065.

Pratt & Whitney Co.
Page 1064.

MACHINES, GRINDING.

Pratt & Whitney Co.
Page 1064.

MACHINES, MILLING.

Niles-Bement-Pond Co
Page 1065.

Pratt & Whitney Co.
Page 1064.

MOLDINGS, METAL.

Acme Supply Co.
Catalogue Section pp. 1008-09.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11.

Hale & Kilburn Co.
Catalogue Section pp. 1020-21.

McCord Mfg. Co.
Page 1054.

Transportation Utilities Co.
Catalogue Section p. 1007.

MOTORS.

General Electric Co.
Catalogue Section pp. 1018-19.

NUT LOCKS.

American Nut & Bolt Fastener Co.
Page 1056; also Figs. 1573 to 1576.

Boss Nut Co.
Page 1056; also Fig. 1563.

Columbia Nut & Bolt Co., Inc.
Page 1054; also Figs. 1560, 1561.

Standard Safety Nut Corp.
Catalogue Section p. 1006; also Fig. 1577A.

U. S. Metal & Mfg. Co.
Page 1049.

NUTS AND BOLTS.

Columbia Nut & Bolt Co., Inc.
Page 1054.

Standard Safety Nut Corp.
Catalogue Section p. 1006; also Fig. 1577A.

PAINTS.

U. S. Metal & Mfg. Co.
Page 1049.

PINIONS.

U. S. Metal & Mfg. Co.
Page 1049.

PINS, COTTER.

(See Cotter Pins.)

PIPE AND PIPE FITTINGS.

American Car & Foundry Co.
Page 1032.

PLANING MACHINERY.

Niles-Bement-Pond Co.
Page 1065.

PLATFORMS.

(See Buffers and Platforms; also Vestibule and Platform Details.)

PULLEYS, AXLE.

Consolidated Ry. Elec. Ltg. & Equip. Co.
Catalogue Section pp. 982-83; also Figs 2459, 2466.

Electric Storage Battery Co.
Catalogue Section p. 984.

Gould Coupler Co.
Page 1060; also Figs. 2475, 2477.

Gould Storage Battery Co.
Page 1060; (See Gould Coupler Co., figure numbers).

Safety Car Heating & Lighting Co.
Catalogue Section pp. 978-81; also Fig. 2449.

PUNCHES.

Pratt & Whitney Co.
Page 1064.

RANGES, BROILERS & COOKERS.

Adams & Westlake Co.
Page 1051; also Fig. 1723.

Safety Car Heating & Lighting Co.
Catalogue Section pp. 978 to 981; also Figs. 1715 to 1721.

REAMERS.

Pratt & Whitney Co.
Page 1064.

REGULATORS, TEMPERATURE.

Chicago Car Heating Co.
Page 1048.

REGULATORS, VOLTAGE.

Consolidated Ry. Elec. Ltg. & Equip. Co.
Catalogue Section pp. 982-83.

REPLACERS, CAR.

Q & C Co.
Catalogue Section p. 1012; also Fig. 2784.

RESERVOIRS, AIR.

Westinghouse Air Brake Co.
Page 1058.

Westinghouse Traction Brake Co.
Page 1059.

RINGS, ROLLED STEEL.

Standard Steel Works Co.
Catalogue Section pp. 1004-05.

RODS, BOTTOM CONNECTING.

Schaefer Equipment Co.
Page 1046.

ROOFING, CAR.

Haskell & Barker Car Co., Inc.
Page 1036.

Railway Supply & Curtain Co.
Page 1052.

Transportation Utilities Co.
Catalogue Section p. 1007; also Fig. 922A.

U. S. Metal & Mfg. Co.
Page 1049.

SAND BLAST APPARATUS.

U. S. Metal & Mfg. Co.
Page 1049.

SASH LOCKS AND BALANCES.

Acme Supply Co.
Catalogue Section pp. 1008-09.

Adams & Westlake Co.
Page 1051.

Curtain Supply Co.
Page 1052

Dayton Mfg. Co.
Page 1053.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11.

Howard & Co., James L.
Page 1052.

McCord Mfg. Co.
Page 1054.

Railway Supply & Curtain Co.
Page 1052; also Fig. 1990.

Transportation Utilities Co.
Catalogue Section p. 1007; also Figs. 1902, 1904.

SASH, METALLIC.

Edwards Co., Inc., O. M.
Catalogue pp. 1010-11.

McCord Mfg. Co.
Page 1054.

SASH RATCHETS, DECK.

McCord Mfg. Co.
Page 1054.

Railway Supply & Curtain Co.
Page 1052.

Transportation Utilities Co.
Catalogue Section p. 1007; also Fig. 1903.

SEATS, CAR.

(See Car Seats.)

SHAPERS.

Pratt & Whitney Co.
Page 1064.

SHEATHING, METALLIC (STEEL).

Transportation Utilities Co.
Catalogue Section p. 1007; also Fig. 1592.

SHOES, SKID.

Q & C Co.
Catalogue Section p. 1012; also Fig. 2785.

SIDE FRAMES.

Allegheny Steel Co.
Catalogue Section p. 995.

American Steel Foundries.
Catalogue Section pp. 986-87.

Gould Coupler Co.
Catalogue Section p. 992.

Scullin Steel Co.
Catalogue Section pp. 996 to 999.

SLOTTING MACHINERY.

Niles-Bement-Pond Co.
Page 1065.

SPRING DAMPENERS.

McCord & Co.
Page 1068; also Fig. 1181.

SPRING PLANK, EQUALIZED.

Scullin Steel Co.
Catalogue Section pp. 996 to 999.

SPRINGS.

American Steel Foundries.
Catalogue Section pp. 986-87; also Figs. 1169 to 1171; 1184.

Brill Co., The J. G.
Page 1034.

Railway Steel-Spring Co.
Page 1055.

Standard Steel Works Co.
Catalogue Section pp. 1004-05; also Fig. 1179.

STAKE POCKETS.

American Car & Foundry Co.
Page 1032; also Fig. 959.

U. S. Metal & Mfg. Co.
Page 1049; also Fig. 958.

STEPS, CAR (STEEL).

Acme Supply Co.
Catalogue Section pp. 1008-09.

Transportation Utilities Co.
Catalogue Section p. 1007.

STRAIGHTENING MACHINERY.

Niles-Bement-Pond Co.
Page 1065.

STRAINERS.

Chicago Car Heating Co.
Page 1048.

Westinghouse Air Brake Co.
Page 1058.

TAPS.

Pratt & Whitney Co.
Page 1064.

TESTING MATERIAL.

Hunt & Co., Robert W.
Page 1062.

TIRES, STEEL.

Railway Steel-Spring Co.
Page 1055; also Figs. 1189 to 1200.

Standard Steel Works Co.
Catalogue Section pp. 1004-05; also Figs. 1201 to 1212.

TRAP DOORS AND RIGGING.

Barney & Smith Car Co.
Page 1033.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11; also Figs. 551 to 555; 1843 to 1847.

Gould Coupler Co.
Catalogue Section p. 992.

Transportation Utilities Co.
Catalogue Section p. 1007; also Figs. 549, 550, 882.

TRAPS, STEAM.

Chicago Car Heating Co.
Page 1048.

TREADS, CAR STEP.

Acme Supply Co.
Catalogue Section pp. 1008-09; also Figs. 570 to 573.

Transportation Utilities Co.
Catalogue Section p. 1007.

TRUCKS, FREIGHT CAR.

American Car & Foundry Co.
Page 1032.

TRUCKS, FREIGHT CAR—Continued.

American Steel Foundries.
Catalogue Section pp. 986-87; also Figs. 981 to 986.

Barney & Smith Car Co.
Page 1033.

Bettendorf Co.
Page 1043; also Figs. 967 to 971.

Brill Co., The J. G.
Page 1034.

Buckeye Steel Castings Co.
Catalogue Section pp. 988-89; also Fig. 987.

Clark Car Co.
Catalogue Section p. 1016.

Commonwealth Steel Co.
Page 1049.

Gould Coupler Co.
Catalogue Section p. 992; also Figs. 962, 964.

Laconia Car Co.
Page 1037.

Pressed Steel Car Co.
Page 1038; also Figs. 963, 965.

Russel Wheel & Foundry Co.
Page 1042.

Scullin Steel Co.
Catalogue Section pp. 996-99.

Standard Car Truck Co.
Catalogue Section p. 1000; also Figs. 974 to 980.

Standard Steel Car Co.
Page 1041.

TRUCKS, PASSENGER CAR.

American Car & Foundry Co.
Page 1032; also Figs. 1000, 1021.

Brill Co., The J. G.
Page 1034; also Figs. 993, 1017.

Commonwealth Steel Co.
Page 1049; also Figs. 999, 1005, 1008, 1009, 2456.

Harlan & Hollingsworth Corp.
Page 1042; also Figs. 990, 1001 to 1003; 1014 to 1016.

Pressed Steel Car Co.
Page 1038; also Figs. 994, 1018.

Standard Steel Car Co.
Page 1041; also Fig. 1013.

TURBINES, STEAM.

General Electric Co.
Catalogue Section pp. 1018-19.

TURNBUCKLES.

U. S. Metal & Mfg. Co.
Page 1049; also Fig. 1571.

UNDERFRAMES.

American Car & Foundry Co.
Page 1032; also Figs. 434, 436, 441.

Barney & Smith Car Co.
Page 1033; also Fig. 451.

Bettendorf Co.
Page 1043; also Figs. 424, 435; 437 to 439.

Commonwealth Steel Co.
Page 1049; also Figs. 420, 432, 440.

Greenville Steel Car Co.
Page 1040.

Harlan & Hollingsworth Corp.
Page 1042; also Figs. 444, 445.

Haskell & Barker Car Co., Inc.
Page 1036.

Laconia Car Co.
Page 1037.

UNDERFRAMES—Continued.

Pressed Steel Car Co.
Page 1038; also Fig. 433.

Ralston Steel Car Co.
Page 1040; also Figs. 429 to 431; 442.

Western Steel Car & Foundry Co.
Page 1039; also Figs. 423, 443.

UNCOUPLING APPARATUS.

American Steel Foundries.
Catalogue Section pp. 986-87; also Figs. 778-779.

Keyoke Railway Equipment Co.
Catalogue Section p. 993.

UNLOADERS, COKE.

Goodwin Car Co.
Catalogue Section p. 1017.

UPHOLSTERY.

Barney & Smith Car Co.
Page 1033.

Hale & Kilburn Co.
Catalogue Section pp. 1020-21.

Pantasote Co.
Catalogue Section p. 1013.

Scarritt-Comstock Furniture Corp.
Page 1050.

U. S. Metal & Mfg. Co.
Page 1049.

VALVES.

American Car & Foundry Co.
Page 1032; also Fig. 954.

Chicago Car Heating Co.
Page 1048.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11.

Westinghouse Air Brake Co.
Page 1058.

VARNISHES.

U. S. Metal & Mfg. Co.
Page 1049.

VENTILATORS.

Automatic Ventilator Co.
Page 1054; also Figs. 2267 to 2272.

Brill Co., The J. G.
Page 1034.

Globe Ventilator Co.
Page 1062; also Figs. 2273, 2274.

Howard & Co., James L.
Page 1052; also Fig. 2275.

Safety Car Heating & Lighting Co.
Catalogue Section pp. 978 to 981; also Figs. 2276-2277.

VENTILATORS, FREIGHT CAR END.

Wine Railway Appliance Co.
Catalogue Section pp. 1014-15; also Figs. 909 to 911.

VESTIBULES.

Gould Coupler Co.
Catalogue Section p. 992.

VESTIBULE AND PLATFORM DETAILS.

Acme Supply Co.
Catalogue Section pp. 1008-09; also Figs. 536 to 541; 569 to 573; 582 to 585.

Adams & Westlake Co.
Page 1051; also Figs. 576-577; 580-581; 604 to 607; 609 to 612; 614; 616-617; 620-621; 622, 625.

Curtain Supply Co.
Page 1052; also Figs. 542 to 546; 589 to 597; 599-600.

VESTIBULE AND PLATFORM DETAILS—Continued.

Dayton Mfg. Co.
Page 1053; also Figs. 575, 578-579; 598, 608, 615; 618-619; 623-624.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11; also Figs. 551 to 555.

Gould Coupler Co.
Catalogue Section p. 992; also Fig. 532.

Howard & Co., James L.
Page 1052; also Fig. 613.

McConway & Torley Co.
Catalogue Section pp. 990-91; also Figs. 528 to 531.

Miner, W. H.
Page 1031.

Q & C Co.
Catalogue Section p. 1012; also Figs. 547, 548; 588.

Railway Supply & Curtain Co.
Page 1052; also Figs. 586-587.

Transportation Utilities Co.
Catalogue Section p. 1007.

WAINSCOTING.

Pantasote Co.
Catalogue Section p. 1013.

WASHERS.

American Nut & Bolt Fastener Co.
Page 1056.

Camel Co.
Page 1063. Fig. 482.

National Malleable Castings Co.
Page 1044.

Wine Railway Appliance Co.
Catalogue Section pp. 1014-15.

WASHERS, LOCK.

American Nut & Bolt Fastener Co.
Page 1056.

WASHSTANDS.

(See Lavatory Supplies.)

WASTE.

Howard & Co., James L.
Page 1052.

WATER CLOSETS.

(See Hoppers, Flush or Dry.)

WATER COOLERS.

Adams & Westlake Co.
Page 1051.

Dayton Mfg. Co.
Page 1053.

WEATHER STRIPS.

Acme Supply Co.
Catalogue Section pp. 1008-09.

Athey Co.
Page 1054.

Edwards Co., Inc., O. M.
Catalogue Section pp.; 1010-11.

McCord Mfg. Co.
Page 1054.

Railway Supply & Curtain Co.
Page 1052.

Transportation Utilities Co.
Catalogue Section p. 1007; also Fig. 1903A.

WEATHER STRIPS, FREIGHT CARS.

Camel Co.
Page 1063.

WELDING, ELECTRIC ARC.

General Electric Co.
Catalogue Section pp. 1018-19.

WELDING, ELECTRIC ARC—Continued.

U. S. Metal & Mfg. Co.
Page 1049.

WELDING, OXY-ACETYLENE.

Commercial Acetylene Ry. Light & Signal Co., Inc.
Catalogue Section p. 985.

WHEELS.

American Car & Foundry Co.
Page 1032.

American Steel Foundries.
Catalogue Section pp. 986-87; also Fig. 1215.

Barney & Smith Car Co.
Page 1033.

Forged Steel Wheel Co.
Page 1041.

Laconia Car Co.
Page 1037.

Mt. Vernon Car Mfg. Co.
Page 1040.

National Malleable Castings Co.
Page 1044.

Pressed Steel Car Co.
Page 1038.

Railway Steel-Spring Co.
Page 1055; also Figs. 1189 to 1200.

Russel Wheel & Foundry Co.
Page 1042.

Standard Steel Car Co.
Page 1041.

Standard Steel Works Co.
Catalogue Section pp. 1004-05; also Figs. 1201 to 1214.

WINDOWS AND FIXTURES.

Acme Supply Co.
Catalogue Section pp. 1008-09; also Figs. 1894 to 1901; 1973 to 1975.

Adams & Westlake Co.
Page 1051; also Figs. 1885, 1887, 1954; 1959 to 1964; 1966 to 1968; 1971, 1972, 2001.

Curtain Supply Co.
Page 1052; also Figs. 1980, 1982.

Dayton Mfg. Co.
Page 1053; also Figs. 1918; 1921 to 1923; 1955, 1958, 1959, 1969, 1970; 1977 to 1979; 1998, 1999.

Edwards Co., Inc., O. M.
Catalogue Section pp. 1010-11; also Figs. 1926 to 1937.

Howard & Co., James L.
Page 1952; also Figs. 1954, 1956, 1957, 1972.

McCord Mfg. Co.
Page 1054; also Figs. 1938 to 1950; 1952.

Railway Supply & Curtain Co.
Page 1052; also Fig. 1990.

Transportation Utilities Co.
Catalogue Section p. 1007; also Fig. 1903A.

WIRE.

General Electric Co.
Catalogue Section pp. 1018-19.

Kerite Insulated Wire & Cable Co.
Page 1061.

WRENCHES.

National Malleable Castings Co.
Page 1044.

TRADE NAME INDEX

THE BARNEY & SMITH CAR CO.

DAYTON, OHIO

Designers and Builders
All Types of

PASSENGER and FREIGHT CARS
STEEL or WOOD CONSTRUCTION

Extremely Well-Built Cars

Cars that keep straight from end to end after many years in trying climates, cars that have little expense charged against them for maintenance, cars that are giving character and fame to the service of many railways in many countries; these are the cars that come from the splendidly organized plant of Wason Manufacturing Company, a plant with seventy years of continuously successful history back of it and considered today to be one of the best equipped and most progressive concerns for the turning out of especially fine cars for advertised trains and for every kind of standard and special steam railway rolling stock of steel, part-steel or wood.

WASON CARS

THE J. G. BRILL COMPANY

PHILADELPHIA, PA.

CABLE ADDRESS: "BRILL," PHILADELPHIA

LONDON OFFICE: 110 CANNON STREET, E. C.

CABLE ADDRESS: "AXLES," LONDON

American Car Company, St. Louis, Mo. **G. C. Kuhlman Car Company, Cleveland, Ohio**
John Stephenson Company, Elizabeth, N. J. **Compagnie J. G. Brill, Paris, France**
Wason Manufacturing Company, Springfield, Mass.

AGENCIES—AUSTRALASIA—Noyes Brothers, Melbourne, Sidney, Dunedin, Brisbane, Perth. BELGIUM AND HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels. ARGENTINE AND URUGUAY—C. S. Clarke & Co., Calle Bartolome Mitre 478, Buenos Aires. NATAL, TRANSVAAL AND ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal. ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan.

HASKELL & BARKER CAR CO., Inc.

Michigan City, Indiana

BUILDERS OF ALL CLASSES OF FREIGHT EQUIPMENT

Steel underframes for reinforcing old cars a specialty
Special facilities for repairing steel and wooden cars

WE ARE PREPARED TO FURNISH PROMPTLY A COMPLETE LINE OF

- Malleable Castings
- Grey Iron Castings
- Car Forgings
- Misc. Railroad Forgings
- Steel Pressings
- Metal Roofs, Inside and Outside
- Metal Carlines
- Bolsters, Body and Truck
- Draft Gear
- Brake Beams
- Journal Boxes
- Journal Bearings
- Door Fixtures
- Coupler Centering Devices

CHILLED CAR WHEELS, REGULAR AND SPECIAL TYPES

Capacity—One Hundred Cars Per Day

STEAM AND ELECTRIC RAILWAY CARS

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

The Laconia Car Company is fully equipped to build all types of cars for use on either steam or electric railways. Any class of car of either all-steel, composite, or wooden construction can be built to meet the railroad's specifications or, if desired, drawings and specifications, will be prepared by this company.

The four types of cars illustrated clearly indicate the variety of design, both as regards service and size, and the high grade of workmanship.

The mail car shown in Fig. 1 was built for the Boston & Maine and has an over-all length of 64 ft. 5 in. It is an all-steel fireproof car. Its construction fully complies with all the Post Office requirements, both as regards floor plan and strength. Four-wheel all-steel trucks of the Commonwealth type are used. The wheels are steel tired and the axles are M. C. B. standard 5 in. by 9 in.

The steel subway car shown in Fig. 2 was built for the Boston Elevated Railway Company for service in the Cambridge subway. It is 69 ft. in length and of the side truss construction. The three large side doors facilitate loading and unloading, thus reducing the length of time required for each stop. Automatic stops are provided which reduce the possibility of accidents by preventing the car running against signals. Special electric trucks are used with sufficiently powerful motors to provide an average speed of 40 miles an hour.

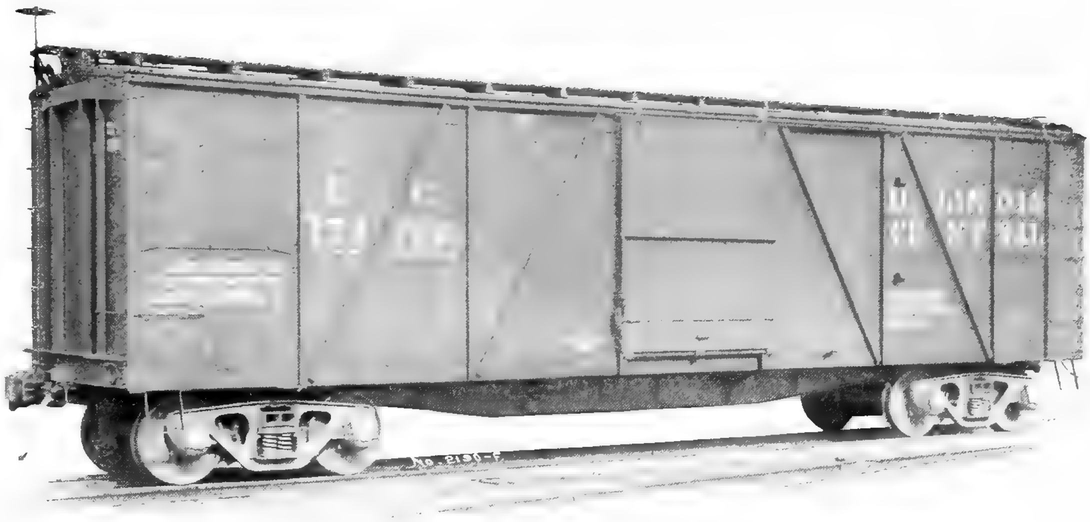
The Maine Central rack car, illustrated in Fig. 3, has a carrying capacity of 40 tons. Its length is 38 ft. 0-¾ in.; width, 8 ft. 6 in.; height, 8 ft. 1 in., and it weighs 42,700 lbs. A steel underframe of the fish-belly type is used, the center sill carrying the load. A special feature of this car is the door arrangement; large sliding doors are provided, thus facilitating the loading of long lengths of timber. Four wheel arch bar trucks with standard 5 in. by 9 in. M. C. B. journals are used.

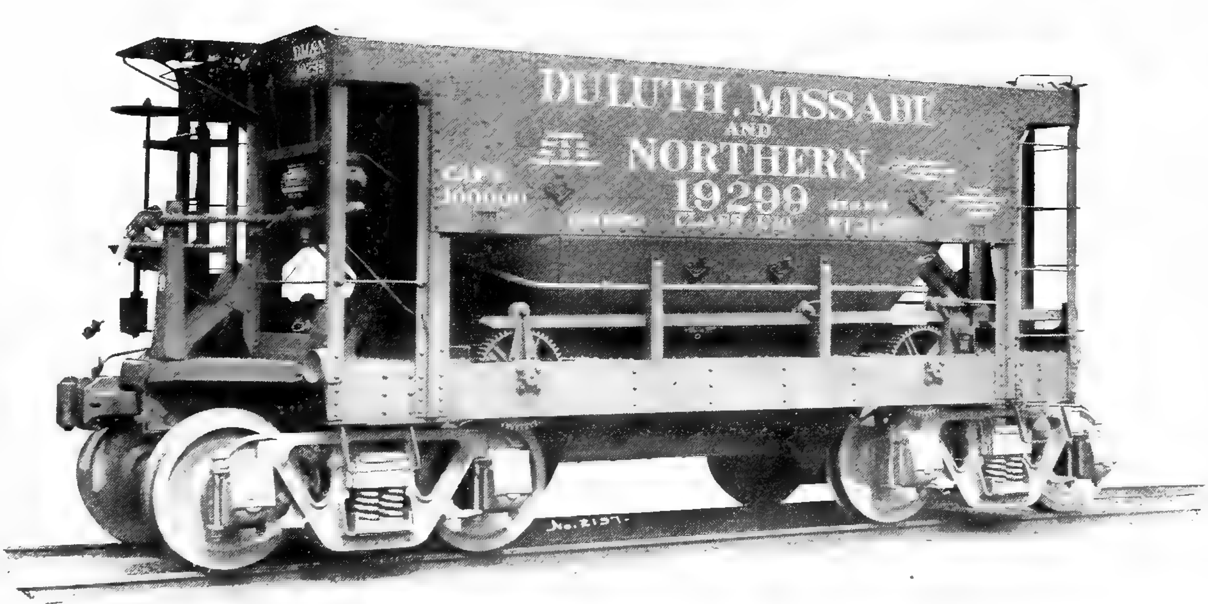
The semi-steel express car shown in Fig. 4 is designed for use on surface street car lines. It is of the steel underframe type with the weight carried on the side sills, which are reinforced by a wide steel plate that also forms a portion of the superstructure. The balance of the superstructure is of wood construction. Special equalized electric trucks are used and the car is equipped with the most modern appliances known to electric railway service.

LACONIA CAR COMPANY

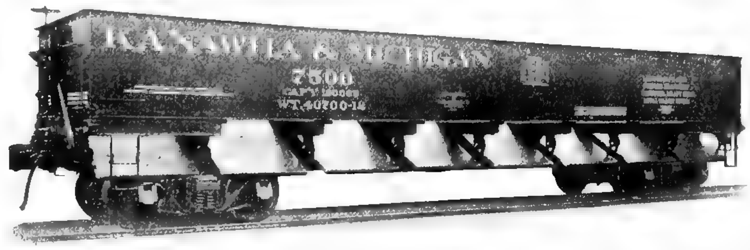
60 Congress Street, Boston, Mass.

Works at Laconia, N. H.




DULUTH, MISSABE
AND
NORTHERN
19299

THE RALSTON STEEL CAR COMPANY



RALSTON GENERAL SERVICE CAR

COLUMBUS, OHIO

Designers and Builders of All Types of

FREIGHT CARS
and
Steel Underframes

MT. VERNON CAR MFG. CO.

MT. VERNON, ILL.

Manufacturers of

Freight Cars of Every Description
Car Wheels, Castings and Forgings

Capacity New Plant
28 Steel Freight Cars
Per Day

Capacity Old Plant
25 Cars, 450 Car Wheels
Per Day

Steel Car Repairs

SPECIALIZING in the repairs of steel cars, we offer unusual facilities for handling steel car repair contracts.

o o o o

The distinguishing feature of our service to the railroads is our ability to turn out work promptly on contract time.

o o o o

With our facilities and equipment we are in a position to furnish railroads, complete **Steel Freight Cars, Steel Underframes, Pressed Steel Repair Parts and Forgings.** Our capacity is fifteen steel freight cars a day.

Quotations and estimates gladly furnished on request.

Greenville Steel Car Co.

Greenville Penn'a

STANDARD STEEL CAR COMPANY

WORKS:

BUTLER, PA. NEW CASTLE, PA. HAMMOND, IND.

OFFICES:

Pittsburgh, Pa.: Frick Bldg. New York: 170 Broadway

Chicago: Fisher Bldg.

Builders of All Types of Steel and Composite Freight Cars
And All Steel Passenger Equipment

Capacity: 60,000 Cars Per Annum

MIDDLETOWN CAR COMPANY

WORKS:

MIDDLETOWN, PA., U. S. A. RIO DE JANEIRO, BRAZIL

OFFICES:

Pittsburgh, Pa.; Frick Bldg. New York: 170 Broadway.

LONDON: Salisbury House, Finsbury Circus.
RIO DE JANEIRO: 107-109 Avenida Rio Branco.
BUENOS AIRES: 46 Reconquista.

Builders of All Types of Freight and Passenger Equipment

EXPORT WORK OUR SPECIALTY

Cable Address: "MIDSTANDUS" PITTSBURGH

FORGED STEEL WHEEL COMPANY

PITTSBURGH, PA.

Manufacturers of

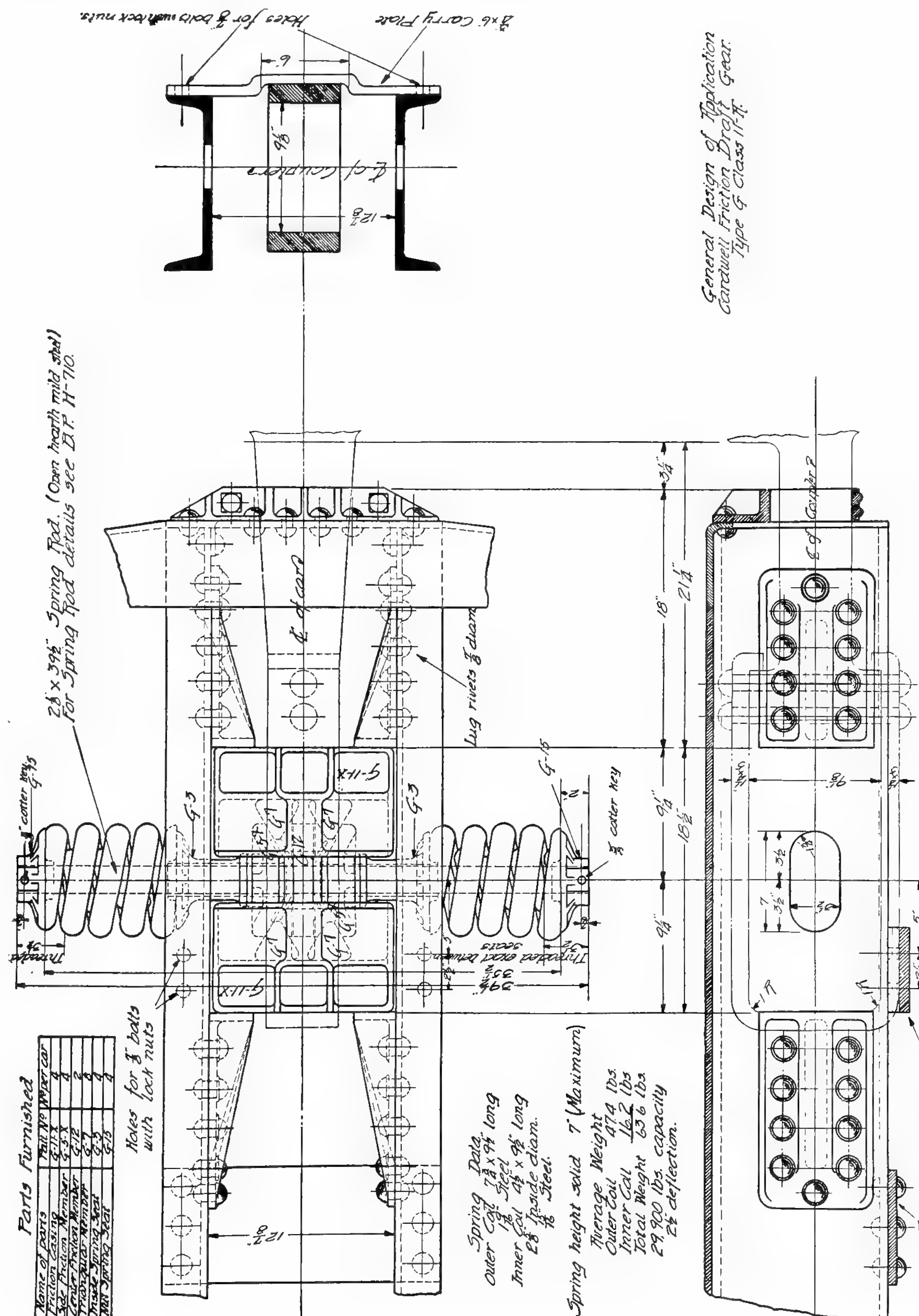
SOLID WROUGHT CARBON STEEL WHEELS

in acordance with

Standard Designs and Standard Specifications

Capacity: 180,000 Wheels Per Annum

Cardwell Friction Draft Gear



Union Draft Gear Co.
McCormick Bldg., Chicago

U. S. Metal & Mfg. Co.

165 Broadway
New York City

Chicago **Atlanta**

Railway Supplies

Selling Agents for

Dunham Hopper Door Device

Feasible Drop Brake Staff

Empire Pressed Steel Truck Bolster

Columbia Lock Nut

Cayuta Car & Locomotive Jacks

C. & C. Electric Arc Welders

Union Fibre Co.'s Lith-Fibrofelt-Linofelt

Anglo-American Varnishes—Shop Cleaner

Injector Sand Blast Apparatus

"Texoderm"

Collapsible Stake Pocket

Chillingworth Seamless Gear Case

Sole Eastern Agents for St. Louis Surfacer and Paint Co.

General Eastern Agents for Hutchins Car Roofing Co.

Special Agents for the Tool Steel Gear & Pinion Co.

Special Agents for C. & C. Electric & Mfg. Co.

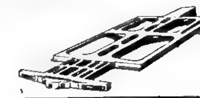
General Eastern Agents of the Union Fibre Co.

Commonwealth Devices

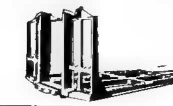
(Patented)

Steel Underframe for Passenger-Train Cars.

Platform Integral with Double Body Bolster

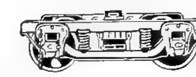


Upright End-Frame for Passenger-Train Cars

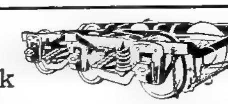


Double Body Bolster for Passenger-Train Cars

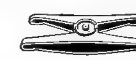
Four-Wheel Passenger Truck



Six-Wheel Passenger Truck



Double Truck Center Bolster

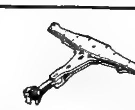


Adjustable Chafing Plate for Passenger Trucks

End Sill for Passenger Cars

Needle Beams for Passenger and Freight Cars

Commonwealth Transom Draft Gear for Freight Cars

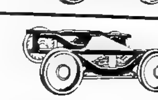


Separable Body Bolster for Freight Cars

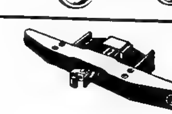
Flory Carry Iron and Striking Plate

Tender Trucks

Engine Trucks

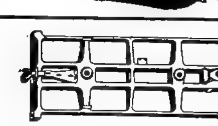


Pilot Beams and Tender Bumpers



K. W. Trailer Trucks

One-Piece Tender Frame

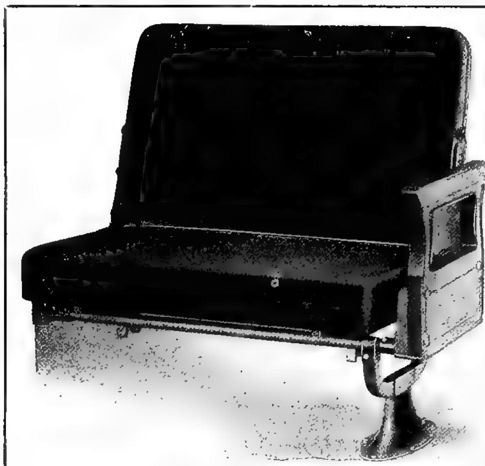


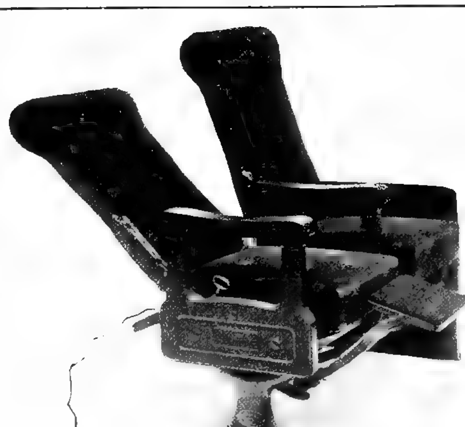
Cast Steel Pilots

And Other Excellent Devices

COMMONWEALTH STEEL COMPANY

St Louis, Mo.





These Bulletins on
Adlake Car Equipment
are part of our regular service

They are issued to cover new appliances, and are sent to you on request

White Ajax Metal Washstands and Trimmings (Bulletin A-14)

Made of solid white metal; will not tarnish; easy to keep clean and sanitary; lever faucets and lever drains assure control of water flow and ease of maintenance.

Unity Electric Lighting Fixtures (Bulletin A-16)

Each fixture cast in one piece from base to reflector; reflectors scientifically designed to give maximum amount of light.

Adlake—Small Train Indicating Lamp for Caboose (Bulletin B-3)

Shows number of train clearly, making quick identification possible; used on front and rear of caboose cupola; plainly visible before and after passing of train.

Adlake Continuous Rod Bottom Basket Rack (Bulletin C-4)

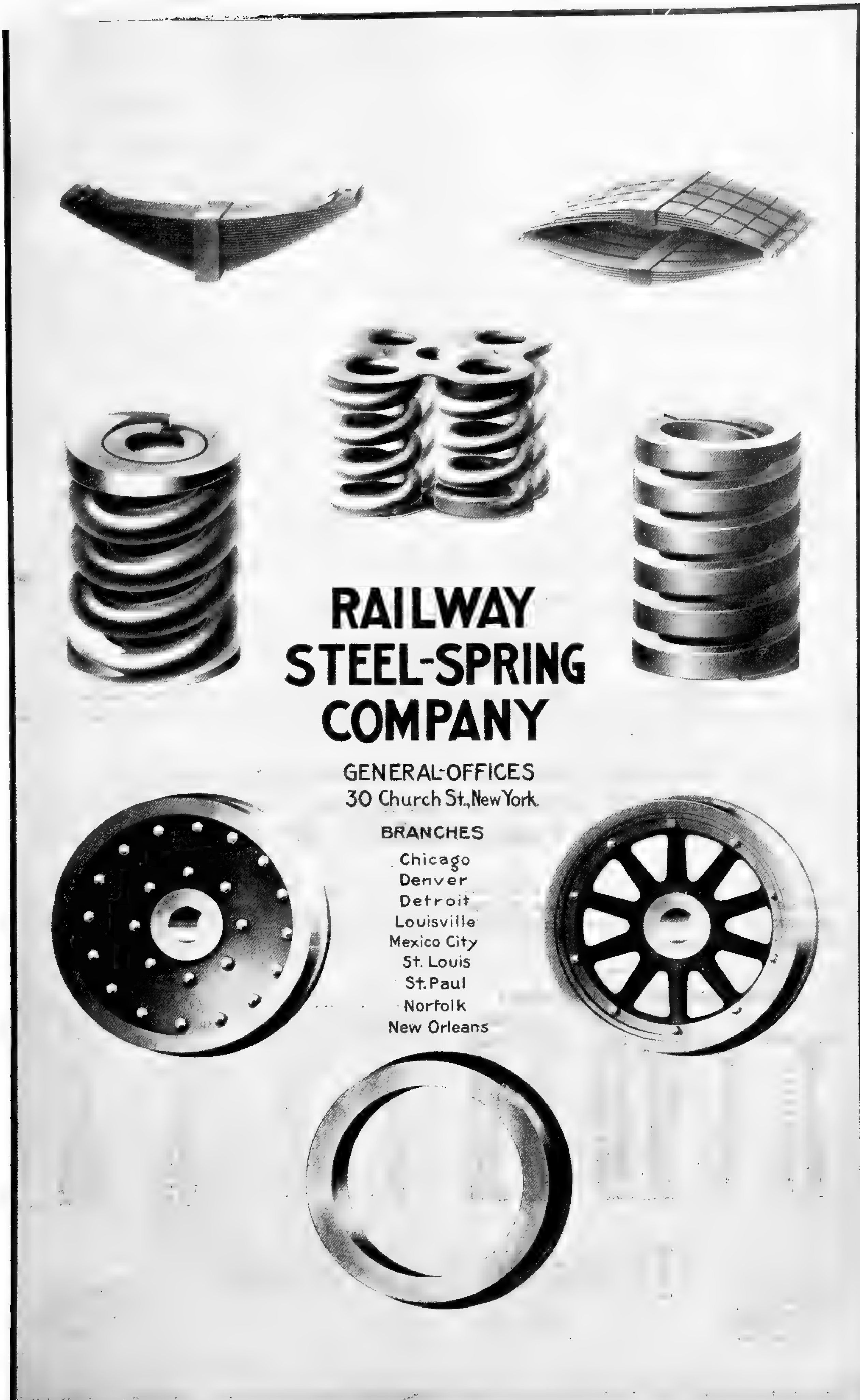
Double the capacity of individual racks; wide enough to hold all baggage and bundles, thus preventing luggage from being placed in aisles and obstructing them.

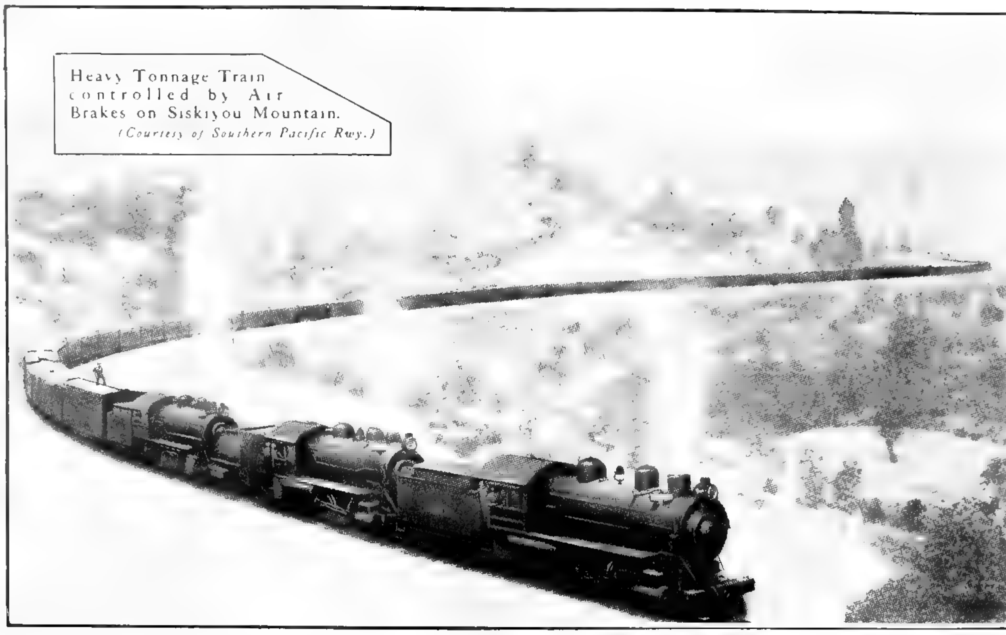
The Adams & Westlake Company

319 West Ontario Street

Chicago, Ill.

U. S. A.


RAILWAY
STEEL-SPRING
COMPANY
GENERAL-OFFICES
30 Church St., New York.
BRANCHES
Chicago
Denver
Detroit
Louisville
Mexico City
St. Louis
St. Paul
Norfolk
New Orleans



The Air Brake: Revenue Earner

While the Air Brake is primarily a safety device it is also a revenue earner.

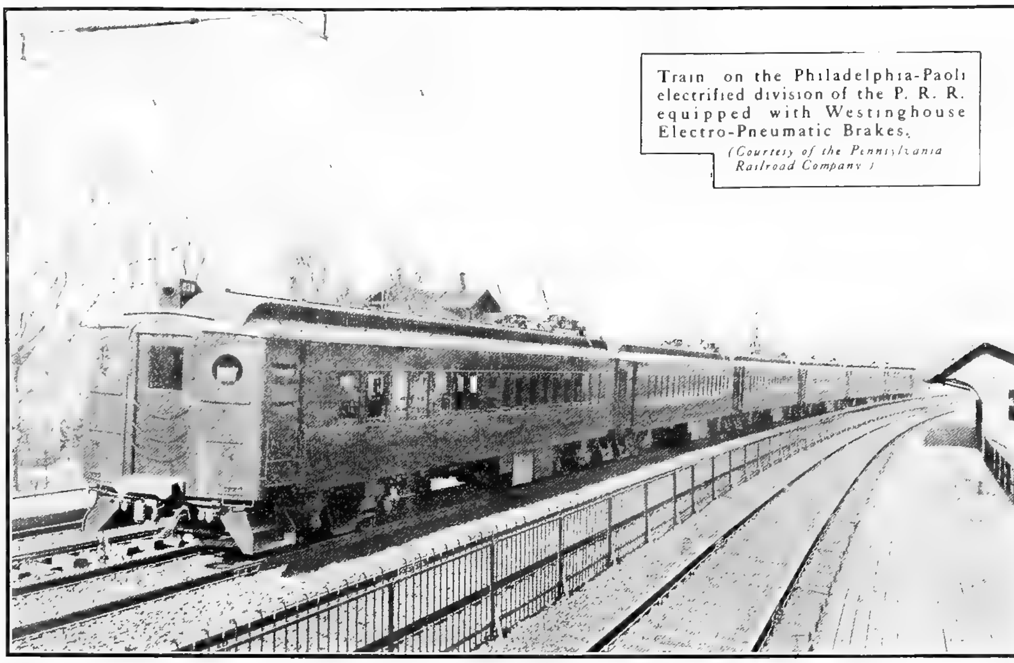
In the above illustration the pull of six powerful locomotives overcomes the retarding force of gravity and raises the heavy tonnage train from the valleys below to the crest of the mountain range, thereby performing work which establishes the locomotive as a revenue earner.

This done, the work of handling the train down the grade on the opposite side of the mountain is taken over by the Air Brake. The control of the accelerating force of gravity under these conditions contributes as much to traffic movement as the six locomotives and in equal measure establishes the Air Brake as a revenue earner.

TRADE MARK

Westinghouse Air Brake Co.

Wilmerding, Pa.



Train on the Philadelphia-Paoli electrified division of the P. R. R. equipped with Westinghouse Electro-Pneumatic Brakes.
(Courtesy of the Pennsylvania Railroad Company.)

A Suitable Brake for Each Class of Electric Railway Service

Westinghouse Straight Air Brake for slow-moving cars.

Westinghouse "Featherweight" Straight Air Brake with Emergency Feature for single motor car, or two-car (motor and trailer) train in city and suburban service where moderate speeds prevail.

Westinghouse Quick Recharge, Quick Service, Graduated Release, Straight Air Feature, High-Pressure Emergency, Automatic Brake for electric trains of two to five cars for suburban and interurban high speed service.

Westinghouse Quick Action, Quick Recharge, Quick Service, Graduated Release, Automatic Brake for trains of five to ten cars in high speed electric railway service.

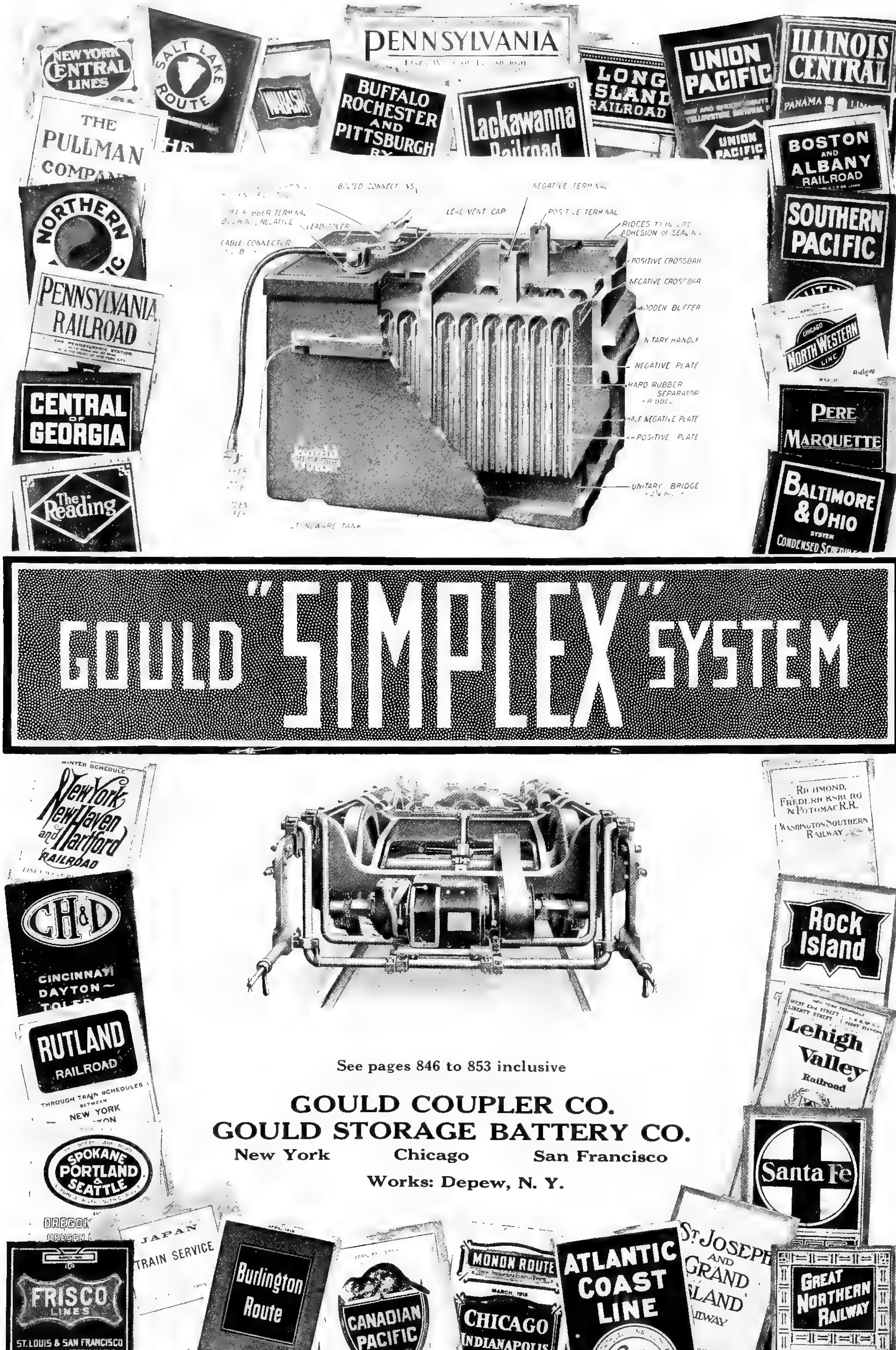
Westinghouse Electro - Pneumatic, Instant - Acting, High - Pressure Emergency, Automatic Brake for elevated, subway and high speed electric surface lines, also for electrified divisions of steam railways.

Westinghouse Variable-Load Brake for all heavy Electric Traction Service.

Our field corps of Engineers and Inspectors is made up of "firing line" specialists, trained with reference to all Air Brake Problems of Operation and Maintenance. These Experts are at your service.

Westinghouse Traction Brake Company

Wilmerding, Pa.


PENNSYLVANIA
NEW YORK CENTRAL LINES
SALT LAKE ROUTE
WABASH
BUFFALO ROCHESTER AND PITTSBURGH
Lackawanna
LONG ISLAND RAILROAD
UNION PACIFIC
ILLINOIS CENTRAL
THE PULLMAN COMPANY
BOSTON AND ALBANY RAILROAD
NORTHERN
SOUTHERN PACIFIC
PENNSYLVANIA RAILROAD
NORTH WESTERN LINE
CENTRAL OF GEORGIA
PERE MARQUETTE
The Reading
BALTIMORE & OHIO SYSTEM
LEAD VENT CAP
NEGATIVE TERMINAL
POSITIVE CROSSBAR
NEGATIVE CROSSBAR
WOODEN BUFFER
NEGATIVE PLATE
POSITIVE PLATE
UNITARY BRIDGE
GOULD "SIMPLEX" SYSTEM
New York New Haven and Hartford Railroad
Richmond, Fredericksburg & Potomac R.R.
Washington Southern Railway
CH&D
CINCINNATI DAYTON
Rock Island
RUTLAND RAILROAD
THROUGH TRAIN SCHEDULES BETWEEN NEW YORK
Lehigh Valley Railroad
SPOKANE PORTLAND & SEATTLE
Santa Fe
See pages 846 to 853 inclusive
GOULD COUPLER CO.
GOULD STORAGE BATTERY CO.
New York Chicago San Francisco
Works: Depew, N. Y.
JAPAN TRAIN SERVICE
FRISCO LINES
ST. LOUIS & SAN FRANCISCO
CHICAGO & EASTERN ILLINOIS
Burlington Route
CANADIAN PACIFIC
MONON ROUTE
CHICAGO INDIANAPOLIS
ATLANTIC COAST LINE
ST. JOSEPH AND GRAND ISLAND
GREAT NORTHERN RAILWAY